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2012 Photonics West®

21–26 January 2012

Register Today
spie.org/pwadvance

Biomedical optics and industrial applications of optoelectronics, lasers, and micro/nanophotonics

Location
The Moscone Center
San Francisco, California, USA

Conference dates
21–26 January 2012

Exhibition dates
BiOS Expo:
21–22 January
Photonics West:
24–26 January

Technologies
- BiOS–Biomedical Optics
- OPTO–Integrated Optoelectronics
- LASE–Lasers and Applications
- MOEMS-MEMS–Micro & Nanofabrication
- Green Photonics

This program is current as of **12 September 2011**
See latest updates online

Registration fees increase after **6 January 2012**

Secure your housing by **19 December 2011** to get best rates and selection

SPIE Photonics West

Conferences and Courses: 21–26 January 2012
BiOS Exhibition: 21–22 January 2012
Photonics West Exhibition: 24–26 January 2012
The Moscone Center · San Francisco, California, USA

Everything you need to know about the meeting, The Moscone Center, and San Francisco is online

- **Up-to-date paper listings and session times**
- **Exhibiting companies and activity on the show floor**
- **Hotel, travel, and complete registration information**
- **Information on driving and parking during exhibition days**
- **Schedule your week: MySchedule Tool and smart phone apps**
- **Information about local travel options**

Authors and Presenters

- Find full instructions for a successful presentation at SPIE Photonics West—oral and poster.
- Find full instructions for successful manuscript preparation.

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Online Info

2012 PhotonicsWest

This program is current as of 12 Sept. 2011. For latest updates: spie.org/pwadvance

BiOS | LASE | MOEMS-MEMS | OPTO

Attend the world's largest photonics and laser event

The conference and marketplace for the photonics, biophotonics, and laser industry

- 19,000 Attendees
- 1,150 Exhibitors
- 4,200 Papers
- 65 Courses

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BiOS
SPIE Photonics West

Symposium Chairs

James Fujimoto
Massachusetts Institute of Technology (USA)

R. Rox Anderson M.D.
Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard School of Medicine (USA)

Photonic Therapeutics and Diagnostics

Program Chair: **Brian Jet-Fei Wong,** Beckman Laser Institute and Medical Clinic, Univ. of California, Irvine (USA)

Clinical Technologies and Systems

Program Chairs: **Tuan Vo-Dinh,** Duke Univ. (USA) and **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA)

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Program Chairs: **Steven L. Jacques,** Oregon Health & Science Univ. (USA) and **William P. Roach,** U.S. Air Force (USA)

Biomedical Spectroscopy, Microscopy, and Imaging

Program Chairs: **Ammasi Periasamy,** Univ. of Virginia (USA) and **Daniel L. Farkas,** Cedars-Sinai Medical Ctr. (USA)

Nano/Biophotonics

Program Chairs: **Paras Prasad,** SUNY/Buffalo (USA) and **Dan V. Nicolau,** The Univ. of Liverpool (United Kingdom)

This program is current as of 12 September 2011 Online Info

LASE

SPIE Photonics West

Symposium Chairs

Friedhelm Dorsch
TRUMPF Werkzeugmaschinen GmbH + Co. KG (Germany)

Alberto Piqué
U.S. Naval Research Lab. (USA)

Symposium Co-chairs

Bo Gu
IPG Photonics Corp. (China)

Andreas Tünnermann,
Friedrich-Schiller-Univ. Jena (Germany)

Laser Source Engineering

Program Chair: **Gregory J. Quarles,** B.E. Meyers & Co., Inc. (USA)

Nonlinear Optics

Semiconductor Lasers and LEDs

Program Chair: **Klaus P. Streubel,** OSRAM GmbH (Germany)

Laser Micro-/Nanoengineering

Program Chairs: **Henry Helvajian,** The Aerospace Corp. (USA) and **James S. Horwitz,** U.S. Dept. of Energy (USA)

Laser Applications

MOEMS-MEMS

SPIE Photonics West

Symposium Chair

Harald Schenk
Fraunhofer Institute for Photonic Microsystems (Germany)

Symposium Cochair

David L. Dickensheets
Montana State Univ. (USA)

Micro/Nanofabrication

Devices/Applications/Reliability

OPTO

SPIE Photonics West

Symposium Chair

Klaus P. Streubel
OSRAM GmbH (Germany)

Symposium Co-chairs

David L. Andrews
Univ. of East Anglia Norwich (United Kingdom)

Liang-Chy Chien
Kent State Univ. (USA)

Optoelectronic Materials and Devices

Program Chair: **James G. Grote,** Air Force Research Lab. (USA)

Photonic Integration

Program Chair: **Yakov Sidorin,** Quarles Brady LLP (USA)

Nanotechnologies in Photonics

Program Chair: **Ali Adibi,** Georgia Institute of Technology (USA)

Advanced Quantum and Optoelectronic Applications

Program Chair: **Zameer Ul Hasan,** Temple Univ. (USA)

Semiconductor Lasers and LEDs

Program Chair: **Klaus P. Streubel,** OSRAM GmbH (Germany)

Displays and Holography

Program Chair: **Liang-Chy Chien,** Kent State Univ. (USA)

Optical Communications: Devices to Systems

Program Chair: **Benjamin Dingel,** Nasfine Photonics, Inc. (USA)

GREEN PHOTONICS

Symposium Chair

Stephen J. Eglash
Precourt Institute for Energy, Stanford Univ. (USA)

Be part of the SPIE Green Photonics "Virtual" Conference

Energy, sustainability, and conservation are inherently interdisciplinary. With over 50 papers, the Green Photonics virtual symposium brings together the latest research in a broad range of photonics applications across Photonics West.

Virtual Program on Green Photonics

Green Photonics Awards

Awards in each of the four areas will be presented at the OPTO Plenary Session on Tuesday morning, and the LASE Plenary Session on Wednesday morning.

Awards presented at the OPTO Plenary Session:

- Green Photonics Award for Solid State Lighting/Displays
- Green Photonics Award for Optical Communications Research
- Green Photonics Award for Renewable Energy Generation: Fusion and Photovoltaics

Award presented at the LASE Plenary Session:

- Green Photonics Award for Laser-assisted Manufacturing or Micro/Nano Fabrication

Get the training you need to stay competitive in today's job market:

Courses at SPIE Events offer an engaging experience for those who prefer face-to-face instruction, where interaction with the instructor and sharing information with other students provide increased value.

- 65 courses and workshops to choose from
- Learn from the best instructors in the industry
- SPIE Student Members get 50% off courses

Biomedical Spectroscopy, Microscopy, and Imaging

Clinical Technologies and Systems

Displays and Holography

Laser Applications

Laser Micro-/Nanoengineering

Laser Source Engineering

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Optics and Optical Engineering

Optoelectronic Materials and Devices

Optomechanics

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Semiconductor Lasers and LEDs

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

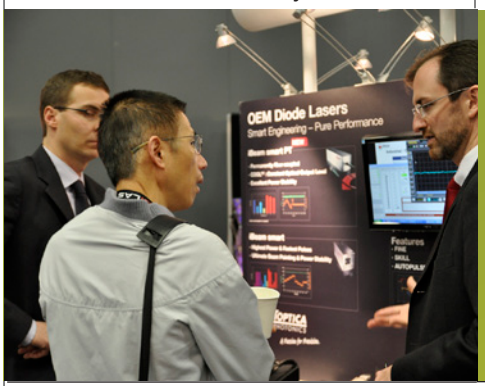
Industry Workshops

Business & Intellectual Property

Fundamental Optics

Professional Development Workshops

Special Events Daily Schedule

Saturday	Sunday	Monday
21 January	22 January	23 January
	**SPIE BiOS EXPO** **The world's largest biophotonics and biomedical optics show** **Exhibition Dates and Hours:** Saturday 21 January . . 12:00 pm to 5:00 pm Sunday 22 January. . . . 10:00 am to 5:00 pm	**MOEMS-MEMS PLENARY SESSION**, 9:00 am to 12:00 noon, p. 18 • Welcome and Announcement of MOEMS-MEMS Best Paper Award and Best Student Paper Award *(Schenk, Dickensheets)* • Large-Scale Integration of Nanosystems *(Roukes)* • Powering the Wireless World with MEMS *(Schaevitz)* • New Optical, Acoustic, and Electrical Technologies for Developing World Diagnostics *(Cooper)*
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SPIE Photonics West Welcome Reception

Monday 24 January
7:00 to 8:30 pm

"The Art of Optics"

Enjoy a night of photonics-inspired art, conversations with your colleagues, and food tasting from around the world. Please remember to wear your conference registration badges. Dress is casual.

Tuesday

24 January

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- Announcement of the Green Photonics Awards *(Eglash)*
- Spinoptics: Spin Degeneracy Removal in Nanostructures *(Hasman)*
- High-Contrast Metastructures for Integrated Optics *(Chang-Hasnain)*
- Engaging Spins in Semiconductors for Quantum Information Processing *(Awschalom)*

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INDUSTRY WORKSHOP: **Critical Skills for Compelling Research Proposals** *(Diehl)* 1:30 to 5:30 pm, p. 25

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- **Diagnostic Opportunities for Nonlinear Optical Microscopy** *(Anderson)* 3:30 to 4:30 pm

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IBOS—International Biomedical Optics Society, 7:30 to 9:00 pm *(Barton, Wang),* p. 14

TECHNICAL EVENT: **Holography** *(Bjelkhagen)*, 7:30 to 9:00 pm, p. 21

TECHNICAL EVENT: **Workshop on The Nature of Light: What Are Photons?** *(Roychoudhuri)*, 7:30 to 9:00 pm, p. 21

SPIE Member Reception, 8:00 to 9:30 pm, p. 30

Wednesday

25 January

SPIE Photonics West Exhibition

Walk the floor of the world's premier lasers and photonics marketplace

Exhibition Dates and Hours:

Tuesday 24 January . . . . . 10:00 am to 5:00 pm

Wednesday 25 January . . . 10:00 am to 5:00 pm

Thursday 26 January . . . . . 10:00 am to 4:00 pm

Best Student Paper Competition and Ceremony, Frontiers in Ultrafast Optics: Biomedical, Scientific and Industrial Applications XII (Conf. 8247), p. 17
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PROFESSIONAL DEVELOPMENT WORKSHOP: **The Craft of Scientific Presentations: A Workshop on Technical Presentations** *(Alley)*, 8:30 am to 12:30 pm, p. 27

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- Announcement of the Green Photonics Awards *(Eglash)*
- Plasmonics for Beam Shaping and Wavefront Engineering *(Capasso)*
- The National Ignition Facility and Progress Towards Inertial Fusion Ignition *(Moses)*
- Successful Technology Approach for Lasers in Manufacturing *(Leibinger)*

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- **Executive Perspectives on the World of Optics and Photonics** *(Hausken)* 2:00 to 3:00 pm
- **Photonics for Energy and the Environment: an Industry Perspective** *(Eglash)* 3:30 to 4:30 pm

OPTO Start-up Challenge. Does your research project have commercial potential? Can you convience others? p. 30

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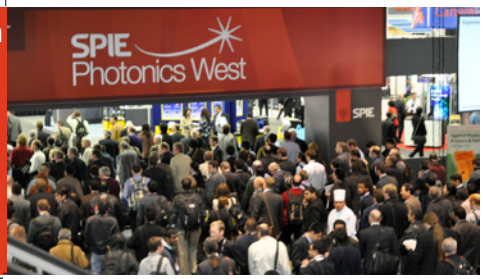
Top employers are coming together to interview and hire candidates at SPIE Photonics West. See p. 12

Tuesday 24 January · 10:00 am to 5:00 pm **Wednesday 25 January · 10:00 am to 5:00 pm**

Thursday

26 January



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Award Ceremony, 5:40 to 5:50 pm

Job Fair

Two Days Only

The Moscone Center

Tuesday 24 January · 10:00 am to 5:00 pm

Wednesday 25 January · 10:00 am to 5:00 pm

Top employers are coming together to interview and hire candidates at Photonics West!

Whether you're looking for a better job, re-entering the workforce or just starting your career, plan to visit the Job Fair at Photonics West–come prepared to discuss your skills and talents with our industries leaders.

- Discuss career options with employers
- Build your network
- Gain visibility with hiring companies
- Post your resume today! Visit the Career Center on spie.org/careercenter

All SPIEWorks services are free to individuals seeking employment.

Employers

Don't Miss This Recruiting Opportunity—hire top talent at Photonics West!

Over the years SPIE has worked with more than 3,000 companies, recruiters and research institutions to help them find technicians, technical sales people, scientists and engineers. Each year hundreds of companies and research institutions participate in SPIE Job Fairs, onsite and online.

If your company is interested in recruiting at Photonics West, contact Sara Liebert for more information. Call 360.715.3705 or email jobsales@spie.org to reserve your space today!

BiOS Special Events

BiOS
SPIE Photonics West

HOT TOPICS

Saturday 21 January
7:00 to 9:00 pm

Hear the latest technical breakthroughs and directions from leading worldwide experts. Access to the BiOS Hot Topics and the "Nano/Biophotonics Plenary Session is included with your registration.

Welcome and Introduction

James Fujimoto
Massachusetts Institute of Technology (USA)
BiOS 2011 Symposium Chair

R. Rox Anderson M.D.
Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard School of Medicine (USA)
BiOS 2011 Symposium Chair

Presentation of Britton Chance Award

Hot Topics Moderator

Sergio Fantini
Tufts Univ. (USA)

Photovoltaic Retinal Prosthesis for Restoring Sight to the Blind

Daniel Palanker
Stanford Univ. (USA))

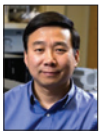
Emerging Applications for Optical Coherence Tomography in the Head, Neck, and Upper Airway

Brian J. Wong
Beckman Laser Institute and Medical Clinic (USA)

Early Cancer Detection with Coherence Imaging

Adam Wax
Duke Univ. (USA)

Scanning Fiber Optic Nonlinear Endomicroscopy



Xingde Li
Johns Hopkins Univ. (USA)

Coherence Imaging of Cancer with Novel Optical Sources

Stephen Boppart
Univ. of Illinois/Urbana-Champagne (USA)

Advances in Fluorescence and Opto-acoustic Imaging

Vasilis Ntziachristos
Technical Univ. Munich (Germany)

In-vivo Microscopy: a New Window on the Brain

Elizabeth Hillman
Columbia Univ. (USA)

Bio Laser

Seok Hyun Yun
Harvard Univ./ Massachusetts General Hospital (USA))

BiOS Special Events

NANO/BIOPHOTONICS PROGRAM TRACK PLENARY SESSION

Single-molecule active control microscopy for nanoscale 3D cell images

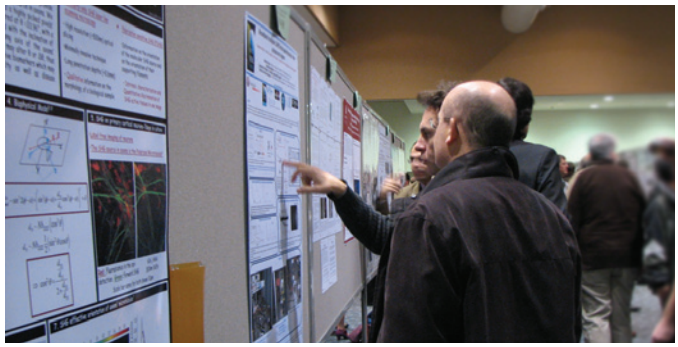
Tuesday 24 January · 1:30 to 2:30 pm

Session Chair: **Dan Nicolau,**
Univ. of Liverpool (United Kingdom)

W.E. Moerner, Stanford Univ.

Single-molecule fluorescence imaging enables biophysical measurements in cells without ensemble averaging, but also yields enhanced spatial resolution surpassing the diffraction limit (super-resolution) when combined with active control of the single emitters to maintain sparse concentrations. Using photo-induced blinking and/or photoswitching/photoactivation of fluorescent proteins, a variety of cellular superstructures have been imaged with sub-40 nm resolution. Several approaches lead to 3D imaging; the double-helix point spread function enables quantitative tracking of single mRNA particles in living yeast cells as well as 3D images in bacterial and eukaryotic cells with relatively uniform localization precision over a large depth-of-field (microns).

W. E. Moerner, the Harry S. Mosher Professor of Chemistry and professor, by courtesy, of Applied Physics, conducts research in physical chemistry of single molecules, biophysics, nanoparticle trapping, and nanophotonics. He earned three bachelor's degrees from Washington University in 1975 and master's and doctoral degrees from Cornell University in 1978 and 1982. From 1981 to 1995, he was a research staff member at IBM, receiving two IBM Outstanding Technical Achievement Awards. Moerner was Guest Professor of Physical Chemistry at the Swiss Federal Institute of Technology from 1993 to 1994 and Professor and Distinguished Chair in Physical Chemistry at the University of California-San Diego from 1995 to 1998, the year he joined the Stanford faculty. He spent time as the Robert B. Woodward Visiting Professor at Harvard University in 1997-1998. He was elected Fellow of the American Physical Society in 1992 and received the society's Earle K. Plyler Prize for Molecular Spectroscopy in 2001 and the Irving Langmuir Prize in Chemical Physics in 2009. His other elected fellowships include the Optical Society of America, the American Academy of Arts and Sciences, the Australian Academy of Sciences and the American Association for the Advancement of Science. He is a Member of the National Academy of Sciences, and co-recipient of the Wolf Prize in Chemistry (with Allen Bard) in 2008.



BiOS Interactive Poster Sessions

Saturday 21 January . . . . . 3:00 to 4:00 pm
Sunday 22 January . . . . . 3:00 to 4:00 pm
Sunday 22 January . . . . . 5:30 to 7:30 pm
Monday 23 January . . . . . 5:30 to 7:30 pm
Wednesday 25 January (with OPTO) . . . . . 6:00 to 8:00 pm

Conference attendees are invited to attend the BiOS poster sessions throughout the week. Come view the posters, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Please see individual conference programs for poster session timing. Attendees are required to wear their conference registration badges to the poster sessions.

IBOS—International Biomedical Optics Society

Tuesday 24 January · 7:30 to 9:00 pm

Chairs: **Jennifer K. Barton,** The Univ. of Arizona (USA);
Lihong V. Wang, Washington Univ. in St. Louis (USA)

Biomedical optics is a major growth area in modern medicine. The International Biomedical Optics Society is a nonprofit interdisciplinary group that provides a unique channel for communications among physicians and clinicians employing optics in medicine and the scientists and engineers who provide foundations for advancements in this field. The BiOS symposium, where IBOS meets, is the premier annual international forum for discussions and announcements of technical/clinical and educational/pedagogical developments in the use of lasers, optical fibers, spectroscopic diagnostic techniques, and related areas of optical medicine.

The 2012 program will include speaker:

Charles Lin
Wellman Center for Photomedicine, Harvard Medical School, and Massachusetts General Hospital (USA)

Optical imaging techniques for in vivo cell tracking and molecular imaging

All registered conference participants are encouraged to attend this evening session. Attendees are requested to wear their conference badges.

PicoQuant Young Investigator Award

Single Molecule Spectroscopy and Imaging V (Conf. 8228)

Sunday 22 January
5:35 to 5:45 pm

We are pleased to announce that a prize will be awarded to the best oral presentation by a presenter under the age of 35 within Conference 8228:Single Molecule Spectroscopy and Imaging V. Participants must be both the primary author and presenter of an accepted abstract to be eligible.

Prize donated by **PicoQuant GmbH Berlin** (Germany).

Pascal Rol Award 2011

Ophthalmic Technologies XXII (Conf. 8209)

Sunday 23 January
5:45 to 6:00 pm

Outstanding extended abstracts submitted to the Ophthalmic Technologies XXII conference will be nominated for the Pascal Rol Award for Best Paper in Ophthalmic Technologies. The award and prize will be presented after the last scientific session of the conference to recognize the best paper and presentation. The 2011 recipient of the Pascal Rol Award was Dr. James Loudin from Stanford University.
(see www.pascalrolfoundation.org).

JenLab Young Investigator Award

Multiphoton Microscopy in the Biomedical Sciences XII (Conf. 8226)

Monday 24 January
3:05 to 3:15 pm

We encourage graduate students, postdocs, or scientists who are not more than 32 years old to apply for the Jen Lab Young Investigator Award. To receive this $2000 cash award, participants must 1) be both the primary author and presenter of an accepted abstract, and 2) the associated proceedings paper must be submitted at least 2 weeks prior to the meeting start dates for review by the selection committee.

Prize donated by **Jen Lab GmbH** (Germany).

Student Poster Session Competition

Multiphoton Microscopy in the Biomedical Sciences XII (Conf. 8226)

Monday 24 January
3:05 to 3:15 pm

Graduate Students and postdoctoral fellows with accepted posters can participate in the poster session competition of the conference on Multiphoton Microscopy in the Biomedical Sciences. There is a cash award for the winner(s). The participants should mention that their submission is for the "Students Poster Session Competition (SPSCMP)." The participants should follow the rules and regulations of SPIE for submission of their abstract and manuscript.

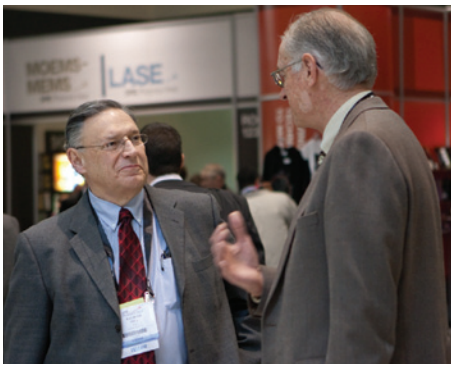
Seno Medical Best Paper Awards

Photons Plus Ultrasound: Imaging and Sensing 2012 (Conf. 8223)

Tuesday 24 January
5:15 to 5:30 pm

Seno Medical will sponsor two awards for this conference: best paper and best poster presented. Authors: to compete for these awards, please e-mail a 3-page summary of your accepted paper, along with the abstract, to the conference Chairs by 16 January 2012 (Alexander Oraevsky: aao@tomowave.com and Lihong Wang: lhwang@wustl.edu).

Prize donated by **Seno Medical** (USA).



LASE
SPIE Photonics West

LASE PLENARY SESSION

Wednesday 25 January
10:20 am to 12:30 pm

Welcome and Opening Remarks

Session Chairs:

Friedhelm Dorsch,
TRUMPF GmbH & Co. KG (Germany)

Alberto Piqué
U.S. Naval Research Lab. (USA)

Announcement of the Green Photonics Award

Stephen J. Eglash
Precourt Institute for Energy, Stanford Univ. (USA)

Plasmonics for Beam Shaping and Wavefront Engineering

Federico Capasso
Harvard Univ. (USA)

Coupled photon-electron oscillations in sub-wavelength metallic structures known as surface plasmons not only enable the manipulation and concentration of light at the nanoscale, leading important near-field applications but also offer unique opportunities to mold light propagation by shaping wavefronts and polarization with unprecedented flexibility. Plasmonic collimators have been successfully used to dramatically reduce beam divergence in mid-ir and THz lasers and to achieve multidirectional/multi-wavelength laser beams. Designer plasmonic interfaces have been used to alter in fundamental ways light propagation by introducing phase discontinuities that generate anomalously reflected and refracted beams leading, to a powerful generalization of the centuries old laws of reflection and refraction, from which new optical components will emerge.

Federico Capasso is the Robert Wallace Professor of Applied Physics at Harvard University, which he joined in 2003 after a 27 years career at Bell Labs where he rose from postdoc to VP of Physical Research. His research has spanned a broad range of topics in the areas of solid-state electronics, photonics, QED and nanotechnology. He is a co-inventor of the quantum cascade laser.

The National Ignition Facility and Progress Towards Inertial Fusion Ignition

Edward I. Moses
Lawrence Livermore National Lab. (USA)

The National Ignition Facility (NIF), built for studying inertial confinement fusion (ICF) and high-energy-density (HED) science, is operational and conducting experiments at Lawrence Livermore National Laboratory (LLNL). A primary goal of the current experimental campaign is to create the conditions necessary to demonstrate laboratory-scale thermonuclear ignition and burn. To date, all of the capabilities needed to conduct implosion experiments and demonstrate ignition and burn at NIF by the end of 2012 are in place. This talk describes the NIF's unprecedented experimental capabilities with a focus on the NIF laser performance, reliability and availability during the experimental campaign phase. The talk will also address the transition of NIF to a national user facility, providing access to researchers from the Department of Energy (DOE) laboratories as well as the national and international academic and fusion energy communities.

This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

Dr. Edward Moses is the Director for the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory (LLNL). Dr. Moses was responsible for completing construction and activation of the NIF, the world's largest and most energetic laser system. Experiments on NIF will access high energy density regimes with direct application to strategic security as well as applications for fusion energy research, high energy density science, and astrophysics.

Successful Technology Approach for Lasers in Manufacturing

Peter Leibinger
TRUMPF GmbH & Co. KG (Germany)

The success of the laser as a manufacturing tool in nearly all industry sectors is driven by the increasing availability of different technologies to create and amplify laser light. Different strategies and philosophies are pursued to succeed in the field of laser development for the manufacturing industry. The main approaches are to either focus on as few different technologies as possible to address the demands of many applications or to provide dedicated laser systems for specific applications based on multiple technologies.

This talk will give a comparison of these two different approaches and will point out the core aspects of a long-term successful development road map for laser systems in manufacturing.

Dr.-Ing. E.h. Peter Leibinger is Head of the Laser Technology and Electronics Division and responsible for group-wide research and development and for new business fields. Leibinger serves in several honorary functions. In February 2011 a honorary doctorate was awarded to Leibinger by the Technical University of Dresden.

LASE Interactive Poster Session

Tuesday 24 January
6:00 to 8:00 pm

Conference attendees are invited to attend the LASE poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

TECHNICAL EVENT

Laser Communications

Tuesday 24 January
7:30 to 9:00 pm

Session Chairs: **Hamid Hemmati,** Jet Propulsion Lab. (USA) and **Don Boroson,** MIT Lincoln Lab. (USA)

This technical event on Laser Communications will hold its informal annual meeting in conjunction with the Free-Space Laser Communication Technologies XXIII conference. All professionals involved in theory and applications of free-space laser communications, remote sensing and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Attendees are invited to bring suggestions for discussion topics.

Best Student Paper Competition

Frontiers in Ultrafast Optics: Biomedical, Scientific and Industrial Applications XII (Conf. 8247)

Session Chairs: **Alexander Heisterkamp,** Laser Zentrum Hannover e.V. (Germany); **Michel Meunier,** Ecole Polytechnique de Montréal (Canada); **Stefan Nolte,** Friedrich-Schiller-Univ. Jena (Germany)

Wednesday 25 January

Competition · 8:00 to 9:00 am
Award Ceremony · 9:30 to 9:50 am

For conference 8247: Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XII, we are pleased to announce that a cash prize will be awarded to the best student presentation in this conference (both poster and oral papers considered).

Papers submitted by **graduate and undergraduate** students are eligible. In order to ensure a fair evaluation, the conference chairs and the program committee will judge the students during a special student competition session held during the conference. Here the students present a brief **5-minute summary** of their original talk or poster presented at the conference.

Following the student competition, the judges will meet and decide on the winner. The winner and runner-up will be announced during the award ceremony and awarded **a cash prize**.

Award Sponsors:

Amplitude SYSTEMES

APE

Best Oral Student Paper Competition

Fiber Lasers IX: Technology, Systems, and Applications (Conf. 8237)

Thursday 26 January

Award Ceremony · 5:40 to 5:50 pm

For conference 8237: Fiber Lasers IX: Technology, Systems, and Applications, we are pleased to announce that a **cash prize** will be awarded to the best student oral presentation in the conference.

Throughout the conference, qualifying student oral presentations will be evaluated by a conference steering committee, led by Craig Robin. Student presentations will be judged based on scientific merit, impact, and clarity of the presentation (not the manuscript). While the award is not judged by the manuscript, a manuscript must be submitted.

To be eligible for consideration, a student must be listed as an author on an accepted paper, must have conducted the majority of the work being presented, and must make the oral presentation.

To be considered for this prize, please confirm the student presenter of your oral talk by email to Craig Robin [Craig.Robin@kirtland.af.mil], and include your SPIE paper number, paper title, and attach a copy of the university-issued Student ID Card by 5 December 2011.

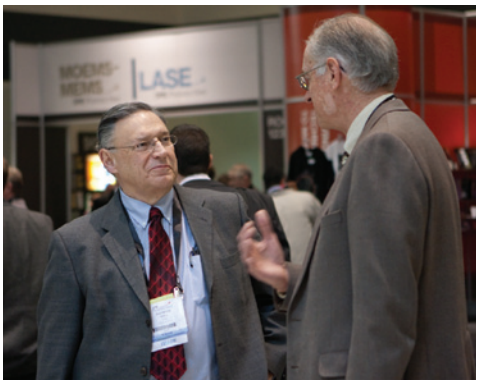
The winner of the Best Student Oral Presentation Award will be announced during the Student Award Ceremony on Thursday afternoon.

Award Sponsors:

NKT Photonics the power of light

Fianium ultrafast fiber lasers

PolarOnyx



MOEMS-MEMS
SPIE Photonics West

MOEMS-MEMS PLENARY SESSION

Monday 23 January
9:00 am to 12:00 pm

Welcome and Announcement of MOEMS-MEMS Best Paper Award and Best Student Paper Award

Session Chairs:

Harald Schenk
Fraunhofer Institute for Photonic Microsystems (Germany)

David L. Dickensheets
Montana State Univ. (USA)

Large-Scale Integration of Nanosystems

Michael Roukes
California Institute of Technology

Michael Roukes is the Robert M. Abbey Professor of Physics, Applied Physics, and Bioengineering at the California Institute of Technology. He was founding Director of Caltech's Kavli Nanoscience Institute (KNI), and now serves as its Co-Director. Roukes is co-founder and co-director of the Alliance for Nanosystems VLSI, an international collaboration between Caltech's KNI and CEA/LETI-Minatec/Clinatec in Grenoble, France (www.nanovlsi.org). Concurrently, he holds a Chaire d'Excellence in Nanoscience from the Réseau Thématique de Recherche Avancée.

Coffee Break

Powering the Wireless World with MEMS

Samuel B. Schaevitz
Lilliputian Systems, Inc. (USA)

Battery life is horrible. That is a painful consequence of the explosion in features and applications in modern wireless electronics of all types, and is particularly acute in advanced smartphones. Fuel cells have long been touted as the solution to the battery problem, and significant programs have been funded at large companies, start-ups, and within academia. Thus far, none of those efforts have resulted in a commercially successful product for consumer electronics.

Lilliputian Systems has taken a unique approach by leveraging MEMS fabrication methods to enable the use of a fuel cell known as a solid oxide fuel cell (SOFC). SOFCs provide high efficiency and reliable operation and allow the use of high energy density fuels, such as butane. This combination overcomes the barriers which have prevented other fuel cell efforts from being commercialized. But in order to use SOFCs, the MEMS structure must operate at elevated temperatures, typically above 600°C, must do so very efficiently, and must be effectively integrated into a complete system. By overcoming these unusual challenges, Lilliputian has developed a solution with a run-time 5-10X longer than existing batteries and with instant recharge by inserting a new cartridge. The absolute safety of the approach is supported by world-wide approval for carry-on and use on airplanes.

Over the past several years, Lilliputian Systems has created the many innovations required to bring this complex system to high-volume manufacturing. This talk will discuss the unique challenges in system architecture and high-temperature MEMS design which have been overcome, enabling Lilliputian to provide long-lasting portable power for consumer electronics devices.

Samuel Schaevitz received SB ('00), MEng('00), and Eng('01) degrees from MIT in Electrical Engineering, and is a Hertz Fellow. He founded Lilliputian Systems, Inc. in 2001, and is currently serving as CTO, in charge of R&D and Engineering activities.

New Optical, Acoustic, and Electrical Technologies for Developing World Diagnostics

Jonathan Cooper
Univ. of Glasgow (United Kingdom)

Infectious diseases cause 10 million deaths each year worldwide, accounting for ~60% of all deaths of children aged 5-14. Although these deaths arise primarily through pneumonia, TB, malaria and HIV, there are also the so called "neglected diseases" such as sleeping sickness and bilharzia, which have a devastating impact on rural communities, in sub-Sahara Africa. Here, the demands for a successful Developing World diagnostic are particularly rigorous, requiring low cost instrumentation with low power consumption (there is often no fixed power infrastructure). In many cases, the levels of infection within individuals are also sufficiently low that instruments must show extraordinary sensitivity, with measurements being made in blood or saliva. In this talk, a description of these demands will be given, together with a review of some of the solutions that have been developed, which include using acoustics, optics and electrotechnologies, and their combinations to manipulate the fluid samples. In one example, we show how to find a single trypanosome, as the causative agent of sleeping sickness.

Jonathan Cooper has pioneered technologies in biosensors (1980s), protein and DNA microarrays (1990s) and Lab-on-a-Chip and Bionanotechnology (2000s). He has published ca. 200 research papers, and is the founder of Mode Diagnostics (www.modedx.com), producing home diagnostics for bowel cancer and other bathroom diagnostic tests. In his recent research, he has focused upon using plasmonics and phononics in the field of medical diagnostics. In one example, using phononics, he has created frequency dependent acoustic lenses and mirrors with phononic crystals to enable generic platforms for low cost Developing World diagnostics. Jon was elected as a Fellow of the Royal Academy of Engineering, a Fellow of the Institute of Physics, a Fellow of the Institute of Electrical Engineering and a Fellow of the Royal Society of Edinburgh. He was appointed to the Wolfson Chair in Biomedical Engineering in 2009 and was awarded a Royal Society Merit Award in 2010.

PANEL DISCUSSION

Prospects and Future of Microfluidics

Monday 23 January · 5:40 to 7:00 pm

Moderator: **Holger Becker,** microfluidic ChipShop GmbH (Germany)

The commercialization of microfluidic devices and systems is rapidly progressing. However not all promising approaches have become an economic success and investor's payback often has not met initial expectations. The discussion will look upon experiences made in the product development and market introduction phase of microfluidics enabled devices and will present lessons learned from various perspectives, from device performance to commercial organization. It tries to identify trends and will present case studies from different applications.

MOEMS-MEMS Interactive Poster Session

Tuesday 24 January · 6:00 to 8:00 pm

Conference attendees are invited to attend the MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

NEW!

MOEMS-MEMS Best Paper Award and Best Student Paper Award

Monday 23 January · 9:00 am

We are pleased to announce that a cash prize will be awarded to the best paper and best student paper in this symposium.

To be eligible for the MOEMS-MEMS Best Paper Award, you must:

- be listed as an author on an accepted paper within MOEMS-MEMS
- submit your manuscript online by 19 December.

To be eligible for the MOEMS-MEMS Best Student Paper Award, you must:

- be a student without a doctoral degree
- be listed as an author on an accepted paper within MOEMS-MEMS
- submit your manuscript online by 19 December
- have conducted the majority of the work to be presented
- be the presenter of the paper.

Qualifying papers will be evaluated by the awards committee. The winners will be announced during the MOEMS-MEMS Plenary Session and awarded a cash prize.

OPTO
SPIE Photonics West

OPTO PLENARY SESSION

Tuesday 24 January
8:00 to 10:10 am

Welcome and Opening Remarks

Session Chair

Klaus P. Streubel
OSRAM GmbH (Germany)

Announcement of the OPTO Green Photonics Award

Stephen J. Eglash
Precourt Institute for Energy, Stanford Univ. (USA)

Spinoptics: Spin Degeneracy Removal in Nanostructures

Erez Hasman
Technion-Israel Institute of Technology (Israel)

Spin-symmetry breaking in nanoscale structures caused by spin-orbit interaction, leading to a new branch in optics - spinoptics is presented. The spin-based effects offer an unprecedented ability to control light and its polarization state in nanometer-scale optical devices, thereby facilitating a variety of applications related to nano-photonics. The direct observation of optical spin-Hall effect that appears when a wave carrying spin angular momentum (AM) interacts with plasmonic nanostructures is introduced. A plasmonic nanostructure exhibits a crucial role of an AM selection rule in a light-surface plasmon scattering process. A spin-dependent dispersion splitting was obtained in a structure consisting of a coupled thermal antenna array. The observed effects inspire one to investigate other spin-based plasmonic effects and to propose a new generation of optical elements for nano-photonic applications.

Erez Hasman is a Professor of optical sciences and head of Micro and Nanooptics Laboratory, Faculty of Mechanical Engineering and Russell Berrie Nanotechnology Institute, Technion - Israel Inst. of Technology, Haifa, Israel. He has made significant contributions in the field of nanophotonics and radiative heat transfer from nanostructures, and specifically developing a new branch in optics - Spinoptics, opening a new avenue for controlling light in nanometer-scale optical devices. (see: www.technion.ac.il/optics).

High-Contrast Metastructures for Integrated Optics

Connie J. Chang-Hasnain
Univ. of California, Berkeley (USA)

A new concept of dielectric grating has emerged with many extraordinary properties, resulting from a large contrast in refractive index of the grating and its surrounding, and subwavelength dimensions. I will discuss various interesting properties by varying grating parameters to yield a very broadband, high-reflectivity mirror for light incident in surface-normal direction or at a glancing angle, or as a high-Q resonator with surface-normal output. I will discuss using high contrast subwavelength metastructures as a platform for many useful applications in lasers, filters, hollow core waveguides, vertical to in-plane waveguide couplers, bio/chemical and gas sensors and detectors.

Connie Chang-Hasnain is the John R. Whinnery Chair Professor in EECS Department at the University of California, Berkeley. Dr. Chang-Hasnain was an MTS at Bellcore (1987-1992) and an Assistant Professor at Stanford University (1992-1996). She received numerous awards for her research contributions, including 2011 IEEE David Sarnoff Award for for pioneering contributions to VCSEL arrays and tunable VCSELs, 2007 Nick Holonyak Jr Award, and 2003 IEEE William Streifer Scientific Achievement Award. Since 2007, she is the Editor-in-Chief of the Journal of Lightwave Technology.

Engaging Spins in Semiconductors for Quantum Information Processing

David Awschalom
Univ. of California, Santa Barbara (USA)

Eighty years since Dirac developed the quantum theory of electron spin, contemporary information technology still relies largely on classical electronic. There is a growing interest in exploiting spins in semiconductor nanostructures for the manipulation and storage of information in emergent technologies based upon spintronics and quantum logic. Localized electronic states of carbon-based systems have appeared as a unique solid state platform for fundamental studies of magnetism and quantum science at the single spin level. In diamond, the spins of individual nitrogen-vacancy color centers can be imaged and manipulated at room temperature and have remarkably long coherence times. We provide an overview of temporally- and spatially-resolved optoelectronic measurements used to

generate, manipulate, and read single electron and nuclear spin states in controlled environments. Recent demonstrations including gigahertz quantum control, nondestructive readout, patterned spin arrays, and single nuclear spin quantum memories represent progress toward the control and coupling of spins and photons for technologies beyond electronics.

David Awschalom is a Professor of Physics, Electrical and Computer Engineering at the University of California, Santa Barbara, and serves as the Peter J. Clarke Director of the California NanoSystems Institute. His group pursues research in optical and magnetic interactions in semiconductor quantum structures, spin dynamics and coherence in condensed matter systems, and implementations of quantum information processing in the solid state.

TECHNICAL EVENT

Holography

Tuesday 24 January * 7:30 to 9:00 pm

Session Chair: **Hans I. Bjelkhagen,** Glyndŵr Univ. (United Kingdom) and Technium OpTIC (United Kingdom)

The Holography Technical Group is involved with the whole record of research, engineering, recording materials, and applications of holography. The main fields of interest are display holograms, commercial and artistic, holographic optical elements (HOEs), holographic interferometry and holographic non-destructive testing (HNDT), computer-generated holography (CGH), electro and digital holography, holographic microscopy, and holographic data storage (HDS). This meeting will focus on recent developments and directions, in particular, in regard to new materials, color display holography, digital holography, CGHs and HOEs.

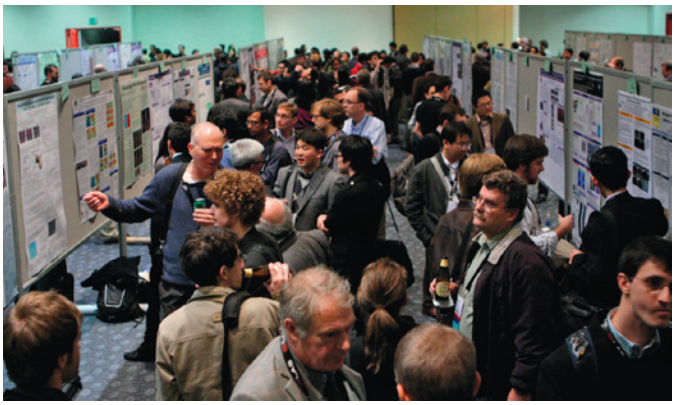
WORKSHOP

The Nature of Light: What Are Photons?

Tuesday 24 January · 7:30 to 9:00 pm

Session Chair: **Chandrasekhar Roychoudhuri,** Univ. of Connecticut (United States) and Femto Macro Continuum (USA)

The purpose of this workshop is to stimulate the engineers to explore the nature of light much deeper so the new knowledge can open up new fountains of engineering innovations guided by our capacity to emulate light-matter interaction processes, hitherto not explored. Theories of physics have been evolving for centuries based on a methodology of thinking (epistemology) that can be characterized as Measurable Data Modeling Epistemology or MDM-E, effectively a “curve fitting” technique. In fact quantum epistemology categorically tells us not to waste time trying to visualize (or try to map) what the detailed interaction processes the photons and detectors undergo to make detectable transformation become manifest in our instruments. So, we are proposing that engineers independently need to promote their own epistemology for research, Interaction Process Mapping Epistemology, or IPM-E. IPM-E will help accelerate the rate of new technology innovations through emulation of nature’s interaction processes.



OPTO Interactive Poster Session

Wednesday 25 January · 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Industry Events

Don't miss these FREE Sessions

Hear from industry leaders on some of the biggest challenges and most promising areas of the optics and photonics marketplace. Understand market trends and lessons learned.

Open to All Attendees
EXHIBITION VISITORS, EXHIBITORS, AND TECHNICAL CONFERENCE ATTENDEES

Silicon Photonics and Photonic Integrated Circuits

Tuesday 24 January · 2:00 to 3:00 pm

Panel Moderator: **Peter Hallett,** SPIE

Invited Panel Members:

LUXTERA
Peter De Dobbelaere, Vice President of Engineering

ONECHIP PHOTONICS
Andy Weirich, Vice President of Product Line Management

INFINERA
Radha Nagarajan, Director of Engineering in the Photonic Integrated Circuits Group

INTEL CORP.
Mario J. Paniccia, Corporate Technology Group

SUN-ORACLE
Ashok Krishnamoorthy, Distinguished Engineer

Demand for smaller and cheaper optical interconnections inside computers is a main driver for silicon photonics, which will create a new market of miniaturized, low-cost photonic components that can leverage the scale of CMOS manufacturing. Learn what industry leaders have discovered at the frontier of silicon photonics and hear how this will revolutionize industries from computing and communication, to biomedicine, and imaging.

Diagnostic Opportunities for Nonlinear Optical Microscopy

Tuesday 24 January · 3:30 to 4:30 pm

Panel Moderator: **Stephen G. Anderson,** SPIE

Panelists:

Karsten König, JenLab GmbH

Arnd Krueger, Sr. Director of Strategic Marketing, Newport Spectra-Pjysics

After it was first reported in 1990, two-photon excited laser scanning fluorescence microscopy was quickly embraced by researchers in cell biology and neuroscience because, compared to conventional confocal microscopy, multiphoton imaging methods offer deeper tissue penetration, less cell damage, and inherent three-dimensional (3D) optical sectioning. Since then the use of multiphoton imaging in biomedical research has seen huge growth, fueled in part by the advent of turnkey solid-state ultrafast lasers. For makers of lasers, optics, and microscopy equipment, his technique represents a notable market opportunity as it expands into clinical diagnostic areas ranging from dental disease to brain tumors to skin cancer detection. Join this session to find out more about current trends and opportunities in multiphoton microscopy.

Executive Perspectives on the World of Optics and Photonics

Wednesday 25 January · 2:00 to 3:00 pm

Panel Moderator: **Tom Hausken,** Director, Components Practice at Strategies Unlimited

Invited Panel Members:
HAMAMATSU CORP.
Kenneth Kaufmann, Vice President

TRUMPF INC.
Timothy Morris, Managing Director

CVI MELLES GRIOT
Stuart Schoenmann, President and CEO

EDMUND OPTICS INC.
Robert Edmund, CEO and Chairman of the Board

COHERENT
Mark Sobey, Senior Vice President of Specialty Laser Systems

NEWPORT CORP.
Dennis Werth, Vice-President, Precision Components and Systems Business

These top executives, representing different aspects of the marketplace, will share their insight and hard-fought lessons regarding trends and opportunities in optics and photonics. Weathering 2010 and 2011 has required extraordinary skills and experience to successfully reset goals and allocate resources. Listening to and questioning these executives will help you understand the current environment better and to set priorities for your business.

Photonics for Energy and the Environment: an Industry Perspective

Wednesday 25 January · 3:30 to 4:30 pm

Panel Moderator: **Stephen J. Eglash,** Director, Precourt Institute for Energy, Stanford Univ.

Panel Members:

David H. Abbott, Additive Mfg. Lean Lab., GE Avionics

Thomas M. Baer, Executive Director, Stanford Photonics Research Ctr.

Jyoti Bhardway, R&D Manager, Philips Lighting Lumileds

Patricia Glaza, Arsenal Venture Partners

Michael Hochberg, Director, Institute for Photonic Integration, Univ. of Washington

Eric Wesoff, Senior Analyst, Greentech Media, Inc.

Top industry executives will present their views on technologies that have great potential to reduce our collective energy consumption and offer alternate energy sources--all within five to ten years. Topics to be discussed include the following:

- **Solid State Lighting and Displays**
- **Laser-assisted Manufacturing and Micro/Nano Fabrication**
- **Silicon for Communications and Computing=**
- **Renewable Energy Generation: Fusion and Photovoltaics**

Changes to Patent Laws

Thursday 26 January · 8:45 to 9:30 am

Speaker: **Paul Davis,** Goodwin Procter

The long awaited change to US patent laws to bring the US into line with Europe and Japan (changing from first-to-invent to first-to file) seems destined to be signed into law by end of 2011. Come learn what these changes will mean for your company's strategy and innovation efforts. Open to all Photonics West attendees.

Paul Davis is a partner in the Goodwin Procter's Business Law Department and a member of its Intellectual Property and Technology Companies Groups. Mr. Davis has a strong patent background in the medical device, electrical engineering, photonics, networking, e-commerce and telecommunication industries, focusing primarily on U.S., international and national phase patent prosecution and strategic counseling services. He has significant experience in litigating intellectual property issues for information technology companies.

Crosslight Software Tutorial on Optoelectronic Device Simulation

Thursday 26 January · 1:30 to 5:30 pm

This hands-on tutorial is free of charge, however, seating is limited and pre-registration is required. Participants are encouraged to bring a laptop PC with pre-installed Crosslight software. To register for the tutorial and the free software trial license, please e-mail your contact information to piprek(at)nusod.org. You will receive detailed instructions on how to install the software on your laptop in the week before the conference.

The tutorial gives a hands-on introduction to high-end simulation tools for electronic and optoelectronic devices (APSYS, LASTIP, PICS3D by Crosslight Software Inc., see below). These software packages combine electrical, thermal, optical, and quantum-mechanical models in two or three dimensions. They can be applied to a large variety of semiconductor devices such as laser diodes, light-emitting diodes, solar cells, photodetectors, modulators, amplifiers, and transistors. The tutorial explains and demonstrates the basic operation of these software tools. Model options and material parameters are discussed and strategies for obtaining realistic simulation results are outlined. Deep insight into micro- and nano-scale physical processes is provided using realistic device examples.

LASTIP: Two-dimensional (2D) simulation of laser diodes. Considers competition of multiple optical laser modes. Includes optical gain function for quantum well or bulk material with different models of spectral broadening, Coulomb interaction, and inter-band optical transitions integrated over k•p non-parabolic subbands. Import of externally generated data possible. Physical models of various laser effects and a material data base for many III-V semiconductor compounds are available.

APSYS: 2D/3D simulation of non-lasing devices. Features include: hot carrier transport, quantum mechanical tunneling, multi-quantum well structures, k·p band structure calculation, selfconsistent Poisson and Schroedinger equations solving, wave guiding in media with arbitrary complex refractive index distribution, transient models, small ac-signal analysis, interface and bulk charge trapping, piezoelectric effect, impact ionization, optical absorption and emission with exciton, and other many-body phenomena, LED ray tracing model to optimize device structure and packaging for light extraction efficiency, photon recycling effect, different relaxation models. Broad range of semiconductor devices, including classical or quantum-mechanical resonant tunneling diodes, bipolar and field effect transistors, LEDs, solar cells, detectors, semiconductor optical amplifiers, electro-absorption modulators.

PICS3D: Three-dimensional (3D) simulation of edge-emitting lasers (FP, DFB, DBR) and vertical-cavity laser diodes (VCSELs). It can also be used for waveguide photodetectors, semiconductor optical amplifiers, photo-pumping, and coupling to external passive optical components, i.e. external gratings (1st and 2nd order). It can calculate longitudinal distribution of carrier density, gain, optical field, and surface emission modes for 2nd order grading DFB. In addition to steady (dc) L-I, or I-V characteristics, it can be used for ac, and transient analysis of laser diodes, mode emission power, spectrum and chirp analysis, AM and FM small signal modulation response, and second harmonic analysis. It may include 3D current flow, vectorial waves, Poisson and Schroedinger Equations self-consistent solution in complex MQW with piezo-electric fields, and quantum-mechanical tunneling.

Further information is available at www.crosslight.com

Industry Workshops

Fundamental Optics

Basic Optics for Non-Optics Personnel

WS609 · Course level: Introductory
CEU .20 $100 Member / $150 Non-member USD
Monday 1:30 to 4:00 pm

This course will provide the technical manager, sales engineering, marketing staff, or other non-optics personnel with a basic understanding of the terms, specifications, and measurements used in optical technology to facilitate effective communication with optics professionals on a functional level. Topics to be covered include basic concepts such as interference, diffraction, polarization and aberrations, definitions relating to color and optical quality, and an overview of the basic measures of optical performance such as MTF and wavefront error. The material will be presented with a minimal amount of math, rather emphasizing working concepts, definitions, rules of thumb, and visual interpretation of specifications. Specific applications will include defining basic imaging needs such as magnification and depth-of-field, understanding MTF curves and interferograms, and interpreting radiometric terms.

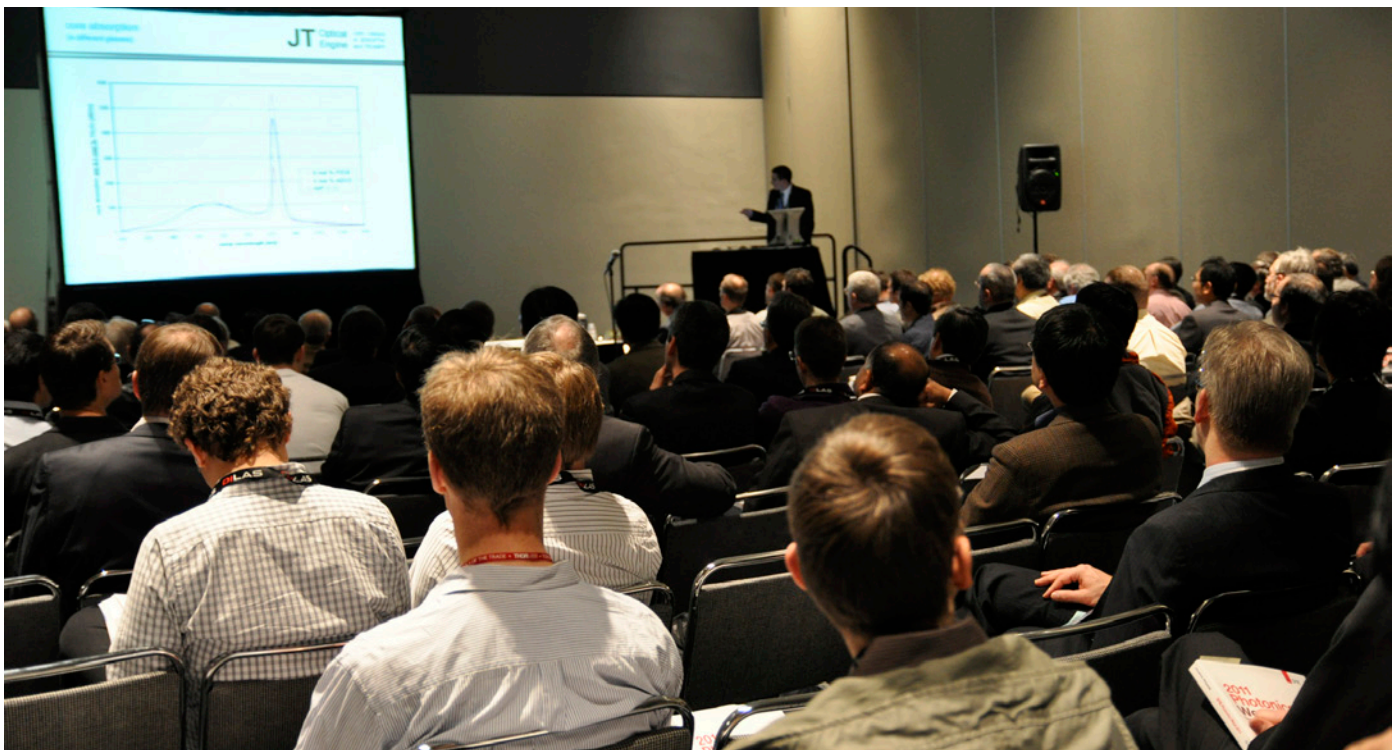
Kevin Harding has been active in the optics industry for over 30 years, and has taught machine vision and optical methods for over 25 years in over 70 workshops and tutorials, including engineering workshops on machine vision, metrology, NDT, and interferometry used by vendors and system houses to train their own engineers. He has been recognized for his leadership in optics and machine vision by the Society of Manufacturing Engineers, Automated Imaging Association, and Engineering Society of Detroit. Kevin is a Fellow of SPIE and was the 2008 President of the Society.

Basic Laser Technology

WS972 · Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Wednesday 8:30 am to 12:30 pm

If you are uncomfortable working with lasers as “black boxes” and would like to have a basic understanding of their inner workings, this introductory course will be of benefit to you. The workshop will cover the basic principles common to the operation of any laser/laser system. Next, we will discuss laser components and their functionality. Components covered will include laser pumps/energy sources, mirrors, active media, nonlinear crystals, and Q-switches. The properties of laser beams will be described in terms of some of their common performance specifications such as longitudinal modes and monochromaticity, transverse electromagnetic (TEM) modes and focusability, continuous wave (CW) power, peak power and power stability. Laser slope and wall-plug efficiencies will also be discussed.

Sydney Sukuta is currently a Laser Technology professor at San Jose City College. He also has industry experience working for the some the world’s leading laser manufacturers in Silicon Valley where he saw first-hand the issues they encounter on a daily basis. In response, Dr. Sukuta developed prescriptive short courses to help absolve most of these issues.



Industry Workshops

Business, Patents + IP

Commercialization of Photonics Technology NEW

WS1056 · Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

The course outlines the approach to move advanced technology into successful commercial products. The elements of commercialization will be defined including: Identification of market opportunities and potential; competitive environment related to both technology and companies; manufacturing encompassing discussion of source, quality, cost, cost reduction, and standards; barriers to entry; value proposition including product differentiation; strategy and funding.
The course price will include an updated edited version of the high **David Krohn** is Managing Partner of Light Wave Venture LLC. He has been in photonics development and commercialization for over 40 years. He has now assisted over 100 companies and organizations in developing photonic-based opportunities.

Magnifying Your IP IQ: Topics for the Savvy Intellectual Property Manager NEW

WS1057 · Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Tuesday 8:30 am to 12:30 pm

This course covers a variety of topics of interest to those with responsibilities for overseeing an intellectual property portfolio. The topics include the key provisions of non-disclosure and licensing agreements, what to know when dealing with venture capitalists and other prospective investors, methods of accelerating the passage of applications through the U.S. Patent and Trademark Office, selection and protection of trademarks, and how to prepare for offensive or defensive patent litigation.

Mark Gallagher is a partner at Knobbe Martens, an intellectual property law firm. Mr. Gallagher specializes in assisting clients in the optical sciences with preparation and prosecution of patents before the U.S. Patent Office. Mr. Gallagher also represents clients through phases of IP due diligence by prospective investors. Mr. Gallagher holds a J.D. degree and a Ph.D. in optical sciences, both from the University of Arizona.

Lori Yamato is also a partner at the Knobbe Martens law firm and specializes in representing clients in intellectual property deals, including preparation and negotiation of license agreements. Ms. Yamato's practice also includes trademark clearance, prosecution and enforcement. Ms. Yamato holds a J.D. degree from the University of Michigan and a B.S. degree in electrical engineering from the University of Southern California.

David Jankowski is a partner at the Knobbe Martens law firm who specializes in patent infringement litigation, representing both plaintiffs and defendants in federal district court and proceedings before the International Trade Commission. Mr. Jankowski holds a J.D. degree from Stanford University and a Ph.D in Astronomy from Cornell University.

Derek Bayles is an associate at the Knobbe Martens law firm and specializes in assisting clients in the optical sciences with preparation and prosecution of patents before the U.S. Patent Office. Mr. Bayles holds a J.D. degree and a B.S. degree in electrical engineering, both from Brigham Young University.

Critical Skills for Compelling Research Proposals NEW

WS1058 · Course level: Introductory
CEU .35 $100 Member / $150 Non-member USD
Tuesday 1:30 to 5:30 pm

Research costs money. The good news is that there are thousands of avenues of financial support. The bad news is that hundreds of thousands of proposals are competing for those funds. This class will teach you to craft high-quality proposals that stand out from the masses. We will focus on five fundamental skills that will bolster the substance, structure, and appearance of your proposals. Adhering to these practices will dramatically increase your odds of winning funding for your research.

Damon Diehl is founder and owner of Diehl Research Grant Services. He has a Ph.D. in optical engineering from the University of Rochester Institute of Optics and a B.A. in physics from the University of Chicago. His class is based on fifteen years of academic and industrial research experience.

Professional Development Speaker Series

Sunday 22 January
2:00 to 5:00 pm

Open to All Attendees

Students and Early Career Professionals – attend this series of talks, discussions, and practical experiences that explore topics in innovation and entrepreneurship. Get inspired to create the next big thing and learn how to build the tools you need to make it happen.

Check online for updates.

SPIE Job Fair

Top employers are coming together to interview and hire candidates at Photonics West!

Tuesday 24 January · 10:00 am - 5:00 pm

Wednesday 25 January · 10:00 am - 5:00 pm

See details on page 12

PANEL DISCUSSION:

Getting Hired in 2012 and Beyond

Tuesday 24 January · 3:00 to 4:00 pm

Join us for a panel discussion on careers in optics and photonics outside the academic world. Learn about getting hired at tech-based companies and non-academic jobs directly from human resource professionals in the optics and photonics sector.

Workshops

Registration required for the workshops below.

Critical Skills for Compelling Research Proposals

NEW

WS1058 · Course level: Introductory
CEU .35 $100 Member / $150 Non-member USD
Tuesday 1:30 to 5:30 pm

This course is free to SPIE Student Members, but you must register to attend.

Research costs money. The good news is that there are thousands of avenues of financial support. The bad news is that hundreds of thousands of proposals are competing for those funds. This class will teach you to craft high-quality proposals that stand out from the masses. We will focus on five fundamental skills that will bolster the substance, structure, and appearance of your proposals. Adhering to these practices will dramatically increase your odds of winning funding for your research.

Damon Diehl is founder and owner of Diehl Research Grant Services. He has a Ph.D. in optical engineering from the University of Rochester Institute of Optics and a B.A. in physics from the University of Chicago. His class is based on fifteen years of academic and industrial research experience.

Resumes to Interviews: Strategies for a Successful Job Search

NEW

WS1059 · Course level: Introductory
CEU .25 $75 Member / $125 Non-member USD
Monday 1:30 to 5:30 pm

This course is free to SPIE Student Members, but you must register to attend.

This course reviews effective strategies and techniques for a successful job search, including writing your cover letter and resume, as well as interviewing tips. The primary goal of the course is to provide creative and proven techniques for new college graduates and professionals to make sense of their job search, have a plan, successfully get the interview, and ultimately land the job.

Creative and comprehensive job search techniques will be discussed as well as actual resume and interviewing examples and tips. Anyone who is getting ready to enter the work force who wants to answer questions such as, “when and how do I start my job search? “, “what kind of cover letter and resume gets noticed?” or “how do I sell myself in an interview?” will benefit from taking this course.

Suzanne Krinsky has been in human resources and corporate recruiting for more than 15 years. She has extensive experience with both in-house corporate environments as well as outside agency/consulting environments. Suzanne is currently the Human Resource Director for Daylight Solutions in San Diego, and also a long-time Board member for the Biotech Human Resource Development Coalition (BEDC) and Human Resource Roundtable member.

The Craft of Scientific Writing: A Workshop on Technical Writing

WS668 · Course level: Introductory
CEU .35 $75 Member / $125 Non-member USD
Wednesday 1:30 to 5:30 pm

This course provides an overview on writing a scientific paper. The course focuses on the structure, language, and illustration of scientific papers.

Michael Alley teaches writing and speaking to engineering students at Penn State. Alley has taught this workshop to researchers at the Army Research Laboratory, Lawrence Livermore National Laboratory, United Technologies, the University of Illinois, the University of Oslo, and Virginia Tech.

The Craft of Scientific Presentations: A Workshop on Technical Presentations

WS667 · Course level: Introductory
CEU .35 $75 Member / $125 Non-member USD
Wednesday 8:30 am to 12:30 pm

This course provides attendees with an overview of what distinguishes the best scientific presentations. The course introduces a new design for presentation slides that is both more memorable and persuasive from what is typically shown at conferences.

Michael Alley teaches writing and speaking to engineering students at Penn State. Alley has taught this workshop to researchers at the Army Research Laboratory, Lawrence Livermore National Laboratory, United Technologies, the University of Illinois, the University of Oslo, and Virginia Tech.

Network

Networking Receptions · Student Social Events · SPIE Member Events

Join your colleagues and develop new relationships at these relaxed-atmosphere networking events.

Lunch with the Experts - A BiOS Student Networking Event

Sunday 22 January · 12:30 to 1:30 pm
Open to BiOS Student Attendees

Enjoy a casual meal with colleagues at this engaging networking opportunity, hosted by SPIE Student Services. This event features experts willing to share their experience and wisdom on career paths in biomedical optics. Seating is limited and will be granted on a first-come, first-served basis.

Student Chapter Meeting

Sunday 22 January · 5:30 to 7:00 pm
Open to All Student Chapter Members

Get the latest news on the Student Chapter program direct from SPIE Student Services. Learn what's coming up and discuss new directions for student chapters. Join us after the meeting for a group dinner out on the town.

SPIE Photonics West Welcome Reception

Monday 23 January · 7:00 to 8:30 pm

"The Art of Optics"

Enjoy a night of photonics-inspired art, conversations with your colleagues, and food tasting from around the world. Please remember to wear your conference registration badges. Dress is casual.

SPIE Fellows Lunch

Monday 23 January · 12:00 to 1:30 pm

All Fellows of SPIE are invited to join your colleagues for an SPIE hosted lunch. The new SPIE Fellows attending Photonics West will be introduced and recognized. Please join us for this informal gathering and a chance to interact with other Fellows. Fellows planning to attend are asked to RSV to Brent Johnson (brentj@spie.org).

Dr. Aydogan Ozcan
University of California Los Angeles

Photonics based Telemedicine Technologies toward Smart Global Health Systems

In this talk Dr. Ozcan will introduce new imaging and detection architectures that can compensate in the digital domain for the lack of complexity of optical components by use of novel theories and numerical algorithms to address the immediate needs and requirements of Telemedicine for Global Health Problems. Applications of a lensfree on-chip microscopy platform to high-throughput imaging and automated counting of whole blood cells, monitoring of HIV+ patients (through CD4 and CD8 T cell counting) and detection of waterborne parasites towards rapid screening of water quality will also be demonstrated.

Dr. Aydogan Ozcan received his Ph.D. degree at Stanford University Electrical Engineering Department in 2005. After a short post-doctoral fellowship at Stanford University, he is appointed as a Research Faculty Member at Harvard Medical School, Wellman Center for Photomedicine in 2006. Dr. Ozcan joined UCLA in the summer of 2007, where he is currently an Associate Professor leading the Bio- Photonics Laboratory at the Electrical Engineering and Bioengineering Departments. This year, Dr. Ozcan was among those being honored by U.S. President Barack Obama with the *Presidential Early Career Award for Scientists and Engineers.*

Biophotonics Start-up Challenge

Monday 23 January · 4:00 to 5:30 pm

Does your research project have commercial potential? Can you convince others?

Interested in entrepreneurial opportunities in this high-tech field? Come to this event to hear research projects that have real commercial potential. This rapid-fire event will feature start-up pitches from students and young professionals as they compete to take their ideas to the next level.

Women in Optics Presentation and Reception

Monday 23 January · 4:30 to 6:00 pm
Open to all conference attendees.

Join us for an evening of networking and inspiration. Connect with others in our industry while enjoying wine and cheese refreshments.

Leslie Fishlock
Founder of Geek Girl Camp

Empowering Women in Tech: Mentor, Give Back, Pay it Forward

Leslie is best known as the CEO, founder and Geek Girl #1 of Geek Girl, whose mission is to educate and empower every girl and woman (and dude) at every age level, on every skill level, at every income level on computer technology. Leslie's vision for education, evangelism, entrepreneurialism, and empowering women is apparent when you meet her. Leslie prides herself on being "the resource", and will share everything she knows about entrepreneurialism, starting a business and tech with anyone who asks.

Her most recent success has been to launch the first Geek Girl Educational Training Center (GGETC) in Hyannis, MA. The Geek Girl ETC offers workshops, personal consultation, drop-in classes, and all forms of group learning, onsite and offsite, and online. Included in this educational endeavor is their famous Help Desk services and Geek Girl for Hire.

SPIE Senior Members Breakfast

Tuesday 24 January · 8:00 to 9:00 am

All SPIE Senior Members are invited to join your colleagues for this first annual SPIE-hosted buffet breakfast. Please join us for this informal gathering and a chance to interact with other Senior Members. Please plan to wear your yellow Senior Member ribbon for entry into this event.

Senior Members planning to attend are asked to RSVP to Brent Johnson (brentj@spie.org).

Student Chapter Info Session

Tuesday 24 January · 1:45 to 2:30 pm
Open to All Attendees

Interested in starting a Student Chapter or just want to learn more about the program and its benefits? Get your questions answered at this informal information session hosted by SPIE Student Services.

Lunch with the Experts - A Student Networking Event

Tuesday 24 January · 12:30 to 1:30 pm
Open to Student Attendees

Enjoy a casual meal with colleagues at this engaging networking opportunity. This event features experts willing to share their experience and wisdom on career paths in optics and photonics and an awards presentation for Newport Spectra-Physics travel grant winners. Seating is limited and will be granted on a first-come, first-served basis.

Sponsored by:

Newport Experience | Solutions
Spectra-Physics A Division of Newport Corporation

Newport Spectra-Physics Research Excellence Travel Awards

The Newport Spectra-Physics Research Excellence Travel Awards Program provides financial support for university students to attend the two largest SPIE meetings in order to present their research. These travel grants are open to any student who has an accepted paper for presentation at Photonics West or Optics + Photonics. Recipients will be selected based on both the quality of the original research described in the submitted paper(s) and financial need.

For application information for this and other SPIE travel grants visit Scholarships and Grants online at spie.org/scholarships

Speed Networking Social

Tuesday 24 January · 4:30 to 6:00 pm
Open to All Attendees

Join us for the next generation of networking. Add a new contact to your network every three minutes while enjoying appetizers at an offsite venue. Bring plenty of business cards, practice your pitch, and prepare to expand your network.

ThirstyBear Brewing Co.
661 Howard Street

From the Moscone Center:
Head Northwest on 3rd Street
Turn right on Howard Street
ThirstyBear is just up the block on your right.

Social and Networking Events

SPIE Member Reception

Hilton San Francisco Union Square Hotel,
333 O'Farrell Street
Tuesday 24 January
8:00 to 9:30 pm

For SPIE Members Only

SPIE Members are invited to the Cityscape Room at the top of the Hilton for an after dinner reception in their honor. Come relax and talk with your colleagues while enjoying dessert, coffee, and unparalled views of downtown San Francisco. Please note: this reception is limited to SPIE Members only. Membership cards or invitations will be requested at the entrance. If you join SPIE on-site, please bring your registration receipt. Dress is casual or business attire.

OPTO Start-up Challenge

Wednesday 25 January · 4:30 to 6:00 pm

Does your research project have commercial potential? Can you convince others?

Interested in entrepreneurial opportunities in this high-tech field? Come to this event to hear research projects that have real commercial potential. This rapid-fire event will feature start-up pitches from students and young professionals as they compete to take their ideas to the next level.

The top three winners of the Start-up challenge will be sponsored to attend the UC-Davis Biomedical Engineering Entrepreneurship Academy courtesy of Newport. This 5-day academy will help winners construct a business case, analyze markets, and develop a network of connections to help drive their new venture.

"No Ties" Student Social

Wednesday 25 January · 8:00 to 10:00 pm
Student Conference Attendees Only.

Relax and hang out with new friends and peers while enjoying the atmosphere of a great off-site venue. No ties required but please bring photo ID.

Jillian's Billiards Club
101 4th Street

From the Moscone Center:
Head Southwest on Howard Street toward 4th Street
Turn right on 4th Street
Jillian's is on the right

Prism Awards Ceremony and Banquet

Wednesday 25 January · 6:30 to 10:30 pm

Seating Limited. Ticket Required.

Join this gala event in which SPIE and Photonics Media recognize the most innovative new photonic products on the market. Network with industry leaders at this VIP event. The evening begins with a reception, followed by an elegant dinner and award ceremony. Please bring tickets to the door. Dress is business attire. Email innovation@spie.org for ticket information.

Sponsors: SPIE Connecting minds. Advancing light. PHOTONICS MEDIA LAURIN PUBLISHING

PRISM AWARDS

Finalists Announced in November

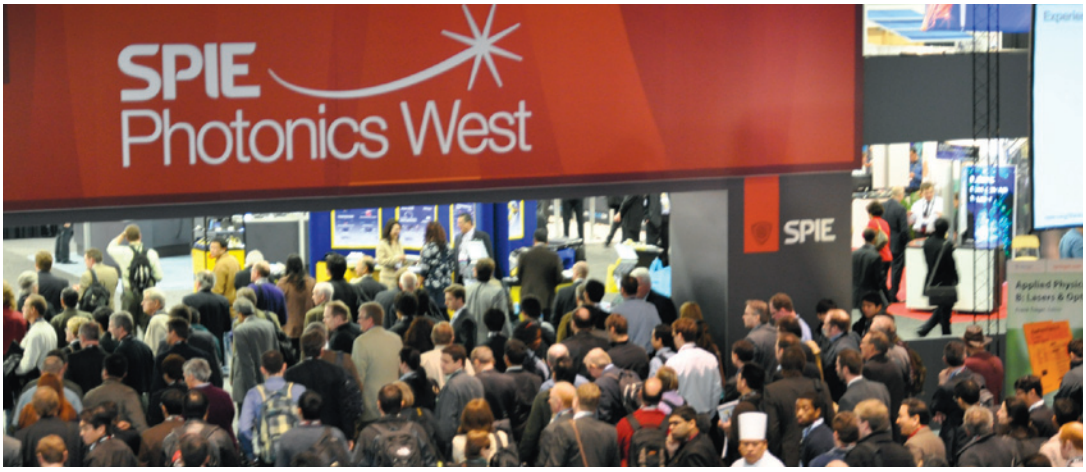
Are you on the list?

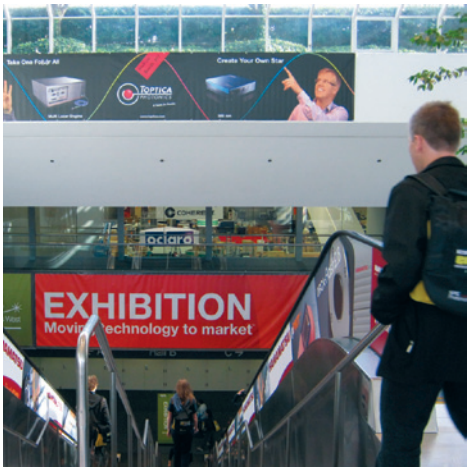
PhotonicsPrismAwards.com

See the finalists, their products, ticket details - all on the new website.

Winners announced 25 January 2012 during Photonics West

PRESENTED BY
SPIE & PHOTONICS MEDIA





Experience the impact of SPIE Photonics West

Walk the floor of two technology-packed free exhibitions

Photonics West

24–26 January 2012
The Moscone Center
San Francisco, California, USA

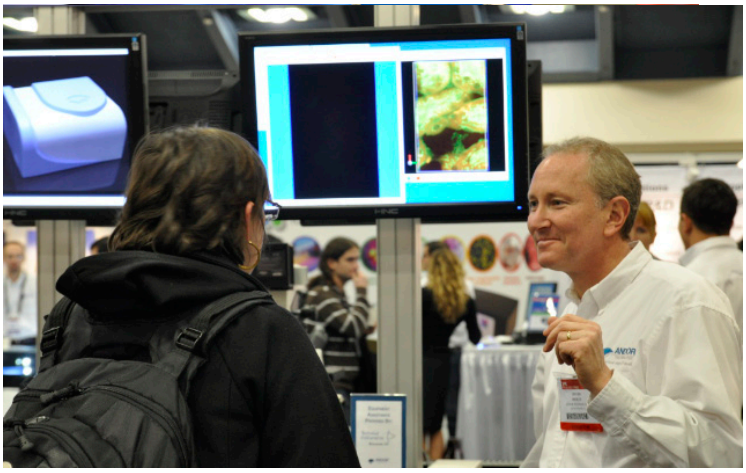
There is absolutely no other photonics and laser exhibition in North America with the size and prestige of SPIE Photonics West. You will see the latest products, top companies, and industry leaders at Photonics West.

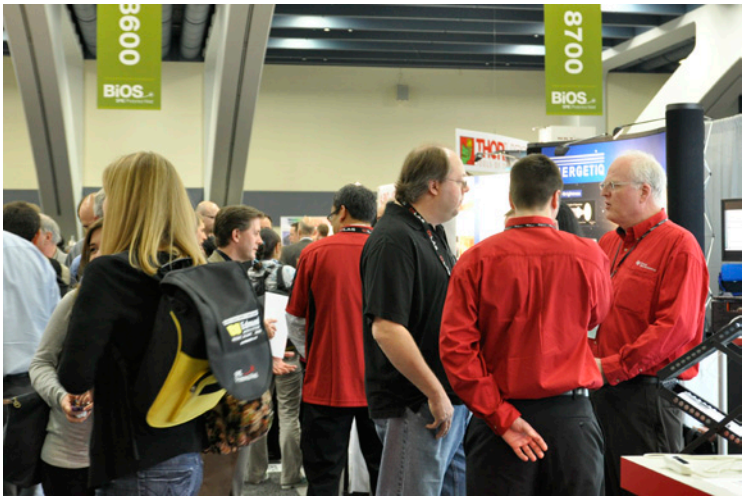
spie.org/pwexhibition

Exhibition Technologies

- Laser sources and systems
- Optical components and materials
- IR sources and detectors
- Cameras and sensors
- Electronic imaging components
- Fiber optic systems
- Optical coatings
- Lenses and filters
- Positioning and mounts
- Metrology

Photonics West – 1,150 Companies





If you work in biomedical optics you can't afford to miss the BiOS Exhibition

BiOS EXPO

21–22 January 2012
The Moscone Center
San Francisco, California, USA

Take advantage of this focused exhibition the weekend before SPIE Photonics West. SPIE BiOS is the ideal place to interact with the developers and early adopters of the newest biophotonics technologies, as well as the best venue to see the latest technologies and instrumentation for imaging, diagnostics, and therapeutics.

spie.org/biosexpo

Exhibition Technologies

- Molecular imaging
- Lasers
- Biomedical optics components and instrumentation
- Nano/biophotonics
- Biosensors
- Spectroscopy
- Microscopic imaging
- Life sciences

BiOS EXPO — 195 Companies

BiOS

SPIE Photonics West

Register Today

Conferences and Courses: 21–26 January 2012
BiOS EXPO: 21–22 January 2012
Photonics West Exhibition: 24–26 January 2012
The Moscone Center | San Francisco, California, USA

DISCOUNT DEADLINE:
Rates increase $100 ($50 for students) on 6 January 2012

Symposium Chairs

James Fujimoto
Massachusetts Institute of Technology (USA)

R. Rox Anderson M.D.
Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard School of Medicine (USA)

Photonic Therapeutics and Diagnostics

Program Chair: **Brian Jet-Fei Wong,** Beckman Laser Institute and Medical Clinic, Univ. of California, Irvine (USA)

Clinical Technologies and Systems

Program Chairs: **Tuan Vo-Dinh,** Duke Univ. (USA) and **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA)

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Program Chairs: **Steven L. Jacques,** Oregon Health & Science Univ. (USA) and **William P. Roach,** U.S. Air Force (USA)

This program is current as of 12 September 2011 Online Info

Biomedical Spectroscopy, Microscopy, and Imaging

Program Chairs: **Ammasi Periasamy,** Univ. of Virginia (USA) and **Daniel L. Farkas,** Cedars-Sinai Medical Ctr. (USA)

Nano/Biophotonics

Program Chairs: **Paras Prasad,** SUNY/Buffalo (USA) and **Dan V. Nicolau,** The Univ. of Liverpool (United Kingdom)

Executive Organizing Committee

BiOS Daily Conference Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday

Photonic Therapeutics and Diagnostics

Program Chair: **Brian Jet-Fei Wong,** Beckman Laser Institute and Medical Clinic, University of California, Irvine (USA)

8207A **Photonics in Dermatology and Plastic Surgery** *(Kollias, Choi, Zeng)* p. 39

8207G **Photons and Neurons IV** *(Mahadevan-Jansen, Jansen)* p. 51

8207B **Therapeutics and Diagnostics in Urology: Lasers, Robotics, Minimally Invasive, and Advanced Biomedical Devices** *(Kang, Knudsen)* p. 41

8208 **Lasers in Dentistry XVIII** *(Rechmann, Fried)* p. 54

8207C **Optical Imaging, Therapeutics, and Advanced Technology in Head and Neck Surgery and Otolaryngology** *(Wong, Ilgner, Izdebski)* p. 43

8207D **Optical Techniques in Pulmonary Medicine** *(Suter, Lam, Brenner)* p. 45

8207E **Diagnostic and Therapeutic Applications of Light in Cardiology** *(Gregory, Tearney, Marcu)* p. 47

8207F **Optical Techniques in Neurosurgery, Brain Imaging, and Neurobiology** *(Hirschberg, Madsen)* p. 49

8207H **Optics in Bone Surgery and Diagnostics** *(Mandelis)* p. 53

8209 **Ophthalmic Technologies XXII** *(Manns, Söderberg, Ho)* p. 56

8210 **Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XXI** *(Kessel, Hasan)* p. 60

8211 **Mechanisms for Low-Light Therapy VII** *(Hamblin, Anders, Carroll)* p. 62

8212 **Frontiers in Biological Detection: From Nanosensors to Systems** *(Miller, Fauchet)* p. 64

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday

Clinical Technologies and Systems

Program Chairs: **Tuan Vo-Dinh,** Duke Univ. (USA) and **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA)

8213 **Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XVI** *(Izatt, Fujimoto, Tuchin)* p. 66

8214 **Advanced Biomedical and Clinical Diagnostic Systems X** *(Vo-Dinh, Mahadevan-Jansen, Grundfest)* p. 71

8215 **Design and Quality for Biomedical Technologies V** *(Raghavachari, Liang)* p. 74

8220 **Optical Biopsy X** *(Alfano)* p. 84

8216 **Multimodal Biomedical Imaging VII** *(Azar, Intes)* p. 76

8217 **Endoscopic Microscopy VII** *(Tearney, Wang)* p. 78

8219 **Biomedical Vibrational Spectroscopy VII: Advances in Research and Industry** *(Mahadevan-Jansen, Petrich)* p. 82

8218 **Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications XII** *(Gannot)* p. 80

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Program Chairs: **Steven L. Jacques,** Oregon Health & Science Univ. (USA) and **William P. Roach**, U.S. Air Force (USA)

8229B **Design and Performance Validation of Phantoms Used in Conjunction with Optical Measurement of Tissue IV** *(Nordstrom)* p. 118

8207G **Photons and Neurons IV** *(Mahadevan-Jansen, Jansen)* p. 51

8221 **Optical Interactions with Tissue and Cells XXIII** *(Jansen, Thomas)* p. 86

8222 **Dynamics and Fluctuations in Biomedical Photonics VII** *(Tuchin, Duncan, Larin, Leahy, Wang)* p. 89

8223 **Photons Plus Ultrasound: Imaging and Sensing 2012** *(Oraevsky, Wang)* p. 92

8224 **Biophotonics and Immune Responses VII** *(Chen)* p. 98

BiOS Daily Conference Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday

Biomedical Spectroscopy, Microscopy, and Imaging

Program Chairs: **Ammasi Periasamy,** Univ. of Virginia, (USA) and **Daniel L. Farkas,** Cedars-Sinai Medical Ctr. (USA)

8225 **Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues X** *(Farkas, Nicolau, Leif)* p. 100

8227 **Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XIX** *(Conchello, Cogswell, Wilson, Brown)* p. 110

8226 **Multiphoton Microscopy in the Biomedical Sciences XII** *(Periasamy, König, So)* p. 104

8229A **Optical Diagnostics and Sensing XII: Toward Point-of-Care Diagnostics** *(Coté)* p. 116

8228 **Single Molecule Spectroscopy and Superresolution Imaging V** *(Enderlein, Gryczynski, Erdmann, Koberling)* p. 113

8229B **Design and Performance Validation of Phantoms Used in Conjunction with Optical Measurement of Tissue IV** *(Nordstrom)* p. 118

8230 **Biomedical Applications of Light Scattering VI** *(Wax, Backman)* p. 130

Nano/Biophotonics

Program Chairs: **Paras Prasad,** SUNY/Buffalo (USA) and **Dan V. Nicolau,** The Univ. of Liverpool (United Kingdom)

8232 **Colloidal Nanocrystals for Biomedical Applications VII** *(Parak, Yamamoto, Osiński)* p. 125

8231 **Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications VIII** *(Cartwright, Nicolau)* p. 123

8233 **Reporters, Markers, Dyes, Nanoparticles, and Molecular Probes for Biomedical Applications** *(Achilefu, Raghavachari)* p. 128

8234 **Plasmonics in Biology and Medicine IX** *(Vo-Dinh, Lakowicz)* p. 131

Conference 8207A

Saturday-Sunday 21-22 January 2012 • Part of Proceedings of SPIE Vol. 8207

Photonics in Dermatology and Plastic Surgery

Conference Chairs: **Nikiforos Kollias,** Johnson & Johnson CPPW (USA); **Bernard Choi,** Beckman Laser Institute and Medical Clinic (USA); **Haishan Zeng,** The BC Cancer Agency Research Ctr. (Canada)

Program Committee: **Anthony J. Durkin,** Beckman Laser Institute and Medical Clinic (USA); **Iltefat Hamzavi,** Henry Ford Hospital (USA); **Jessica Ramella-Roman,** The Catholic Univ. of America (USA)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:30 to 10:15 am

Session I

Session Chair: **Bernard Choi,**
Beckman Laser Institute and Medical Clinic (USA)

Validation study of automated dermal/epidermal junction localization algorithm in reflectance confocal microscopy images of skin, Sila Kurugol, Jennifer Dy, Northeastern Univ. (USA); Milind Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. (USA); Dana H. Brooks, Northeastern Univ. (USA) . . . . . [8207A-01]

Collagen crosslink status analysed in vitro using second-harmonic generation (SHG) and fluorescence lifetime imaging (FLIM), Vivien Lutz, Stefan Puschmann, Stefan Gallinat, Horst Wenck, Klaus-Peter Wittern, Frank F. Fischer, Beiersdorf AG (Germany). . . . . [8207A-02]

The characterisation of skin lesions using two-photon excited multispectral fluorescence lifetime imaging, Clifford B. Talbot, Imperial College London (United Kingdom); Rakesh Patalay, Imperial College London (United Kingdom) and Imperial College Healthcare NHS Trust (United Kingdom); Yuriy Alexandrov, Sean Warren, Ian Munro, Imperial College London (United Kingdom); Hans G. Breunig, Karsten Koenig, JenLab GmbH (Germany); Mark A. A. Neil, Paul M. W. French, Imperial College London (United Kingdom); Gordon W. Stamp, Imperial College Healthcare NHS Trust (United Kingdom) and The Royal Marsden Hospital NHS Trust (United Kingdom); Anthony Chu, Imperial College Healthcare NHS Trust (United Kingdom); Christopher Dunsby, Imperial College London (United Kingdom) . . . . . [8207A-03]

Simultaneous dual-wavelength OCT for dermatological applications, Aneesh Alex, Jessika Weingast, Boris Pova?ay, Bernd Hofer, Michael Binder, Hubert Pehamberger, Wolfgang Drexler, Medizinische Univ. Wien (Austria) . . . . . [8207A-04]

Modeling of skin cooling, blood flow, and optical properties in wounds created by electrical shock *(Invited Paper)*, Thu A. Nguyen, The Catholic Univ. of America (USA); Jeffrey W. Shupp M.D., Lauren T. Moffatt, James C. Jeng, Marion H. Jordan M.D., The Burn Center at Washington Hospital Ctr. (USA); Jessica C. Ramella-Roman, The Catholic Univ. of America (USA) . . . . [8207A-05]

SESSION 2 . . . . . Sat. 10:45 am to 12:10 pm

Session II

Session Chair: **Jessica C. Ramella-Roman,**
The Catholic Univ. of America (USA)

Intelligent image analysis for image-guided hair removal and skin therapy, Thomas T. Lu, Tien-Hsin Chao, Jet Propulsion Lab. (USA) . . . . . [8207A-06]

Dermal reflectivity determined by optical coherence tomography is an indicator of epidermal hyperplasia and dermal edema within inflamed skin, Kevin G. Phillips, Yun Wang, Oregon Health & Science Univ. (USA); David Levitz, Tel Aviv Univ. (Israel); Niloy Choudhury, Michigan Technological Univ. (USA); Emily Swanzey, James Lagowski, Molly Kulesz-Martin, Steven L. Jacques, Oregon Health & Science Univ. (USA) . . . . . [8207A-07]

Reduction of OCT image artifacts for improved imaging of skin, Yih M. Liew, Robert A. McLaughlin, Fiona Wood, David D. Sampson, The Univ. of Western Australia (Australia) . . . . . [8207A-08]

Preclinical in-vivo evaluation of NPe6-mediated photodynamic therapy on normal vasculature *(Invited Paper)*, Wesley Moy, Shreyas Patel, Ben Lertsakdadet, Rajan Arora, Katherine Nielsen, Beckman Laser Institute and Medical Clinic (USA); Kristen Kelly M.D., Univ. of California, Irvine School of Medicine (USA); Bernard Choi, Beckman Laser Institute and Medical Clinic (USA) . . . . . [8207A-09]

Lunch Break . . . . . 12:10 to 1:40 pm

SESSION 3 . . . . . Sat. 1:40 to 3:25 pm

Session III

Session Chair: **Anthony J. Durkin,**
Beckman Laser Institute and Medical Clinic (USA)

Deep skin structural and microcirculation imaging with extended-focus OCT, Cedric Blatter, Branislav Grajciar, Medizinische Univ. Wien (Austria); Robert Huber, Ludwig-Maximilians-Univ. München (Germany); Rainer Leitgeb, Medizinische Univ. Wien (Austria) . . . . . [8207A-10]

Evaluation of port-wine stain treatment outcomes using multispectral imaging, Ravikant Samatham, Steven Jacques, Alfons L. Krol, Oregon Health & Science Univ. (USA) . . . . . [8207A-11]

In vivo multiphoton microscopy assessment of topical corticosteroid-induced skin modifications and depigmentation, Emmanuelle Tancrède, Hassan Ait El Madani, L'Oréal Recherche & Innovation (France) and Hôpital Saint-Louis (France); Armand Bensussan, Hôpital Saint-Louis (France); Anne Colonna, L'Oréal Recherche & Innovation (France); Alain Dupuy, l'Hôpital Pontchaillou (France); Martine Bagot, Hôpital Saint-Louis (France); Ana-Maria Pena, L'Oréal Recherche et Innovation (France). . . . . [8207A-12]

Combined fluorescence-Raman spectroscopy measurements with an optical fiber probe for the diagnosis of melanocytic lesions, Alessandro Cosci, Riccardo Cicchi, European Lab. for Non-linear Spectroscopy (LENS) (Italy); Susanna Rossari, Vincenzo De Giorgi, Daniela Massi, Univ. degli Studi di Firenze (Italy); Francesco S. Pavone, European Lab. for Non-linear Spectroscopy (LENS) (Italy). . . . . [8207A-13]

Imaging immune response of skin mast cells in vivo with two-photon microscopy *(Invited Paper)*, Chunqiang Li, The Univ. of Texas at El Paso (USA); Riikka K. Pastila, Radiation and Nuclear Safety Authority (Finland); Charles P. Lin, Wellman Ctr. for Photomedicine (USA) . . . . . [8207A-14]

SESSION 4 . . . . . Sat. 3:55 to 5:40 pm

Session IV

Session Chair: **Iltefat Hamzavi,** Henry Ford Hospital (USA)

Pulsed photothermal depth profiling of tattoos undergoing laser removal treatment *(Invited Paper)*, Matija Milanic, Boris Majaron, Jo?ef Stefan Institute (Slovenia). . . . . [8207A-15]

Combination of Stokes polarized light imaging, roughness metrics, and morphological features for the detection of melanoma, Pejhman Ghassemi, The Catholic Univ. of America (USA); Thomas A. Germer, National Institute of Standards and Technology (USA); Jeffrey W. Shupp M.D., The Burn Center at Washington Hospital Ctr. (USA); Suraj S. Venna, Marc E. Boisvert M.D., Washington Hospital Ctr. (USA); Katherine Flanagan, M. H. Jordan M.D., The Burn Center at Washington Hospital Ctr. (USA); Jessica Ramella-Roman, The Catholic Univ. of America (USA) . . . . . [8207A-16]

Intense high-frequency pressure waves produced with low laser fluences, Carlos Serpa, Gonçalo F. F. Sá, Luis G. Arnaut, Univ. de Coimbra (Portugal). . . . . [8207A-17]

Determination of optimal glycerol concentration for optical tissue clearing effects, Eungjun Youn, Taeyoon Son, Han Sung Kim, Byungjo Jung, Yonsei Univ. (Korea, Republic of) . . . . . [8207A-18]

FootLaser treatment for onychomycosis in an in vitro hallux model, David M. Harris, Bio-Medical Consultants, Inc. (USA); Sam Lewis, Elaine Wells-Gray, Jeremy Ault, PathoLase, Inc. (USA) . . . . . [8207A-19]

BiOS Hot Topics
Sat. 7:00 to 9:00 pm
BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 5 . . . . . Sun. 8:30 to 10:15 am

Session V

Session Chair: **Haishan Zeng,**
The BC Cancer Agency Research Ctr. (Canada)

Evaluation of facial hyperpigmentation: comparison of fluorescence and polarization images, Eunji Kim, Han Sung Kim, Byungjo Jung, Yonsei Univ. (Korea, Republic of). . . . . [8207A-20]

Investigation of line scanning for confocal microscopy in tissue, Bjorg A. Larson, Sanjeewa Abeytunge, Chris Glazowski, Milind Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. (USA) . . . . . [8207A-21]

In vivo video rate multiphoton microscopy imaging of human skin, Hequn Wang, Anthony M. D. Lee, Zack Frehlick, Yingqiu Yu, The BC Cancer Agency Research Ctr. (Canada); Shuo Tang, The Univ. of British Columbia (Canada); Jianhua Zhao, The BC Cancer Agency Research Ctr. (Canada); Harvey Lui M.D., David I. McLean M.D., The Univ. of British Columbia (Canada); Haishan Zeng, The BC Cancer Agency Research Ctr. (Canada) . . . . . [8207A-22]

Hyperspectral imaging of bruises in the SWIR spectral region, Lise L. Randeberg, Norwegian Univ. of Science and Technology (Norway); Julio E. Hernandez-Palacios, Norsk Elektro Optikk AS (Norway) . . . . . [8207A-23]

Polarization imaging for non-invasive detection of skin cancer margins *(Invited Paper)*, Ravikant Samatham, Steven L. Jacques, Ken Lee, Oregon Health & Science Univ. (USA) . . . . . [8207A-24]

SESSION 6 . . . . . Sun. 10:45 am to 12:35 pm

Session VI

Session Chair: **Nikiforos Kollias,** Johnson & Johnson CPPW (USA)

Assessing human skin with diffuse reflectance spectroscopy and colorimetry *(Invited Paper)*, InSeok Seo, Yang Liu, Paulo R. Bargo, Nikiforos Kollias, Johnson & Johnson CPPW (USA) . . . . . [8207A-25]

Ex vivo and in vivo full-field optical coherence tomography on skin, Fabrice Harms, Eugénie Dalimier, Bertrand de Poly, LLTECH SAS (France); Anne Latrive, ESPCI - Institut Langevin (France); Denis Salomon, Univ. Hospital of Geneva (Switzerland); A. Claude Boccara, ESPCI - Institut Langevin (France) and LLTech SAS (France) . . . . . [8207A-26]

Real-time Raman spectroscopy for in vivo evaluation of skin cancers *(Invited Paper)*, Jianhua Zhao, Haishan Zeng, The BC Cancer Agency Research Ctr. (Canada) and The Univ. of British Columbia (Canada); David I. McLean, Harvey Lui, The Univ. of British Columbia (Canada) and The BC Cancer Agency Research Ctr. (Canada). . . . . [8207A-27]

Multiphoton tomography of tattoos, Karsten König, JenLab GmbH (Germany) . . . . . [8207A-28]

In vivo Raman spectroscopy of the skin: advances and issues for clinical implementation, Isaac J. Pence, Elizabeth Vargis, Quyen Nguyen, Chetan Patil, Vanderbilt Univ. (USA); Darrel Ellis, Vanderbilt Univ. Medical Ctr. (USA); Anita Mahadevan-Jansen, Vanderbilt Univ. (USA) . . . . . [8207A-29]

POSTER SESSION and COFFEE BREAK . . Sat. 3:30 to 4:30 pm

Attendees are invited to view the conference posters, which will be available on Saturday. The poster session, with authors present, will be held from 3:30 to 4:30 PM on Saturday afternoon, in conjunction with the coffee break.

Poster authors: Please put up your poster before the Saturday morning coffee break, and stand with your poster during the poster session from 3:30 to 4:30 PM. Please remove it immediately following the session. Posters remaining on the boards after the session will be discarded.

In vivo assessment of the structure of skin microcirculation by reflectance confocal-laser-scanning microscopy, Keiichi Sugata, Osamu Osanai, Hiromitsu Kawada, Kao Corp. (Japan) . . . . . [8207A-30]

Modeling and analytical treatment of FTIR spectra of nucleic acids and proteins in the patients with Bowen's disease, Natalja S. Eikje M.D., MC Professional Ltd. (Estonia). . . . . [8207A-31]

OCT monitoring of cosmetic creams in human skin in vivo, Seung Hee Han, Sogang Univ. (Korea, Republic of) and Univ. of Toronto (Canada) and Univ. Health Network (Canada); Changhan Yoon, Sogang Univ. (Canada); Leigh Conroy, Alex Vitkin, Univ. of Toronto (Canada) and Univ. Health Network (Canada) . . . . . [8207A-32]

Diagnosing basal-cell carcinoma in vivo by near-infrared Raman spectroscopy: a principal components analysis discrimination algorithm, Landulfo Silveira, Jr., Fabrício L. Silveira, Univ. Camilo Castelo Branco (Brazil); Benito Bodanese, Univ. Comunitária da Região de Chapecó (Brazil); Marcos T. T. Pacheco, Renato A. Zângaro, Univ. Camilo Castelo Branco (Brazil) [8207A-33]

Conference 8207B

Saturday 21 January 2012 • Part of Proceedings of SPIE Vol. 8207

Therapeutics and Diagnostics in Urology: Lasers, Robotics, Minimally Invasive, and Advanced Biomedical Devices

Conference Chairs: **Hyun Wook Kang,** American Medical Systems, Inc. (USA); **Bodo E. Knudsen,** The Ohio State Univ. (USA)

Program Committee: **Nathaniel M. Fried,** The Univ. of North Carolina at Charlotte (USA); **Matthew T. Gettman,** Mayo Clinic (USA); **Ed Koullick,** American Medical Systems Holdings, Inc. (USA); **Unyime O. Nseyo,** North Florida Foundation for Research and Education, Inc. (USA); **Joel M. Teichman,** Univ. British Columbia (Canada) and St. Paul's Hospital (Canada); **Rudolf M. Verdaasdonk,** Vrije Univ. Medical Ctr. (Netherlands)

Saturday 21 January

SESSION 1 . . . . . Sat. 9:00 to 10:20 am

Laser-Tissue Interaction

Session Chair: **Nathaniel M. Fried,**
The Univ. of North Carolina at Charlotte (USA)

Subsurface optical stimulation of the rat prostate nerves using a continuous-wave, 1550-nm single-mode diode laser, Serhat Tozburun, The Univ. of North Carolina at Charlotte (USA); Gwen Lagoda, Arthur Burnett M.D., The Johns Hopkins Univ. (USA); Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA) . . . . . .[8207B-34]

Interstitial laser coagulation of localized kidney tumor by Nd:YAG laser, Oleg Teodorovich, Central Clinical Hospital (Russian Federation); David G. Kochiev, A. M. Prokhorov General Physics Institute (Russian Federation); Andrei V. Ivanov, N. N. Blokhin Russian Cancer Research Ctr. (Russian Federation); Stanislav Naryshkin, Central Clinical Hospital (Russian Federation); Alexei Lukashev, Astelia Technologies (USA) . . . . . .[8207B-35]

Photoselective vaporization of prolene mesh used in female stress urinary incontinence procedures: preliminary studies using a compact, high-power red diode laser, Sarah B. Rosenbury, David Burks, Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA) . . . . . .[8207B-36]

In vitro testing of dual-mode thulium microsurgical laser, Matthew D. Keller, Jonathon D. Wells, Lockheed Martin Aculight (USA) . . . . . .[8207B-37]

SESSION 2 . . . . . Sat. 10:50 to 11:50 am

Surgical Therapy

Session Chair: **Rudolf M. Verdaasdonk,**
Vrije Univ. Medical Ctr. (Netherlands)

Prospective study on laser-assisted laparascopic partial nephrectomy, Ronald Sroka, Georg Hennig, Katja Zilinberg, Wael Khoder, Ludwig-Maximilians-Univ. München (Germany). . . . . .[8207B-38]

Tissue ablation after 120W greenlight laser vaporisation and bipolar plasma vaporisation of the prostate: a comparison using transrectal three-dimensional ultrasound volumetry, Benedikt Kranzbühler, Christian Fankhauser, Oliver Gross, Lukas J. Hefermehl, Cédric Poyet, Remo Largo, Daniel Eberli, Michael Müntener, Hans-Helge Seifert, Matthias Zimmermann, Tullio Sulser, Alexander Müller, Thomas Hermanns, Univ. Hospital Zürich (Switzerland) . . . . . .[8207B-39]

Electrosurgical injuries during robot assisted surgery: insights from the FDA MAUDE database, Andrew Fuller, George Vilos, Stephen E. Pautler M.D., The Univ. of Western Ontario (Canada). . . . . .[8207B-40]

SESSION 3 . . . . . Sat. 1:10 to 3:10 pm

Optical Imaging

Session Chair: **Unyime O. Nseyo,**
North Florida Foundation for Research and Education, Inc. (USA)

Imaging of the canine vas deferens for non-invasive laser vasectomy: comparison of optical coherence tomography and ultrasound, Christopher Cilip, The Univ. of North Carolina at Charlotte (USA); Mohamad Allaf M.D., The Johns Hopkins Univ. (USA); Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA) . . . . . .[8207B-41]

Next generation of optical diagnostics for bladder cancer using probe-based confocal laser endomicroscopy, Jen-Jane Liu, Ying Pan, Stanford Univ. School of Medicine (USA); Shelly T. Hsiao, Veterans Affairs Palo Alto Health Care System (USA); Timothy Chang, Katherine E. Mach, Stanford Univ. School of Medicine (USA); Kristin C. Jensen, Veterans Affairs Palo Alto Health Care System (USA); Joseph C. Liao, Stanford Univ. School of Medicine (USA) . . . . . .[8207B-42]

Monitoring of lower urinary tract function in patients with spinal cord injury using near-infrared spectroscopy (NIRS), Babak Shadgan M.D., The Univ. of British Columbia (Canada); Lynn Stothers, UBC Hospital Bladder Care Ctr. (Canada); Andrew J. Macnab, Mark Nigro, The Univ. of British Columbia (Canada) . . . . . .[8207B-43]

Real-time bladder navigation using an advanced stereotactic system, Michelle Agenant M.D., Univ. Medical Ctr. Utrecht (Netherlands); Arjen van Rhijn, Wim Koomen, Personal Space Technologies, Inc. (Netherlands); Froukje Euwe, Herke Jan Noordmans, Stefan Been, Ruud Bosch M.D., Univ. Medical Ctr. Utrecht (Netherlands) . . . . . .[8207B-44]

Functional optical coherence tomography of renal cancer, Dirk J. Faber, Univ. van Amsterdam (Netherlands); Daniel M. de Bruin, Academisch Medisch Ctr. (Netherlands); Kurdo Barwari, Jean J. de la Rosette, M. Laguna, Univ. van Amsterdam (Netherlands); Ton G. van Leeuwen, Academisch Medisch Ctr. (Netherlands) . . . . . .[8207B-45]

Multimodal flexible cystoscopy for creating co-registered panoramas of the bladder urothelium, Timothy D. Soper, Matthew R. Burkhardt, Michael P. Porter M.D., Eric J. Seibel, Univ. of Washington (USA). . . . . .[8207B-46]

POSTER SESSION and COFFEE BREAK . . Sat. 3:30 to 4:30 pm

Attendees are invited to view the conference posters, which will be available on Saturday. The poster session, with authors present, will be held from 3:30 to 4:30 PM on Saturday afternoon, in conjunction with the coffee break.

Poster authors: Please put up your poster before the Saturday morning coffee break, and stand with your poster during the poster session from 3:30 to 4:30 PM. Please remove it immediately following the session. Posters remaining on the boards after the session will be discarded.

Could Raman spectroscopy discriminate the biochemical alterations among prostate carcinoma and benign prostate tissue? an in vitro study, Landulfo Silveira, Jr., Camilo Castelo Branco Univ. (Brazil); Kátia Ramos Moreira Leite M.D., Miguel Srougi M.D., Univ. de São Paulo (Brazil); Fabrício L. Silveira, Marcos T. Pacheco, Camilo Castelo Branco Univ. (Brazil); Carlos A. Pasqualucci M.D., Univ. de São Paulo (Brazil) . . . . . .[8207B-52]

A systematic study of cancerous and normal prostate tissues: fractal dimensional parameter, absorption and scattering coefficients, Y. Pu, W.B. Wang, M. Alrubaiee, S. K. Gayen, The City College of New York (USA); M. Xu, Fairfield Univ. (USA). . . . . .[8207B-53]

Design of catheter-based diffusing optical device for endometrial coagulation, Danop Rajabhandharaks, Hyun Wook Kang, American Medical Systems, Inc. (USA). . . . . .[8207B-54]

SESSION 4 . . . . . Sat. 4:10 to 5:50 pm

Laser Lithotripsy

Session Chair: **Joel M. H. Teichman,** St. Paul's Hospital (Canada)

Short-pulsed Tm:YAG laser lithotripsy: comparative study on ablation performance with conventional Ho:YAG laser, Danop Rajabhandharaks, Hyun Wook Kang, American Medical Systems, Inc. (USA). . . . . .[8207B-47]

Thulium fiber laser lithotripsy using bursts of pulse trains for enhanced stone ablation, Richard Blackmon, The Univ. of North Carolina at Charlotte (USA); Pierce Irby M.D., Carolinas Medical Ctr. (USA); Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA) . . . . . .[8207B-48]

3D numerical reproduction of crack patterns, in a cylindrical sample, observed in shock wave lithotripsy, Maddegedara L. Wijerathne, Muneo Hori, The Univ. of Tokyo (Japan); Hide Sakaguchi, Japan Agency for Marine-Earth Science and Technology (Japan) . . . . . .[8207B-49]

Effects of Holmium:YAG energy on BackStop anti-retropulsion polymer, Jinze Qiu, The Univ. of Texas at Austin (USA); Joel M. H. Teichman, The Univ. of British Columbia (Canada); Bingqing Wang, Thomas Milner, The Univ. of Texas at Austin (USA) . . . . . .[8207B-50]

Endoscopic identification of calcium oxalate monohydrate calculi during Ho:YAG lithotripsy, Reza Hamidizedah, Joel M. H. Teichman M.D., St. Paul's Hospital (Canada) . . . . . .[8207B-51]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Saturday-Monday 21-23 January 2012 • Part of Proceedings of SPIE Vol. 8207

Optical Imaging, Therapeutics, and Advanced Technology in Head and Neck Surgery and Otolaryngology

Conference Chairs: **Brian Jet-Fei Wong,** Beckman Laser Institute and Medical Clinic (USA); **Justus F. Ilgner,** Univ. Hospital Aachen (Germany); **Krzysztof Izdebski,** Pacific Voice and Speech Foundation (USA)

Program Committee: **James A. Burns,** Massachusetts General Hospital (USA); **Henricus J. C. M. Sterenborg,** Erasmus MC (Netherlands); **Waseem K. Jerjes,** UCL Medical School and Leeds Teaching Hospitals NHS Trust (United Kingdom); **Milind Rajadhyaksha,** Memorial Sloan-Kettering Cancer Ctr. (USA); **Chung-Ku Rhee,** Dankook Univ. Hospital (Korea, Republic of); **Yuling Yan,** Santa Clara Univ. (USA)

In conjunction with:

PACIFIC VOICE & SPEECH FOUNDATION

Saturday 21 January

SESSION 1 . . . . . Sat. 8:30 to 10:30 am

Session Chair: **Brian Jet-Fei Wong,**
Beckman Laser Institute and Medical Clinic (USA)

In vivo monitoring method for traumatic brain injury of mouse based on near-infrared light, Weitao Li, Zhiyu Qian, Xuena Wang, Xing Liu, Nanjing Univ. of Aeronautics and Astronautics (China) . . . . . .[8207C-01]

Thermal and mechanical processes in laser reshaping of costal cartilage for ENT, Olga I. Baum, Yulia M. Soshnikova, Emil N. Sobol, Institute on Laser and Information Technologies (Russian Federation) . . . . . .[8207C-02]

Real-time line-scanning reflectance confocal endoscope to enhance sectioning and reduce speckle for intraoral imaging, Christopher Glazowski, Milind Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. (USA). . .[8207C-03]

Reflectance confocal microscope for imaging oral tissues in vivo, potentially with line scanning as a low-cost approach for clinical use, Gary Peterson, Sanjee Abeytunge, Memorial Sloan-Kettering Cancer Ctr. (USA); Zach Eastman, Lucid Inc. (USA); Milind Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. (USA) . . . . . .[8207C-04]

In vivo measurement of differential motion inside the organ of Corti using a low-coherence interferometer system, Fangyi Chen, Dingjun Zha, Oregon Health & Science Univ. (USA); Anders Fridberger, Karolinska Institutet (Sweden); Jiefu Zheng, Niloy Choudhury, Steven L. Jacques, Oregon Health & Science Univ. (USA); Ruikang K. Wang, Univ. of Washington (USA); Alfred L. Nuttall, Oregon Health & Science Univ. (USA). . . . . .[8207C-05]

Endoscopic laser scalpel for head and neck cancer surgery, Ricardo Toledo-Crow, Snehal Patel, Milind Rajadhyaksha, Stefan Kirov, Yongbiao Li, Memorial Sloan-Kettering Cancer Ctr. (USA) . . . . . .[8207C-06]

SESSION 2 . . . . . Sat. 11:00 am to 1:00 pm

Session Chair: **Justus F. Ilgner,** Univ. Hospital Aachen (Germany)

Optimization of targeted two-photon PDT triads for the treatment of head and neck cancers, Charles W. Spangler, Jean R. Starkey, Galyna Dubinina, SensoPath Technologies Inc. (USA); Carl Fahlstrom, Montana State Univ. (USA); Joyce Shepard, SensoPath Technologies Inc. (USA) . . . . . .[8207C-10]

Ultrafast laser microsurgery, simultaneous multiphoton, and SHG imaging of healthy and scarred vocal folds, Murat Yildirim, Onur Ferhanoglu, Christopher L. Hoy, The Univ. of Texas at Austin (USA); James B. Kobler, Massachusetts General Hospital (USA); Adela Ben-Yakar, The Univ. of Texas at Austin (USA) . . . . . .[8207C-11]

5-aminolevulinic acid photodynamic therapy for head and neck dysplasia, Harry Quon M.D., Johns Hopkins Univ. (USA); Mary E. Putt, Timothy C. Zhu, Jarod C. Finlay, Andrea Dimofte, Michael Mehler, Kelly M. Malloy, The Univ. of Pennsylvania Health System (USA); Craig E. Grossman M.D., Univ. of Pennsylvania (USA); Shannon Gallagher-Colombo, Univ. of Pennsylania (USA); Gregory S. Weinstein M.D., Bert W. O'Malley, Jr. M.D., Carmen E. Rodriguez, Theresa M. Busch, The Univ. of Pennsylvania Health System (USA) . .[8207C-12]

The optimal time to treat noise-induced hearing loss (NIHL) with low level laser therapy (LLLT), Chung-Ku Rhee M.D., Jin-Chul Ahn M.D., Phil-Sang Chung M.D., Myung-Whan Suh M.D., Dankook Univ. Hospital (Korea, Republic of) . . . . . .[8207C-13]

Laser cordectomy for early glottic carcinoma, Phil-Sang Chung M.D., Dankook Univ. Hospital (Korea, Republic of) . . . . . .[8207C-14]

Photochemical internalisation: the results of the 1st clinical trial in humans, Waseem K. Jerjes, Univ. of Leeds (United Kingdom) and Leeds Teaching Hospitals NHS Trust (United Kingdom) and Univ. College London Medical School (United Kingdom); Ahmed A. Sultan, Univ. College London (United Kingdom); Kristian Berg, The Norwegian Radium Hospital (Norway); Zaid Hamdoon, Univ. College Hospital (United Kingdom); Charles A. Mosse, Univ. College London (United Kingdom); Anders Høgset, PCI Biotech AS (Norway); Dawn Carnell, Univ. College Hospital (United Kingdom); Stephen G. Bown M.D., Univ. College London (United Kingdom); Colin Hopper, Univ. College London Hospitals NHS Foundation Trust (United Kingdom) . . . . . .[8207C-15]

SESSION 3 . . . . . Sat. 2:00 to 4:30 pm

Session Chair: **Krzysztof Izdebski,**
Pacific Voice and Speech Foundation (USA)

Quality of life of patients undergoing photodynamic therapy, Waseem K. Jerjes, Colin Hopper, Univ. College London (United Kingdom) . . . . . .[8207C-16]

Management of superficial tissue disease using PDT: non-melanomatous skin cancer, Waseem K. Jerjes, Colin Hopper, Univ. College London (United Kingdom) . . . . . .[8207C-17]

Human airway structure modeling using long rang OCT, Joseph Jing, Jun Zhang, Beckman Laser Institute and Medical Clinic (USA); Marc Rubinstein, Anthony E. Chin Loy, Brian J. Wong, Univ. of California, Irvine School of Medicine (USA); Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) . . . . . .[8207C-18]

Preliminary subglottic stenosis imaging in a rabbit model using OCT, Jennifer L. Lin M.D., Jonathon W. Boyd M.D., Brian J. F. Wong M.D., Univ. of California, Irvine (USA). . . . . .[8207C-19]

High-speed phonoscopy images analyzed by and Nyquist Plots, Rita R. Patel, Univ. of Kentucky (USA) . . . . . .[8207C-20]

Snake based automatic tracing of vocal-fold motion from high-speed laryngeal images, Gan Du, Santa Clara Univ. (USA) . . . . . .[8207C-21]

BiOS Hot Topics
Sat. 7:00 to 9:00 pm
BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 4 . . . . . Sun. 8:30 to 10:30 am

Session 4

Session Chair: **Brian Jet-Fei Wong,**
Beckman Laser Institute and Medical Clinic (USA)

Miniature OCT endsocpic probe for in vivo human vocal folds imaging, Gangjun Liu, Brian Wong, Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) . . . . . [8207C-22]

Improvement of clinical assessment of selected mucosal vocal folds lesions using high speed imaging, kymography with simultaneous electroglottography and acoustics signals, Krzysztof Izdebski, . . . [8207C-23]

Analysis of mucosal wave by HIS and Kymography in papilloma treated with Avastin, Krzysztof Izdebski, ... [8207C-24]

Register switch as seen by high speed imaging and Kymography, Krzysztof Izdebski, ... [8207C-25]

Correlations of HIS with other clinical voice measurements, Mette Pedersen, The Medical Ctr. (Denmark); Eeg Martin, ... [8207C-26]

Asynchrony of mucosal wave in normal subjects investigated by HDI and Kymography and processed with Nyquist plots, Krzysztof Izdebski, ... [8207C-27]

SESSION 5 . . . . . Sun. 11:00 am to 1:00 pm

Session 5

Session Chair: **Justus F. Ilgner,** Univ. Hospital Aachen (Germany)

Visualization of time-frequency phonemes properties using wavelet transform to speech signal analysis, Mariusz Ziolko, AGH Univ. of Science and Technology (Poland). . . . . [8207C-28]

Pediatric high speed digital imaging of vocal fold activity, , ... [8207C-29]

Virtual optical laryngoscopy, , ... [8207C-30]

Visualizations by acoustics of voice stress. Is there an optical mucosal wave correlate? . . . . . [8207C-31]

What are we learning about neoglottic phonation from HSDI, Leah Skladany, Univ. of Nevada, Reno (USA) . . . . . [8207C-32]

A silent speech interface based on real time imaging of the vocal tract . . . . . [8207C-33]

Lunch/Exhibition Break . . . . . 1:00 to 2:00 pm

SESSION 6 . . . . . Sun. 2:00 to 5:10 pm

Session 6

Session Chair: **Krzysztof Izdebski,**
Pacific Voice and Speech Foundation (USA)

What is the mucosal wave good for if it can not an it be surfed?, Julie Barkmeier-Kraemer, Univ. of California, Davis (USA) . . . . . [8207C-34]

Visual image analysis of laryngeal tremor, , ... [8207C-35]

Accessing better vocal fold surgical field with stroboscopic illumination, , ... [8207C-36]

Enhancement of diagnoses of allergic laryngitis using stroboscopic visual images of the vocal folds, , ... [8207C-37]

Advantages of advanced HD laryngeal imaging in the office procedures, , ... [8207C-38]

Long range Fourier domain OCT for real time anatomic imaging of human upper airway, Jun Zhang, Joe Jing, Brian Wong M.D., Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA). . . . . [8207C-39]

Early results of an in vivo trial of ESS in thyroid cancer, Jennifer E. Rosen, Ilona D. Goukassian, Boston Univ. (USA); Ousama M. A'Amar, Irving J. Bigio, Boston University (USA); Stephanie L. Lee, Boston Univ. (USA) . . . . . [8207C-40]

Stroboscopic visualization of laryngeal mucosal wave before and after treatment for reflux: is there objective evidence?, Josef Schloemicher-Thier, ... [8207C-41]

Conference 8207D

Saturday 21 January 2012 • Part of Proceedings of SPIE Vol. 8207

Optical Techniques in Pulmonary Medicine

Conference Chairs: **Melissa J. Suter,** Massachusetts General Hospital (USA); **Stephen Lam,** The BC Cancer Agency Research Ctr. (Canada); **Matthew Brenner,** Univ. of California, Irvine (USA)

Program Committee: **David Douglas Sampson,** The Univ. of Western Australia (Australia); **Luc Thiberville,** Rouen Univ. Hospital (France); **Edmund Koch,** Universitätsklinikum Carl Gustav Carus Dresden (Germany); **Victor X. D. Yang,** Ryerson Univ. (Canada); **Johannes F. de Boer,** Vrije Univ. Amsterdam (Netherlands)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:30 to 10:20 am

Diagnostic Imaging

Session Chair: **Stephen Lam,**
The BC Cancer Agency Research Ctr. (Canada)

Optical techniques in pulmonary medicine *(Invited Paper, Presentation Only)*, Stephen Lam, The BC Cancer Agency Research Ctr. (Canada). . . . . .[8207D-55]

Limitations of commercial time-domain optical coherence tomography in the airways, Septimiu D. Murgu M.D., Henri G. Colt, David S. Mukai, Matthew Brenner, Univ. of California, Irvine (USA). . . . . .[8207D-56]

Improvements to a laser Raman spectroscopy system for reducing the false positives of autofluorescence bronchoscopies, Hanna C. Pawluk, Michael A. Short, Stephen Lam, Annette McWilliams, Diana Ionescue, Haishan Zeng, The BC Cancer Agency Research Ctr. (Canada) . . . . . .[8207D-57]

Measurements of airway wall structure by OCT: correlations with histology, Pierre M. Lane, Anthony Lee, The BC Cancer Agency Research Ctr. (Canada); Tara Candido, The Univ. of British Columbia (Canada); Keishi Ohtani, The BC Cancer Agency Research Ctr. (Canada); Rebecca Shalansky, The Univ. of British Columbia (Canada); Annette McWilliams, Tawimas Shaipanich, The BC Cancer Agency Research Ctr. (Canada); Harvey O. Coxson, The Univ. of British Columbia (Canada); Calum E. MacAulay, Stephen Lam, The BC Cancer Agency Research Ctr. (Canada). . . . . .[8207D-58]

Volumetric optical frequency domain imaging of pulmonary pathology, Lida P. Hariri, Matthew B. Applegate, Mari Mino-Kenudson, Eugene J. Mark, Brett E. Bouma, Guillermo J. Tearney, Melissa J. Suter, Massachusetts General Hospital (USA) . . . . . .[8207D-59]

SESSION 2 . . . . . Sat. 10:50 am to 12:10 pm

Structure and Function of Alveoli

Session Chair: **Melissa J. Suter,** Massachusetts General Hospital (USA)

Quantitative investigation of alveolar structures with OCT using total liquid ventilation during mechanical ventilation, Christian Schnabel, Sven Meissner, Edmund Koch, Universitätsklinikum Carl Gustav Carus Dresden (Germany) . . . . . .[8207D-60]

Modeling of light refraction to investigate the validity of alveolar shape and volume visualized by optical frequency domain imaging, Carolin I. Unglert, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA) and Air Liquide R&D Medical Gases (France); William C. Warger II, Eman Namati, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA); Brett Bouma, Guillermo J. Tearney M.D., Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA) and Massachusetts Institute of Technology (USA) . . . . . .[8207D-61]

Multimodal imaging of lung tissue using optical coherence tomography and two-photon microscopy, Maria Gaertner, Peter Cimalla, Stefan Geissler, Sven Meissner, Christian Schnabel, Universitätsklinikum Carl Gustav Carus Dresden (Germany); Wolfgang M. Kuebler, Charité Universitätsmedizin Berlin (Germany) and Univ. of Toronto (Canada); Edmund Koch, Universitätsklinikum Carl Gustav Carus Dresden (Germany). . . . . .[8207D-62]

Four-dimensional visualization of peripheral alveolar dynamics during uninterrupted ventilation in vivo, William C. Warger II, Eman Namati, Carolin I. Unglert, Jocelyn E. Eckert, Brett E. Bouma, Guillermo J. Tearney, Massachusetts General Hospital (USA) . . . . . .[8207D-63]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 3 . . . . . Sat. 1:30 to 3:30 pm

Novel Catheters and Microscopy Techniques

Session Chair: **Johannes F. de Boer,**
Vrije Univ. Amsterdam (Netherlands)

Optical detection and diagnosis of peripheral pulmonary lesions, Alex C. Chee M.D., Massachusetts General Hospital (USA) and Foothills Medical Ctr, Univ. of Calgary (Canada); Lida P. Hariri, Matthew Applegate, Colleen Channick, Guillermo J. Tearney, Brett Bouma, Melissa J. Suter, Massachusetts General Hospital (USA) . . . . . .[8207D-64]

In situ 3D imaging of alveoli with a 30-gauge side-facing OCT needle probe, Xiao Jie Yang, Dirk Lorenser, Rodney W. Kirk, Bryden C. Quirk, Peter B. Noble, Robert A. McLaughlin, David D. Sampson, The Univ. of Western Australia (Australia). . . . . .[8207D-65]

High-speed three-dimensional endoscopic optical frequency domain imaging with external k-clock sampling, Jianan Li, Joshua Mo, Frank Helderman, Mattijs de Groot, Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands) . . . . . .[8207D-66]

Development and testing of a fiber-based rotational monocoil OCT probe for airway imaging, Andrew E. Heidari, OCT Medical Imaging Inc. (USA); Lidek Chou, OCT Medical Imaging Inc. (USA) and Beckman Laser Institute (USA); David S. Mukai, Univ. of California, Irvine (USA); Sari B. Mahon, Beckman Laser Institute and Medical Clinic (USA); Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) and Univ. of California, Irvine (USA); Matthew Brenner, Univ. of California, Irvine (USA) and Beckman Laser Institute, University of California, Irvine (USA); Ram S. Ramalingam, OCT Medical Imaging Inc. (USA). . . . . .[8207D-67]

Three-dimensional high-resolution imaging of lung preparations using ultramicroscopy, David Schwenninger, Constanze Dassow, Josef Guttmann, Univ. Hospital Freiburg (Germany) . . . . . .[8207D-68]

Ultrahigh-resolution optical coherence tomography imaging of diseased rat lung using Gaussian-shaped super-continuum sources, Norihiko Nishizawa, Shutaro Ishida, Nagoya Univ. (Japan); Masashi Kitatsuji, Hiroyoshi Ohshima, HOYA Corp. (Japan); Yoshinori Hasegawa, Miyoko Matsushima, Tsutomu Kawabe, Nagoya Univ. (Japan) . . . . . .[8207D-69]

POSTER SESSION and COFFEE BREAK . . Sat. 3:30 to 4:30 pm

Attendees are invited to view the conference posters, which will be available on Saturday. The poster session, with authors present, will be held from 3:30 to 4:30 PM on Saturday afternoon, in conjunction with the coffee break.

Poster authors: Please put up your poster before the Saturday morning coffee break, and stand with your poster during the poster session from 3:30 to 4:30 PM. Please remove it immediately following the session. Posters remaining on the boards after the session will be discarded.

Lung vasculature imaging using speckle variance optical coherence tomography, Anthony Lee, Michelle Cua, Pierre M. Lane, Annette McWilliams, Tawimas Shaipanich, Calum E. MacAulay, The BC Cancer Agency Research Ctr. (Canada); Victor X. D. Yang, Ryerson Univ. (Canada); Stephen Lam, The BC Cancer Agency Research Ctr. (Canada) . . . . . .[8207D-75]

Calibration-free pulse oximetry technique for the measurement of oxygen saturation in arterial blood, Meir Nitzan, Elias Tobal, Eran Shalom, Salman Noah, Yair Bar Ilan, Jerusalem College of Technology (Israel) . . . . . .[8207D-76]

Optical studies of mitochondrial redox state in normoxic and hyperoxic rat lung tissue, Reyhaneh Sepehr, Kevin Staniszewski, Sepideh Maleki, Univ. of Wisconsin-Milwaukee (USA); Said Audi, Marquette Univ. (USA); Mahsa Ranji, Univ. of Wisconsin-Milwaukee (USA) . . . . . .[8207D-77]

SESSION 4 . . . . . Sat. 4:30 to 6:10 pm

Models of Human Lung Disease

Session Chair: **Matthew Brenner,** Univ. of California, Irvine (USA)

Entropy-based measures of in vivo cilia-driven microfluidic mixing derived from quantitative optical imaging, Kenny Chandrasekera, Stephan Jonas, Dipankan Bhattacharya, Mustafa K. Khokha, Michael A. Choma M.D., Yale School of Medicine (USA) . . . . . .[8207D-70]

Diffuse optical spectroscopy measurements of pulmonary physiological and metabolic effects in a lethal rabbit cyanide model, Jangwoen Lee, Sari B. Mahon, David Yoon, David S. Mukai, Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA); Matthew Brenner, Beckman Laser Institute and Medical Clinic (USA) and Pulmonary and Critical Care Medicine Div. (USA) . . . . . .[8207D-71]

Functional anatomic imaging by micro-optical coherence tomography reveals autoregulatory mechanisms governing mucociliary transport in mammalian respiratory epithelium, Linbo Liu, Wellman Ctr. for Photomedicine (USA); Marina Mazur, Suzanne B. Parker, Shastry Suresh, The Univ. of Alabama at Birmingham (USA); Brett E. Bouma, Wellman Ctr. for Photomedicine (USA) and Harvard-MIT Health Sciences and Technology (USA); Steven M. Rowe, The Univ. of Alabama at Birmingham (USA); Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) and Harvard-MIT Health Sciences and Technology (USA) . . . . . .[8207D-72]

Assessment of smoke inhalation injury using volumetric optical frequency domain imaging in sheep models, Lida P. Hariri, Matthew B. Applegate, John L. Beagle, Guillermo J. Tearney, Charles A. Hales, Melissa J. Suter, Massachusetts General Hospital (USA) . . . . . .[8207D-73]

Dynamic optical imaging of methacholine-induced bronchosconstriction and the response to deep inhalations in sheep, Melissa J. Suter, Matthew B. Applegate, Anja Braune, Vanessa J. Kelly, Guillermo J. Tearney, Guido Musch, Tilo Winkler, Massachusetts General Hospital (USA) . . . . . .[8207D-74]

BiOS Hot Topics
Sat. 7:00 to 9:00 pm
BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Conference 8207E

Saturday-Sunday 21-22 January 2012 • Part of Proceedings of SPIE Vol. 8207

Diagnostic and Therapeutic Applications of Light in Cardiology

Conference Chairs: **Kenton W. Gregory,** Oregon Medical Laser Ctr. (USA); **Guillermo J. Tearney,** Wellman Ctr. for Photomedicine (USA); **Laura Marcu,** Univ. of California, Davis (USA)

Saturday 21 January

KEYNOTE SESSION . . . . . Sat. 8:00 to 10:00 am

Trends and Updates in Cardiology

Session Chair: **Kenton W. Gregory,** Oregon Medical Laser Ctr. (USA)

Cardiovascular pathology, Guillermo J. Tearney M.D., Massachusetts General Hospital (USA) . . . . . [8207E-78]

Cardiovascular imaging, Farouc A. Jaffer, Massachusetts General Hospital (USA) . . . . . [8207E-79]

Cardiovascular therapy, Kenton W. Gregory M.D., Oregon Medical Laser Ctr. (USA) . . . . . [8207E-80]

SESSION 2 . . . . . Sat. 10:30 to 11:50 am

Cardiovascular Microscopy

Session Chair: **Andrew M. Rollins,** Case Western Reserve Univ. (USA)

Label-free nonlinear optical microscopic comparison and quantification of type-I collagen fibrils in infarcted and adipose-derived stem-cell treated myocardium tissues, Alex C. Ko, Leila Mostaço-Guidolin, Fei Wang, Bo Xiang, Michael S. D. Smith, National Research Council Canada (Canada); Arkady Major, Univ. of Manitoba (Canada); Ganghong Tian, Michael G. Sowa, National Research Council Canada (Canada) . . . . . [8207E-81]

Multispectral imaging cell finder (miCellFinder) for a quick blood test of circulating endothelial cells, Svitlana Berezhna, The Scripps Research Institute (USA); Ihor Berezhnyy, Physical Optics Corp. (USA) . . . . . [8207E-82]

4D imaging of embryonic chick hearts by streak-mode Fourier domain optical coherence tomography, Rui Wang, Jelie X. Yun, Clemson Univ. (USA); Richard L. Goodwin, Univ. of South Carolina (USA); Roger R. Markwald, Medical Univ. of South Carolina (USA); Thomas K. Borg, Univ. of South Carolina (USA); Raymond B. Runyan, The Univ. of Arizona (USA); Bruce Z. Gao, Clemson Univ. (USA) . . . . . [8207E-83]

Macrophage imaging in intact atherosclerotic plaques using OCT and two-channel two-photon luminescence microscopy, Tianyi Wang, Biwei Yin, M. Shams Kazmi, Jordan Dwelle, The Univ. of Texas at Austin (USA); Veronika Sapozhnikova, Jake Mancuso, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Brian Willsey, The Univ. of Texas at Austin (USA); Xiankai Li, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Keith P. Johnston, The Univ. of Texas at Austin (USA); Marc D. Feldman, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Andrew K. Dunn, Thomas E. Milner, The Univ. of Texas at Austin (USA) . . . . . [8207E-84]

Lunch/Exhibition Break . . . . . 11:50 am to 1:20 pm

SESSION 3 . . . . . Sat. 1:20 to 2:40 pm

Multimodality Imaging

Session Chair: **Guillermo J. Tearney,** Massachusetts General Hospital (USA)

Miniature integrated optical coherence tomography: ultrasound probe for intravascular imaging, Jiawen Li, Univ. of California, Irvine (USA); Xiang Li, The Univ. of Southern California (USA); Jiechen Yin, Univ. of California, Irvine (USA); Joe Jing, David Mukai, Sari Mahon, Beckman Laser Institute and Medical Clinic (USA); Ahmad Edris, Khiet Hoang, Univ. of California, Irvine (USA); K. Kirk Shung, The Univ. of Southern California (USA); Matthew Brenner, Univ. of California, Irvine (USA) and Univ. of California, Irvine (USA); Jagat Narula, Univ. of California, Irvine (USA); Qifa Zhou, The Univ. of Southern California (USA); Patel Pranav, Univ. of California, Irvine (USA); Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) and Univ. of California, Irvine (USA) . . . . . [8207E-85]

Combining OCT and a fluorescence intensity imaging method for atherosclerosis detection, Shanshan Liang, Beckman Laser Institute and Medical Clinic (USA) and Dalian Univ. of Technology (China); Arya Saidi, Joe Jing, Gangjun Liu, Beckman Laser Institute and Medical Clinic (USA); Jiechen Yin, Jagat Narula, Univ. of California, Irvine (USA); Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) . . . . . [8207E-86]

Translation to intravascular detection of atherosclerotic plaques using combined fluorescence lifetime and ultrasound imaging, Yang Sun, Jing Liu, Matthew Lam, Hongtao Xie, Julien Bec, Univ. of California, Davis (USA); Michael C. Fishbein, Univ. of California, Los Angeles (USA); Jonathan M. Cannata, K. Kirk Shung, The Univ. of Southern California (USA); Laura Marcu, Univ. of California, Davis (USA) . . . . . [8207E-87]

Dual-modality intra-arterial imaging catheter, Hongki Yoo, Jin Won Kim, Massachusetts General Hospital (USA); Milen Shishkov, Wellman Ctr. for Photomedicine (USA); Theodore Morse, The Boston Univ. Photonics Ctr. (USA); Roman Shubochkin, Boston Univ. (USA); Jason R. McCarthy, Massachusetts General Hospital (USA); Brett E. Bouma, Wellman Ctr. for Photomedicine (USA); Farouc A. Jaffer, Massachusetts General Hospital (USA); Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) . . . . . [8207E-88]

SESSION 4 . . . . . Sat. 3:10 to 4:30 pm

OCT

Session Chair: **Atsushi Tanaka,** Wellman Ctr. for Photomedicine (USA)

Mechanical stress on vascular wall enhances neointimal hyperplasia following stent implantation: serial explorations using optical frequency domain imaging in vivo, Atsushi Tanaka, Brett E. Bouma, Melissa J. Suter, Benjamin Greenberger, Kevin Gallagher, Wellman Ctr. for Photomedicine (USA); Dawn Winsor-Hines, Boston Scientific Corp. (USA); Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) . . . . . [8207E-89]

3D optical coherence tomography tissue type imaging, Gijs van Soest, Evelyn Regar, Erasmus MC (Netherlands); Brett Bouma, Gary Tearney, Wellman Ctr. for Photomedicine (USA); Giovanni Ughi, Jan D'Hooghe, Katholieke Univ. Leuven (Belgium); Antonius F. W. van der Steen, Erasmus MC (Netherlands) and Interuniversity Cardiology Institute of the Netherlands (Netherlands) . . [8207E-90]

Simulation of the sunflower artifact in IV-OCT imaging of bare metal stents, Sahar Elahi, Jessica Maisano, The Univ. of Texas at Austin (USA); Jouke Dijkstra, Leids Univ. Medisch Ctr. (Netherlands); Jacob Mancuso, Marc Feldman, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Thomas Milner, The Univ. of Texas at Austin (USA) . . . . . [8207E-91]

Conformational change in coronary artery structure assessed by optical coherence tomography in patients with vasospastic angina, Atsushi Tanaka, Brett E. Bouma, Wellman Ctr. for Photomedicine (USA); Kenei Shimada, Osaka City Univ. (Japan); Manabu Kashiwagi, Takashi Akasaka, Junichi Yoshikawa, Wakayama Medical Ctr. (Japan); Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) . . . . . [8207E-92]

BiOS Hot Topics
Sat. 7:00 to 9:00 pm
BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 5 . . . . . Sun. 8:40 to 10:00 am

Photoacoustic Imaging

Session Chair: **Gijs van Soest,** Erasmus MC (Netherlands)

Automatic lipid detection in human coronary atherosclerosis using spectroscopic intravascular photoacoustic imaging, Krista Jansen, Antonius F. W. van der Steen, Erasmus MC (Netherlands) and Interuniversity Cardiology Institute of The Netherlands - Netherlands Heart Institute (Netherlands); Heleen M. M. van Beusekom, J. Wolter Oosterhuis, Geert Springeling, Frits Mastik, Gijs van Soest, Erasmus MC (Netherlands) . [8207E-93]

High-frequency intravascular photoacoustic (IVPA) imaging for differentiating arterial wall layered structures, Xiang Li, The Univ. of Southern California (USA); Wei Wei, Univ. of California, Irvine (USA); K. Kirk Shung, Qifa Zhou, The Univ. of Southern California (USA); Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) . . . . . [8207E-94]

Combined intravascular ultrasound and spectroscopic photoacoustic imaging for detecting morphology and composition of atherosclerotic plaques, Stanislav Emelianov, The Univ. of Texas at Austin (USA) and The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Bo Wang, Andrei Karpiouk, Jimmy Su, Douglas E. Yeager, The Univ. of Texas at Austin (USA); Pratixa Joshi, James Amirian, The Univ. of Texas Health Science Ctr. at Houston (USA); Silvio Litovsky, The Univ. of Alabama at Birmingham (USA); Konstantin Sokolov, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA) and The Univ. of Texas at Austin (USA); Richard Smalling, The Univ. of Texas Health Science Ctr. at Houston (USA). . . . . [8207E-95]

Intracoronary Laser Speckle Imaging (ILSI) for the mechanical characterization of coronary plaques in living swine, Seemantini K. Nadkarni, Jimmy Toussaint, Guillermo Tearney, Zeinab Hajjarian, Harvard Medical School (USA) . . . . . [8207E-96]

SESSION 6 . . . . . Sun. 10:30 to 11:50 am

Cardiovascular Spectroscopy

Session Chair: **Laura Marcu,** Univ. of California, Davis (USA)

Biochemical characterization of coronary atherosclerosis based on autofluorescence imaging, Jesung Park, Paritosh Pande, Sebina Shrestha, Fred Clubb, Brian Applegate, Javier A. Jo, Texas A&M Univ. (USA) . . [8207E-97]

Automated algorithm for classification of atherosclerotic plaques using depth-resolved spectral analysis of optical frequency-domain imaging datasets, Christine P. Fleming, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Atsushi Tanaka, Joseph A. Gardecki, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA); Pál Maurovich-Horvat, William C. Warger II, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Jocelyn Eckert, Wellman Ctr. for Photomedicine (USA); Udo Hoffmann, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Brett E. Bouma, Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA) . . . . . [8207E-98]

Evaluation of intracoronary near-infrared autofluorescence spectroscopy, Hao Wang, Joseph A. Gardecki, Brett E. Bouma, Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) . . . . . [8207E-99]

Novel method for fast analysis of atherosclerotic plaque time-resolved fluorescence decay characteristics and accurate evaluation of plaque composition, Jing Liu, Univ. of California, Davis (USA) . . . . . [8207E-100]

SESSION 7 . . . . . Sun. 11:50 pm to 12:50 am

Cardiovascular Therapy

Session Chair: **Kenton W. Gregory,** Oregon Medical Laser Ctr. (USA)

Influences on vascular wall smooth muscle cells with novel short-duration thermal angioplasty, Mie Kunio, Natsumi Shimazaki, Tsunenori Arai, Keio Univ. (Japan); Masami Sakurada, Tokorozawa Heart Ctr. (Japan). . . . . [8207E-101]

Real-time control of angioplasty balloon inflation based on feedback from ontravascular optical coherence tomography, Hamed Azarnoush, Sébastien Vergnole, Guy Lamouche, National Research Council Canada (Canada) . . . . . [8207E-102]

Laser-driven short-duration heating angioplasty: chronic artery lumen patency and histology in porcine iliac artery, Natsumi Shimazaki, Mie Kunio, Sho Naruse, Tsunenori Arai, Keio Univ. (Japan); Masami Sakurada, Tokorozawa Heart Ctr. (Japan) . . . . . [8207E-103]

POSTERS - SUNDAY . . . . . Sun. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Accurate measurement of systolic blood pressure by photoplethysmography, Meir Nitzan, Shaul Akiva, Ori Gleisner, Eran Shalom, Jerusalem College of Technology (Israel) . . . . . [8207E-104]

Optical Techniques in Neurosurgery, Brain Imaging, and Neurobiology

Conference Chairs: **Henry Hirschberg,** Beckman Laser Institute and Medical Clinic (USA); **Steen Madsen,** Univ. of Nevada, Las Vegas (USA)

Program Committee: **Frederic Leblond,** Dartmouth College (USA); **Marlon Stephen Mathews,** Univ. of California, Irvine (USA); **Herbert Stepp,** Ludwig-Maximilians-Univ. München (Germany); **Victor X. D. Yang,** Ryerson Univ. (Canada)

Saturday 21 January

INTRODUCTION. . . . . Sat. 8:25 am

Session Chair: **Henry Hirschberg,**
Beckman Laser Institute and Medical Clinic (USA)

SESSION 1 . . . . . Sat. 8:30 to 10:10 am

Brain Tumor Therapy: Intra Op I

Session Chair: **Herbert Stepp,**
Ludwig-Maximilians-Univ. München (Germany)

identifying brain cancers using dye-enhanced multimodal confocal imaging, Dennis J. Wirth, Univ. of Massachusetts Lowell (USA); Matija Snuderl, Harvard Medical School (USA); Sameer A. Sheth, William Curry, Massachusetts General Hospital (USA); Anna N. Yaroslavsky, Univ. of Massachusetts Lowell (USA) and Massachusetts General Hospital (USA) and Harvard Medical School (USA) . . . . . [8207F-105]

Forward-viewing optical coherence tomography probe for neurosurgical applications, Mark K. Harduar, Cuiru Sun, Ryerson Univ. (Canada); Huikai Xie, Univ. of Florida (USA); Victor X. D. Yang M.D., Ryerson Univ. (Canada) . . . . . [8207F-106]

Raman spectroscopic imaging as complementary tool for histopathologic assessment of brain tumors, Christoph Krafft, Norbert Bergner, Institut für Photonische Technologien e.V. (Germany); Bernd F. M. Romeike, Rolf Kalff, Friedrich-Schiller-Univ. Jena (Germany); Kathrin Geiger, Gabriele Schackert, Technische Univ. Dresden (Germany); Jürgen Popp, Institut für Photonische Technologien e.V. (Germany) . . . . . [8207F-107]

Value of 5-aminolevulinic acid for resection of spinal tumors, Georg Widhalm, Barbara Kiesel, Medizinische Univ. Wien (Austria); Klaus Novak, Medizinische Univ. Wien (Azerbaijan); Georgi Minchev, Adelheid Wöhrer, Christian Matula, Daniela Prayer, Johannes A. Hainfellner, Engelbert Knosp, Stefan Wolfsberger, Medizinische Univ. Wien (Austria) . . . . . [8207F-108]

A non-contact imaging approach for quantitative ALA-induced PpIX fluorescence guided resection, Pablo Valdes, Frederic Leblond, Kolbein Kolste, Dartmouth College (USA); Valerie L. Jacobs, Dartmouth Hitchcock Medical Ctr. (USA); Brian C. Wilson, Univ. of Toronto (Canada); Keith D. Paulsen, Dartmouth College (USA); David W. Roberts, Dartmouth Hitchcock Medical Ctr. (USA). . . . . [8207F-109]

SESSION 2 . . . . . Sat. 10:40 am to 12:00 pm

Cerebrovascular Imaging

Session Chair: **Marlon Stephen Mathews,**
Univ. of California, Irvine (USA)

Intraoperative laser speckle contrast imaging for monitoring cerebral blood flow: results from a 10-patient pilot study, Lisa M. Richards, Erica L. Weber, The Univ. of Texas at Austin (USA); Ashwin B. Parthasarathy, Boston Univ. (USA); Douglas J. Fox, St. David's Hospital (USA); Andrew K. Dunn, The Univ. of Texas at Austin (USA) . . . . . [8207F-110]

Feasibility and methodology of optical coherence tomography imaging of human intracranial aneurysms: ex vivo pilot study, Barry Vuong, Cuiru Sun, Ryerson Univ. (Canada); Tim-Rasmus Kiehl M.D., Univ. Health Network (Canada); Joseph A. Gardecki, Wellman Ctr. for Photomedicine (USA) and Massachusetts General Hospital (USA); Beau A. Standish, Ryerson Univ. (Canada); Leodante da Costa M.D., Sunnybrook Health Sciences Ctr. (Canada) and Univ. of Toronto (Canada); Josaphat V. de Morais M.D., Hospital de Baleia (Brazil); Guillermo J. Tearney M.D., Wellman Ctr. for Photomedicine (USA) and Massachusetts General Hospital (USA) and Harvard-MIT Health Sciences and Technology (USA); Victor X. D. Yang M.D., Ryerson Univ. (Canada) and Univ. of Toronto (Canada). . . . . [8207F-111]

Feasibility of endovascular optical coherence tomography for high-resolution carotid vessel wall imaging, Ho Yiu Cheng, Univ. of Toronto (Canada); Cuiru Sun, Ryerson Univ. (Canada); Tom R. Marotta, Julian Spears, Walter J. Montanera, St. Michael's Hospital (Canada); Peter R. Herman, Univ. of Toronto (Canada); Aman Thind, Brian K. Courtney M.D., Sunnybrook Health Sciences Ctr. (Canada); Beau A. Standish, Victor X. D. Yang, Ryerson Univ. (Canada) . . . . . [8207F-112]

Contrast-enhanced diffuse optical tomography of brain perfusion in humans using ICG, Christina Habermehl, Christoph H. Schmitz, Jens M. Steinbrink, Charité Universitätsmedizin Berlin (Germany). . . [8207F-113]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Sat. 1:30 to 3:10 pm

Brain Tumor Therapy: Post Op

Session Chair: **Henry Hirschberg,**
Beckman Laser Institute and Medical Clinic (USA)

Spectral and lifetime domain measurements of rat brain tumours, Barbara Leh, Lab. IMNC, UMR 8165 (France); Darine Abi Haidar, Lab. IMNC, UMR 8165 (France) and Univ Paris 7-Denis Diderot (France); Kamal Allaoua, Lab. IMNC, UMR 8165 (France); Mauricette Collado-Hilly, INSERM U757, F-91405 Orsay Cedex (France); Imène Chebbi, SARL Nanobactérie (France); Yves Charon, Lab. IMNC, UMR 8165 (France) and Univ Paris 7-Denis Diderot (France); Marie-Alix Duval, Lab. IMNC, UMR 8165 (France) and Univ d'Evry Val d'Essonne (France); Laurent Ménard, Lab. IMNC, UMR 8165 (France) and Univ. Paris 7-Denis Diderot (France); Rainer Siebert, Lab. IMNC, UMR 8165 (France) . . . [8207F-114]

Hyperthermia enhances photochemical internalization-mediated delivery of bleomycin in glioma spheroids, Steen Madsen, Christina Fennimore, Univ. of Nevada, Las Vegas (USA); Henry Hirschberg, Beckman Laser Institute and Medical Clinic (USA) . . . . . [8207F-115]

Quantitative measurement of cerebral blood flow during hypothermia by using time-resolved near-infrared spectroscopy, Mohammad Fazel Bakhsheshi, Mamadou Diop, Keith St Lawrence, Ting-Yim Lee, The Univ. of Western Ontario (Canada). . . . . [8207F-116]

Enhanced gene transfection by photochemical internalization of acid transforming polypeptide micelles, Henry Hirschberg M.D., En-Chung Shih, Beckman Laser Institute and Medical Clinic (USA); Steen J. Madsen, Univ. of Nevada, Las Vegas (USA); Young Jik Kwon, Univ. of California, Irvine (USA) . . . . . [8207F-117]

Dynamic contrast enhanced-magnetic resonance imaging (DCE-MRI) of photodynamic therapy (PDT) outcome and associated changes in the blood-brain barrier following Pc 4-PDT of Glioma in an athymic nude rat model, Vaijayantee Belle, Ali A. Anka, Nathan M. Cross, Paul Thompson, Eric Mott, Rahul Sharma, Kayla Gray, Ruozhen Zhang, Yueshuo Xu, Jiayang Sun, Christopher A. Flask, Nancy L. Oleinick, David Dean, Case Western Reserve Univ. (USA) . . . . . [8207F-118]

SESSION 4 . . . . . Sat. 3:40 to 5:20 pm

CNS Imaging

Session Chair: **Steen J. Madsen,** Univ. of Nevada, Las Vegas (USA)

Spatial frequency domain optical imaging of neurovascular coupling in a mouse model of Alzheimer's disease, Alexander J. Lin, Soren D. Konecky, Tyler B. Rice, Beckman Laser Institute and Medical Clinic (USA); Kim N. Green, UC Irvine Institute for Memory Impairment and Neurological Diseases (USA); Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA) . . . . . [8207F-119]

Neurosurgical hand-held optical coherence tomography (OCT) forward-viewing probe, Cuiru Sun, Ryerson Univ. (Canada); Kenneth K. C. Lee, Univ. of Toronto (Canada); Barry Vuong, Ryerson Univ. (Canada); Michael Cusimano, St. Michael's Hospital (Canada); Alexander Brukson, Adrian Mariampillai, Beau A. Standish, Ryerson Univ. (Canada); Victor X. D. Yang, Ryerson Univ. (Canada) and Univ. of Toronto (Canada) . . . . . [8207F-120]

Discriminant analysis of functional near-infrared imaging for schizophrenia diagnosis, Ching-Cheng Chuang, National Taiwan Univ. (Taiwan); I-Jen Chiang, Taipei Medical Univ. (Taiwan); Tsuo-Hung Lan, National Yang-Ming Univ. (Taiwan); Chung-Ming Chen, National Taiwan Univ. (Taiwan); Yao-Sheng Hsieh, Chun-Yang Wang, National Chiao Tung Univ. (Taiwan); Ching-Po Lin, Chia-Wei Sun, National Yang-Ming Univ. (Taiwan). . . . . [8207F-121]

Hyperspectral optical tomography of evoked hemodynamic activity in the rat cortex, Soren D. Konecky, Beckman Laser Institute and Medical Clinic (USA); Nathan A. Hagen, Rice Univ. (USA); Amaan Mazhar, Beckman Laser Institute and Medical Clinic (USA); Tomasz S. Tkaczyk, Rice Univ. (USA); Ron D. Frostig, Univ. of California, Irvine (USA); Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA). . . . . [8207F-122]

Relative phase of oscillations of cerebral oxy-hemoglobin and deoxyhemoglobin concentrations during sleep in human subjects, Michele L. Pierro, Angelo Sassaroli, Tufts Univ. (USA); Peter R. Bergethon, Boston Univ. School of Medicine (USA); Sergio Fantini, Tufts Univ. (USA) . . . . . [8207F-123]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 5 . . . . . Sun. 8:40 to 10:00 am

Brain Tumor Therapy Intra Op II

Session Chair: **Frederic Leblond,** Dartmouth College (USA)

Compact fluorescence and white-light imaging system for intraoperative visualization of nerves, Daniel C. Gray, Evgenia Kim, Victoria Cotero, Paul Staudinger, Siavash Yazdanfar, Cristina Tan Hehir, GE Global Research (USA) . . . . . [8207F-124]

Non-contact photoacoustic tomography and ultrasonography for brain imaging, Guy Rousseau, Alain Blouin, Jean-Pierre Monchalin, National Research Council Canada (Canada) . . . . . [8207F-125]

Full-field optical coherence tomography for intraoperative diagnosis during brain surgery?, Anne Latrive, Institut Langevin, ESPCI (France) and LLTECH SAS (France); Osnath Assayag, Institut Langevin, ESPCI (France); Fabrice Harms, LLTECH SAS (France); Bertrand Devaux, Ctr. Hospitalier Sainte Anne (France); Albert Claude Boccara, Institut Langevin, ESPCI (France) and LLTECH SAS (France) . . . . . [8207F-126]

Fluorescence guidance during stereotactic biopsy, Herbert Stepp, Wolfgang Beyer, Ludwig-Maximilians-Univ. München (Germany); David Brucker, Andre Ehrhardt, Stefan K. Fischer, Ludwig-Maximilians-Univ. München (USA); Werner Goebel, KARL STORZ GmbH & Co. KG (Germany); Marcus H. Goetz, MRC Systems GmbH (Germany); Georg Hennig, Jochen Herms, Ludwig-Maximilians-Univ. München (Germany); Klaus-Martin Irion, KARL STORZ GmbH & Co. KG (Germany); Ann Johansson, Ludwig-Maximilians-Univ. München (Germany); Pan Li, MRC Systems GmbH (USA); Gesa Palte, Ludwig-Maximilians-Univ. München (Germany); Adrian Rühm, Klinikum der Univ. München (Germany); Sabine Sandner, Ludwig-Maximilians-Univ. München (USA) . . . . . [8207F-127]

SESSION 6 . . . . . Sun. 10:30 to 11:30 am

Neuro Imaging

Session Chair: **Victor X. D. Yang,** Ryerson Univ. (Canada)

Full-field optical coherence microscopy (FFOCM) is a novel technique for subcellular imaging of myenteric neurons in the gastrointestinal tract: potential role in diagnosing Hirschsprung's disease, Emmanuel Coron M.D., Yaron Bromberg, Wellman Ctr. for Photomedicine (USA); Alberto Pieretti, Massachussetts General Hospital (USA); Maxime Mahé, INSERM 913 (France); Egidijus Auksorius, Wellman Center for Photomedicine (USA); Michel Neunlist, INSERM 913 (France); Brett E. Bouma, Wellman Ctr. for Photomedicine (USA); Allan Goldstein, Massachussetts General Hospital (USA); Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) . . . . . [8207F-128]

In vivo optical microprobe imaging for intracellular Ca^{2+} dynamics in response to dopaminergic signaling in deep brain evoked by cocaine, Zhongchi Luo, Yingtian Pan, Congwu Du, Stony Brook Univ. (USA) . [8207F-129]

Multichannel optical brain imaging to separate cerebral vascular, tissue metabolic, and neuronal effects of cocaine, Zhongchi Luo, Zhijia Yuan, Yingtian Pan, Congwu Du, Stony Brook Univ. (USA) . . . . . [8207F-130]

Poster Session and Coffee Break . . . . Sun. 3:00 to 4:00 pm

Attendees are invited to view the conference posters, which will be available on Saturday and Sunday for viewing. The poster session, with authors present, will be held from 3:00 to 4:00 PM on Sunday afternoon, in conjunction with the coffee break.

Poster authors: Please put up your poster before the Saturday morning coffee break, and stand with your poster during the poster session on Sunday from 3:00 to 4:00 PM. Please remove it immediately following the session. Posters remaining on the boards after the session will be discarded.

Cortical-depth dependent cerebral hemodynamic responses to direct epidural stimulation using NIRS and ORIS, Seungduk Lee, Dalkwon Koh, Korea Univ. (Korea, Republic of); Areum Jo, Hae Young Lim, Sungkyunkwan Univ. (Korea, Republic of); Young-Jin Jung, Chang-Hwan Im, Hanyang Univ. (Korea, Republic of); Choong-Ki Kim, Youngwook Seo, Korea Univ. (Korea, Republic of); Minah Suh, Sungkyunkwan Univ. (Korea, Republic of); Beop-Min Kim, Korea Univ. (Korea, Republic of). . . . . [8207F-131]

Development of wireless-based NIRS system with cancellation of motion artifacts, Choong-ki Kim, Seungduk Lee, Dalkwon Koh, Beop-Min Kim, Korea Univ. (Korea, Republic of) . . . . . [8207F-132]

Use of hypothermia in conjunction with photodynamic therapy for treatment of glioblastoma multiforme, Carl J. Fisher, Univ. of Toronto (Canada); Yonghong Chen, Benjamin Lai, Ontario Cancer Institute (Canada); James H. Eubanks, Toronto Western Hospital (Canada); Lothar D. Lilge, Univ. of Toronto (Canada). . . . . [8207F-133]

In vivo identification of brain morphology using optical coherence tomography, Carissa Reynolds, Melissa Eberle, Mike S. Hsu, Yan Wang, Christian M. Oh, Devin K. Binder, B. Hyle Park, Univ. of California, Riverside (USA) . . . . . [8207F-134]

Study of EEG affected by low-level laser array, Jih-Huah Wu, Ming Chuan Univ. (Taiwan) . . . . . [8207F-135]

In vivo measurements of FOSCAN induced fluorescence in rat brain, Herwig Kostron M.D., Emrah Akkatuna, Univ. Hospital Innsbruck (Austria) . . [8207F-136]

Photons and Neurons IV

Conference Chairs: **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA); **E. Duco Jansen,** Vanderbilt Univ. (USA)

Program Committee: **Matthew Keller,** Lockheed Martin Aculight (USA); **Agnella Izzo-Matic,** Northwestern Univ. (USA); **Anna Roe,** Vanderbilt Univ. (USA); **Edward S. Boyden,** MIT Media Lab. (USA); **Samarendra K. Mohanty,** The Univ. of Texas at Arlington (USA)

Monday 23 January

SESSION 1 . . . . . Mon. 8:30 to 10:10 am

Neural Stimulation I

Session Chair: **E. Duco Jansen,** Vanderbilt Univ. (USA)

New applications for infrared neural stimulation, Matthew D. Keller, Jonathon D. Wells, Lockheed Martin Aculight (USA) . . . . . .[8207G-147]

Infrared light excites cells via transient changes in membrane electrical capacitance, Mikhail G. Shapiro, The Univ. of Chicago (USA); Kazuaki Homma, Northwestern Univ. (USA); Sebastian Villarreal, The Univ. of Chicago (USA); Claus-Peter Richter, Northwestern Univ. (USA); Francisco Bezanilla, The Univ. of Chicago (USA) . . . . . .[8207G-148]

Functional characterization of infrared neural stimulation in non-human primate cortex, Jonathan Cayce, Robert Friedman, E. Duco Jansen, Anita Mahadevan-Jansen, Anna Roe, Vanderbilt Univ. (USA) . . . . . .[8207G-149]

Selective, high-optrode-count, artifact-free stimulation with infrared light via intrafascicular Utah Slanted Optrode Arrays, Gregory A. Clark, Sylvana L. Schister, Noah M. Ledbetter, David J. Warren, Florian Solzbacher, The Univ. of Utah (USA); Jonathon D. Wells, Matthew D. Keller, Lockheed Martin Aculight (USA); Steven M. Blair, Loren W. Rieth, Prashant R. Tathireddy, The Univ. of Utah (USA) . . . . . .[8207G-150]

Cochlear infrared neural stimulation in the chronically deaf guinea pig, Agnella Izzo Matic, Claus-Peter Richter, Northwestern Univ. (USA) . .[8207G-151]

SESSION 2 . . . . . Mon. 10:40 am to 12:20 pm

Neural Stimulation II

Session Chair: **Agnella I. Matic,** Northwestern Univ. (USA)

Perturbing biomechanical forces in the developing heart tube with optical pacing, Lindsy M. Peterson, Matthew T. McPheeters, Lee M. Barwick, Shi Gu, Michiko Watanabe, Andrew M. Rollins, Michael W. Jenkins, Case Western Reserve Univ. (USA) . . . . . .[8207G-152]

Novel hardware development for infrared neural stimulation, Matthew D. Keller, Jonathon D. Wells, Lockheed Martin Aculight (USA); Matthew Dummer, Mary Hibbs-Brenner, Vixar Inc. (USA) . . . . . .[8207G-153]

Optical characterization of the Utah Slant Optrode Array for intrafascicular infrared neural stimulation, Tanya Vanessa F. Abaya, Mohit Diwekar, Steve Blair, Prashant Tathireddy, Loren Rieth, Florian Solzbacher, Gregory A. Clark, The Univ. of Utah (USA) . . . . . .[8207G-154]

Identifying and controlling sources of variability in hybrid opto-electrical neural stimulation, Austin R. Duke, Vanderbilt Univ. (USA); Hui Lu, Michael Jenkins, Case Western Reserve Univ. (USA); E. Duco Jansen, Vanderbilt Univ. (USA); Hillel Chiel, Case Western Reserve Univ. (USA). . . . . .[8207G-155]

Neuron absorption study and mid-IR optical excitations, Dingkai Guo, Xing Chen, Shilpa Vadala, Jennie Leach, Fow-Sen Choa, Univ. of Maryland, Baltimore County (USA); Bill Bewley, Chul Soo Kim, Jerry Meyer, U.S. Naval Research Lab. (USA) . . . . . .[8207G-156]

Lunch Break . . . . . 12:20 to 1:30 pm

SESSION 3 . . . . . Mon. 1:30 to 3:10 pm

Detection of Neural Activity I

Session Chair: **Matthew D. Keller,** Lockheed Martin Aculight (USA)

Parametric evaluation of calcium waves evoked by infrared neural stimulation, Jonathan Cayce, Vanderbilt Univ. (USA); Matthew Bouchard, Columbia Univ. (USA); E. Duco Jansen, Vanderbilt Univ. (USA); Elizabeth Hillman, Columbia Univ. (USA); Anita Mahadevan-Jansen, Vanderbilt Univ. (USA) . . . . . .[8207G-157]

Design and implementation of an optical coherence tomography-based optical electrode for non-contact neural recording, Md. Shahidul Islam, Md. Rezuanul Haque, Christian Oh, Yan Wang, Boris Hyle Park, Univ. of California, Riverside (USA) . . . . . .[8207G-158]

The influence of source-detector separation on NIRS signal correction, Andrew J. Berger, Univ. of Rochester (USA); James Goodwin, Univ. of Rochester (USA) and Queensland Univ. of Technology (Australia); Chantel Gaudet, Univ. of Rochester (USA) . . . . . .[8207G-159]

Neural imaging in songbirds using fiber optic fluorescence microscopy, Fatemeh Nooshabadi, Gentry Hearn, Thierry Lints, Kristen C. Maitland, Texas A&M Univ. (USA) . . . . . .[8207G-160]

Neural correlates of contour detection in the primary visual cortex revealed with voltage-sensitive dye imaging, Hamutal Slovin, Bar-Ilan Univ. (USA) . . . . . .[8207G-161]

SESSION 4 . . . . . Mon. 3:40 to 5:20 pm

Detection of Neural Activity II

Session Chair: **Samarendra K. Mohanty,** The Univ. of Texas at Arlington (USA)

Multi-plane two photon microscopy for high speed 3D neuroimaging, Elizabeth M. Hillman, Lauren Grosberg, Brenda Chen, Columbia Univ. (USA); Ugne Klibaite, Pubudu T. Galwaduge, Columbia Univ.. . . . . .[8207G-162]

Plasticity in the visual cortex: interactions between synapses and microglia, Ania Majewska, Univ. of Rochester (USA). . . . . .[8207G-163]

Optically imaging intrinsic signals produced by intracortical microstimulation reveals the circuitry of cortical networks, Robert M. Friedman, Vanderbilt Univ. (USA) . . . . . .[8207G-164]

Subthreshold and suprathreshold cortical lateral interactions revealed by optical imaging, Yves Fregnac, Ctr. National de la Recherche Scientifique (France) . . . . . .[8207G-165]

What hemodynamics can and cannot tell us about local neural activity, Aniruddha Das, Columbia Univ. (USA) . . . . . .[8207G-166]

Tuesday 24 January

SESSION 5 . . . . . Tues. 8:00 to 9:20 am

Axonal Growth

Session Chair: **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA)

Axonal regeneration of cultured mouse hippocampal neurons studied by an optical nanosurgery system, Francesco Difato, Hanako Tsushima, Mattia Pesce, Fabio Benfenati, Axel Blau, Evelina Chieregatti, Istituto Italiano di Tecnologia (Italy) . . . . . .[8207G-167]

Repair of damage and stimulation of growth cone response following laser- induced sub-axotomy, Tao Wu, Samarendra Mohanty, Veronica Gomez-Godinez, Lih-Huei Liaw, Beckman Laser Institute and Medical Clinic (USA); Jill Miotke, Ronald Meyer, Univ. of California, Irvine (USA); Michael Berns, Beckman Laser Institute and Medical Clinic (USA) . . . . . .[8207G-168]

Enhancement and probing of neuronal growth using optical tweezers, Samarendra K. Mohanty, The Univ. of Texas at Arlington (USA) . . . .[8207G-169]

Impact of nanosecond pulsed electric fields on primary hippocampal neurons, Caleb C. Roth, General Dynamics Information Technology (USA); Jason A. Payne, Gerald J. Wilmink, Bennett L. Ibey, Danielle R. Dalzell, Air Force Research Lab. (USA) . . . . . .[8207G-170]

SESSION 6 . . . . . Tues. 9:20 to 10:20 am

Optogenetics I

Session Chair: **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA)

Shining new light on optogenetics, Samarendra K. Mohanty, Ling Gu, The Univ. of Texas at Arlington (USA); Ting Li, Univ. of Electronic Science and Technology of China (China) . . . . . .[8207G-171]

Optogenetics approaches for studying cortical function, Edward Callaway, Univ. of California, San Diego (USA) . . . . . .[8207G-172]

Optogenetic stimulation of the auditory nerve, Victor H. Hernandez, Gerhard Hoch, Matthias Bartels, Georg-August-Univ. Göttingen (Germany); Gerhard Vogt, Carolyn Garnham, MED-EL Deutschland GmbH (Germany); George J. Augustine, Duke Univ. (USA); Nicola Strenzke, Tobias Moser, Georg-August-Univ. Göttingen (Germany) . . . . . .[8207G-173]

SESSION 7 . . . . . Tues. 10:40 am to 12:20 pm

Optogenetics II

Session Chair: **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA)

Imaging voltage in electrically excitable cells, Joel Kralj, ...[8207G-174]

Targeted modulation of retinal cell subtypes to restore visual

function in the rd10 mouse model of blindness, Richard M. Stewart, M. Mehdi Doroudchi,. . . . . .[8207G-175]

A 3-D waveguide array for optogenetic control of neural circuits in the brain, Anthony N. Zorzos,. . . . . .[8207G-176]

Implantable optrode design for optogenetic visual cortical prosthesis, Na Dong, Xiaohan Sun, Southeast Univ. (China); Patrick Degenaar, Newcastle Univ. (United Kingdom). . . . . .[8207G-177]

All-optical control of neuronal function via optical delivery of light-sensitive proteins and optogenetic stimulation, Alexander Villalobos, Ling Gu, Samarendra K. Mohanty, The Univ. of Texas at Arlington (USA) . . . .[8207G-178]

Monday 23 January

POSTERS-MONDAY . . . . . Mon. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Polarization-dependent responses of fluorescent indicators partitioned into myelinated axons, Ileana Micu, Craig Brideau, Peter K. Stys M.D., Univ. of Calgary (Canada). . . . . .[8207G-179]

Quantitative characterization of peripheral nerve structural features using optical coherence tomography, Michael C. Oliveira, Md. Shahidul Islam, Univ. of California, Riverside (USA); Francis P. Henry, Harvard Medical School (USA); Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands); Boris Hyle Park, Univ. of California, Riverside (USA). . . . . .[8207G-180]

Fiber-array based optogenetic prosthetic system for stimulation therapy, Christopher Cote, Ling Gu, Samarendra K. Mohanty, The Univ. of Texas at Arlington (USA) . . . . . .[8207G-181]

Quantitative study of peripheral nerve myelination using polarization-sensitive optical coherence tomography, Yan Wang, B. Hyle Park, Univ. of California, Riverside (USA) . . . . . .[8207G-182]

The microdibi project, Marco Genovese, Istituto Nazionale di Ricerca Metrologica (Italy) . . . . . .[8207G-183]

Conference 8207H

Saturday 21 January 2012 • Part of Proceedings of SPIE Vol. 8207

Optics in Bone Surgery and Diagnostics

Conference Chair: **Andreas Mandelis,** Univ. of Toronto (Canada)

Program Committee: **Robert R. Alfano,** The City College of New York (USA); **Bennett T. Amaechi,** The Univ. of Texas Health Science Ctr. at San Antonio (USA); **Angela Cheung,** Univ. of Toronto (Canada); **Peter Fratzl,** Max-Planck-Institut für Kolloid- und Grenzflächenforschung (Germany); **Huabei Jiang,** Univ. of Florida (USA); **Stephen J. Matcher,** The Univ. of Sheffield (United Kingdom); **Michael D. Morris,** Univ. of Michigan (USA); **Eleftherios P. Paschalis,** Ludwig Boltzmann Institut (Austria)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:40 to 10:20 am

Session 1

Session Chair: **Andreas Mandelis,** Univ. of Toronto (Canada)

Optical coherence tomography for the identification of musculoskeletal structures of the spine, Kathy Beaudette, Ecole Polytechnique de Montréal (Canada); Mathias Strupler, Sainte-Justine Mother and Child Univ. Hospital Ctr. (Canada) and Ecole Polytechnique de Montréal (Canada); Fouzi Benboujja, Carl-Éric Aubin, Caroline Boudoux, Ecole Polytechnique de Montréal (Canada) and Sainte-Justine Mother and Child Univ. Hospital Ctr. (Canada). . . . . .[8207H-137]

New bone surgery instrument based on femtosecond laser, Iulian Ionita, Univ. of Bucharest (Romania) . . . . . .[8207H-138]

Polymer-capped fiber optic Raman probe for in vivo non-invasive Raman tomography and spectroscopy, Paul I. Okagbare, Michael D. Morris, Univ. of Michigan (USA) . . . . . .[8207H-139]

Photoacoustic diagnosis of early osteoporotic bone loss and density variations, Bahman Lashkari, Andreas Mandelis, Univ. of Toronto (Canada) . . . . . .[8207H-140]

Bone-demineralization diagnosis in a bone-tissue-skin matrix using the pulsed-chirped photothermal radar, Sreekumar Kaiplavil, Andreas Mandelis, Univ. of Toronto (Canada) . . . . . .[8207H-141]

SESSION 2 . . . . . Sat. 10:50 am to 12:30 pm

Session 2

Session Chair: **Andreas Mandelis,** Univ. of Toronto (Canada)

Raman spectroscopy: a powerful tool for monitoring unusual bone mineral in diseased or damaged bone, Michael D. Morris, Univ. of Michigan (USA) . . . . . .[8207H-142]

Validating in vivo Raman spectroscopy of bone in human subjects, Francis W. Esmonde-White, Karen A. Esmonde-White, Michael D. Morris, Univ. of Michigan (USA) . . . . . .[8207H-143]

Thermal coherence tomography: a depth-selective thermophotonic radar imaging technique for demineralization diagnosis in hard dental and bone tissues, Nima Tabatabaei, Andreas Mandelis, Univ. of Toronto (Canada); Mehdi Dehghany, Kirk H. MIchaelian, Natural Resources Canada (Canada) . . . . . .[8207H-144]

Raman spectroscopy of bone metastasis, Karen A. Esmonde-White, Joseph Sottnik, Univ. of Michigan Medical School (USA); Michael Morris, Univ. of Michigan (USA); Evan T. Keller, Blake J. Roessler, Univ. of Michigan Medical School (USA) . . . . . .[8207H-145]

Stem cell treated osteogenesis imperfecta bone imaged using Raman spectroscopy, Kristy Cloyd, Martin Hedegaard, Maximilien Vanleene, Pascale Guillot, Sandra Shelfelbine, Molly M. Stevens, Imperial College London (United Kingdom) . . . . . .[8207H-146]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Conference 8208

Sunday 22 January 2012 • Proceedings of SPIE Vol. 8208

Lasers in Dentistry XVIII

Conference Chairs: **Peter Rechmann,** Univ. of California, San Francisco (USA); **Daniel Fried,** Univ. of California, San Francisco (USA)

Program Committee: **Gregory B. Altshuler,** Palomar Medical Technologies, Inc. (USA); **Tatjána Dostálová,** Charles Univ. in Prague (Czech Republic); **John D. Featherstone,** Univ. of California, San Francisco (USA); **David M. Harris,** Bio-Medical Consultants, Inc. (USA); **Harvey A. Wigdor,** Advocate Illinois Masonic Medical Ctr. (USA)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:30 to 10:10 am

Lasers in Periodontology and Soft Tissue: Treatment and Diagnostics

Session Chair: **Peter Rechmann,** Univ. of California, San Francisco (USA)

Comparison of Er,Cr:YSGG laser versus open flap debridement in periodontal pocket therapy: a clinical study, Manak Gupta, Arundeep K. Lamba, Farrukh Faraz, Shruti Tandon, Kirti Chawla, Dheeraj K. Koli, Maulana Azad Institute of Dental Sciences (India); Aarti Bhardwaj, Private Practioner (India) . . . . . [8208-01]

Effects of the new 940 diode laser treatment combined with scaling and root planing in the reduction of periodontal pockets: an in vivo study, Alireza Fallah, Iran Dental Laser Academy (Iran, Islamic Republic of) . . [8208-02]

In-vivo gingival sulcus imaging using full-range, complex-conjugate-free, endoscopic spectral domain optical coherence tomography, Yong Huang, Kang Zhang, The Johns Hopkins Univ. (USA); Wonjin Yi, Seoul National Univ. Dental Research Institute (Korea, Republic of); Jin U. Kang, The Johns Hopkins Univ. (USA) . . . . . [8208-03]

Subgingival calculus detection by swept-source optical coherence tomography, Yao-Sheng Hsieh, National Chiao Tung Univ. (Taiwan); Yi-Ching Ho, Shyh-Yuan Lee, National Yang-Ming Univ. (Taiwan); Chih-Wei Lu, Industrial Technology Research Institute (Taiwan); Cho-Pei Jiang, National Formosa Univ. (Taiwan); Ching-Cheng Chuang, National Taiwan Univ. (Taiwan); Chun-Yang Wang, National Chiao Tung Univ. (Taiwan); Chia-Wei Sun, National Yang-Ming Univ. (Taiwan) . . . . . [8208-04]

Er,Cr:YSGG laser: a new treatment modality for lower lip mucocele, Kirti Chawla, Manak Gupta, Arundeep K. Lamba, Farrukh Faraz, Shruti Tandon, Dheeraj K. Koli, Maulana Azad Institute of Dental Sciences (India); Aarti Bhardwaj, Private Practitioner, Delhi (India) . . . . . [8208-05]

SESSION 2 . . . . . Sun. 10:40 am to 12:00 pm

Lasers and Composites: Bondstrength and Diagnostics

Session Chair: **Peter Rechmann,** Univ. of California, San Francisco (USA)

Bond strengths evaluation of laser ceramic debonding, Tatjána Dostálová M.D., Charles Univ. in Prague (Czech Republic); Helena Jelinkova, Jan Sulc, Czech Technical Univ. in Prague (Czech Republic); Pavel Michalik, Charles Univ. in Prague (Czech Republic); Michal Nemec, Martin Fibrich, Czech Technical Univ. in Prague (Czech Republic); Mitsunobu Miyagi, Sendai National College of Technology (Japan) . . . . . [8208-06]

Shear bond strength of a self-etch adhesive to caries-affected dentin after caries removal by Er:YAG laser, Zhenlin Zhan, Fujian Normal Univ. (China); Weiliang Wu, Fujian Medical Univ. (China); Haibin Zhao, Xianzeng Zhang, Fujian Normal Univ. (China); Shi Lin, Fujian Medical Univ. (China); Shusen Xie, Fujian Normal Univ. (China) . . . . . [8208-07]

Relationship between nondestructive OCT evaluation of resins composites and bond strength in a cavity, Turki A. Bakhsh, Tokyo Medical and Dental Univ. (Japan) and King Abdulaziz Univ. (Saudi Arabia) and Global Ctr. of Excellence (Japan); Alireza Sadr, Tokyo Medical and Dental Univ. (Japan) and Globl Ctr. of Excellence (Japan); Yasushi Shimada, Tokyo Medical and Dental Univ. (Japan); Junji Tagami, Tokyo Medical and Dental Univ. (Japan) and Global Ctr. of Excellence (Japan); Yasunori Sumi, National Ctr. for Geriatrics and Gerontology (Japan) . . . . . [8208-08]

Assessing ex vivo dental biofilms and in vivo composite restorations using cross-polarization optical coherence tomography, , ... [8208-09]

Lunch/Exhibition Break . . . . . 12:00 to 1:40 pm

SESSION 3 . . . . . Sun. 1:40 to 3:20 pm

Laser Ablation, Modelling, Enamel and Caries Imaging

Session Chair: **Daniel Fried,** Univ. of California, San Francisco (USA)

Particle characteristics of different materials after ultra-short pulsed laser (USPL) irradiation, Joerg Meister, Florian Schelle, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Philip Kowalczyk, Rheinische Friedrich Wilhelms University (Germany); Matthias Frentzen, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) . . . . . [8208-10]

Modeling distributed feedback GaAs/AlGaAs lasers in dentistry, Meng-Mu Shih, Univ. of Florida (USA) . . . . . [8208-11]

Investigations on the potential of a novel diode pumped Er:YAG laser system for dental applications, Karl Stock, Florian Hausladen, Raimund Hibst, Univ. Ulm (Germany) . . . . . [8208-12]

Hyperspectral laser-induced autofluorescence imaging of dental caries, Miran Bürmen, Ale? Fidler, Franjo Pernu?, Bo?tjan Likar, Univ. of Ljubljana (Slovenia) . . . . . [8208-13]

Spectrally enhanced image resolution of tooth enamel surfaces, Liang Zhang, Leonard Y. Nelson, Joel H. Berg D.D.S., Eric J. Seibel, Univ. of Washington (USA) . . . . . [8208-14]

SESSION 4 . . . . . Sun. 3:50 to 5:30 pm

Lasers in Early Caries Detection: Monitoring and Caries Treatment

Session Chair: **Daniel Fried,** Univ. of California, San Francisco (USA)

Evaluation of cross-polarized near-infrared hyperspectral imaging for early detection of dental caries, Peter Usenik, Miran Bürmen, Ale? Fidler, Franjo Pernu?, Bo?tjan Likar, Univ. of Ljubljana (Slovenia) . . . . . [8208-15]

Longitudinal assessment of subsurface artificial root caries lesions by optical coherence tomography in comparison with transverse microradiography, Alireza Sadr, Syozi Nakashima, Yasushi Shimada, Junji Tagami, Tokyo Medical and Dental Univ. (Japan); Yasunori Sumi, National Ctr. for Geriatrics and Gerontology (Japan) . . . . . [8208-16]

Monitoring tooth demineralization using a cross polarization optical coherence tomographic system with an integrated MEMS scanner, Daniel Fried, Univ. of California, San Francisco (USA) . . . . . [8208-17]

Transmission of 1064-nm laser radiation during ablation with an ultra-short pulse laser system (USPL), Florian Schelle, Jörg Meister, Bernd Oehme, Mathias Frentzen, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) . . . . . [8208-18]

Minimally invasive treatment of carious dentin with a nanosecond pulsed laser at 5.8 µm wavelength, Katsunori Ishii, Masayuki Saiki, Osaka Univ. (Japan); Kazushi Yoshikawa, Kenzo Yasuo, Kazuyo Yamamoto, Osaka Dental Univ. Hospital (Japan); Kunio Awazu, Osaka Univ. (Japan) . . . . . [8208-19]

POSTERS - SUNDAY . . . . . Sun. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Conference 8209

Saturday-Sunday 21-22 January 2012 • Proceedings of SPIE Vol. 8209

Ophthalmic Technologies XXII

Conference Chairs: **Fabrice Manns,** Univ. of Miami (USA); **Per G. Söderberg,** Uppsala Univ. (Sweden); **Arthur Ho,** Brien Holden Vision Institute (Australia)]

Program Committee: **Rafat R. Ansari,** NASA Glenn Research Ctr. (USA); **Michael Belkin,** Tel Aviv Univ. (Israel); **Ralf Brinkmann,** Univ. zu Lübeck (Germany); **Wolfgang Drexler,** Medizinische Univ. Wien (Austria); **Daniel X. Hammer,** Physical Sciences Inc. (USA); **Karen M. Joos,** Vanderbilt Univ. (USA); **Katsuhiko Kobayashi,** Topcon Corp. (Japan); **Kirill V. Larin,** Univ. of Houston (USA); **Ezra Maguen,** American Eye Institute (USA); **Donald T. Miller,** Indiana Univ. (USA); **Daniel V. Palanker,** Stanford Univ. School of Medicine (USA); **Jean-Marie Parel,** Bascom Palmer Eye Institute (USA); **Roberto Pini,** Istituto di Fisica Applicata Nello Carrara (Italy); **Luigi L. Rovati,** Univ. degli Studi di Modena e Reggio Emilia (Italy); **Georg Schuele,** OptiMedica Corp. (USA); **Jerry Sebag,** The Univ. of Southern California (USA); **Peter Soliz,** VisionQuest Biomedical, LLC (USA); **William B. Telfair,** IRIDEX Corp. (USA); **Valery V. Tuchin,** N.G. Chernyshevsky Saratov State Univ. (Russian Federation)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:30 to 10:00 am

Ophthalmic Imaging: Models

Session Chairs: **Daniel X. Hammer,** Physical Sciences Inc. (USA); **Karen M. Joos,** Vanderbilt Univ. (USA)

In vivo multiphoton imaging of the cornea in control and diabetic rats, Gaël Latour, Laura Kowalczuk, Ecole Polytechnique (France); Michèle Savoldelli, Univ. Paris Descartes (France); Jean-Louis Bourges, Univ. Paris Descartes (France) and INSERM (France); Ivan Gusachenko, Karsten Plamann, Ecole Polytechnique (France); Francine Behar-Cohen, Univ. Paris Descartes (France) and INSERM (France); Marie-Claire Schanne-Klein, Ecole Polytechnique (France) . . . . . [8209-01]

In vivo assessment of the acute effect of sodium iodate toxicity on photoreceptor-RPE layer complex in a rat retinal model with UHROCT, Sepideh Hariri, Alireza Akhlagh Moayed, Univ. of Waterloo (Canada); Shelley Boyd, Univ. of Toronto (Canada); Kostadinka Bizheva, Univ. of Waterloo (Canada) . . . . . [8209-02]

Measurement of pulsatile total blood flow in the rat retina with ultrahigh-speed spectral/Fourier domain OCT, Woo Jhon Choi, Massachusetts Institute of Technology (USA); Bernhard Baumann, Massachusetts Institute of Technology (USA) and Tufts Univ. (USA); Allen C. Clermont, Edward P. Feener, Joslin Diabetes Ctr., Harvard Medical School (USA); Jay S. Duker, Tufts Medical Ctr. (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA) . . . [8209-03]

Effects of intraocular pressure on retinal and optic nerve head blood flow in rats determined by optical coherence tomography/optical microangiography, Zhongwei Zhi, Univ. of Washington (USA); William Cepurna, Oregon Health & Science Univ. (USA); Elaine Johnson, John Morrison, Oregon Health and Science Univ. (USA); Ruikang Wang, Univ. of Washington (USA) . . . . . [8209-04]

Ultrahigh-speed swept-source/Fourier-domain OCT imaging of the rodent retinal structure and blood flow, Jonathan J. Liu, Massachusetts Institute of Technology (USA); Bernhard Baumann, Massachusetts Institute of Technology (USA) and Tufts Univ. (USA); Benjamin M. Potsaid, Massachusetts Institute of Technology (USA) and Thorlabs, Inc. (USA); Martin F. Kraus, Massachusetts Institute of Technology (USA) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Ireneusz Grulkowski, Massachusetts Institute of Technology (USA) and Nicolaus Copernicus Univ. (Poland); Allen E. Clermont, Edward P. Feener, Harvard Medical School (USA); Joachim Hornegger, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Jay S. Duker M.D., Tufts Medical Ctr. (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA) . . . . [8209-05]

In vivo quantification of microglia dynamics with a scanning laser ophthalmoscope in a mouse model of focal laser injury, Clemens Alt, Charles P. Lin, Wellman Ctr. for Photomedicine (USA). . . . . [8209-06]

SESSION 2 . . . . . Sat. 10:30 to 11:45 am

Ocular Biometry

Session Chairs: **Rafat R. Ansari,** NASA Glenn Research Ctr. (USA); **Ezra Maguen,** American Eye Institute (USA)

A new principle for remote continuous monitoring of intraocular pressure variations, Israel Margalit, Yevgeny Beiderman, Bar-Ilan Univ. (Israel); Alon Skaat, Michael Belkin, Tel Aviv Univ. Goldshleger Eye Research Institute (Israel); Ralf-Peter Tornow, Universitäts-Augenklinik Erlangen (Germany); Vicente Mico Vicente Mico, Javier Garcia, Univ. de València (Spain); Zeev Zalevsky, Bar-Ilan Univ. (Israel). . . . . [8209-07]

Image diversity, shape modification with accommodation, dynamical change with accommodation, and age dependence of the ciliary body imaged by optical coherence tomography, Kimiya Shimizu, Nobuyuki Satou, Akihito Igarashi, Motoi Nakanishi, Kitasato Univ. (Japan); Atsushi Goto, Canon Inc. (Japan); Donghak Choi, Reiko Yoshimura, Hideaki Hiro-Oka, Hiroyuki Furukawa, Kitasato Univ. (Japan); Kohji Ohbayashi, Kitasato Univ. School of Medicine (Japan) . . . . . [8209-08]

Volumetric ocular anterior segment biometry using OCT registration and refraction correction techniques, Ireneusz Grulkowski, Massachusetts Institute of Technology (USA) and Nicolaus Copernicus Univ. (Poland); Martin F. Kraus, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) and Massachusetts Institute of Technology (USA); Benjamin Potsaid, Massachusetts Institute of Technology (USA) and Thorlabs Inc. (USA); Bernhard Baumann, Massachusetts Institute of Technology (USA) and Tufts Univ. (USA); David M. Huang, Oregon Health & Science Univ. (USA); Joachim Hornegger, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); James G. Fujimoto, Massachusetts Institute of Technology (USA) . . . . . [8209-09]

Quantitative corneal refractive power measurements utilizing distributed scanning SDOCT, Ryan P. McNabb, Francesco LaRocca, Sina Farsiu, Anthony N. Kuo, Joseph A. Izatt, Duke Univ. (USA) . . . . . [8209-10]

Design and validation of a quasi real-time global aberrometer: the EyeMapper, Cathleen Fedtke, Klaus Ehrmann, Darrin Falk, Brien Holden, Brien Holden Vision Institute (Australia) . . . . . [8209-11]

SESSION 3 . . . . . .Sat. 11:45 am to 12:30 pm

Keynote Session

Session Chair: **Per G. Söderberg,** Uppsala Univ. (Sweden)

Biological engineering of retinal disease: needs for technology, Robin Ali, Univ. College London (United Kingdom) . . . . . [8209-12]

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

BiOS

SESSION 4 . . . . . Sat. 2:00 to 3:30 pm

Ophthalmic Imaging: Motion, Registration, Segmentation, Correction

Session Chairs: **Wolfgang Drexler,** Medizinische Univ. Wien (Austria); **Georg Schuele,** OptiMedica Corp. (USA)

The effect of (micro-) saccades on the image quality of ultrawide-field multimegahertz OCT data, Thomas Klein, Wolfgang Wieser, Raphael J. André, Christoph M. Eigenwillig, Robert Huber, Ludwig-Maximilians-Univ. München (Germany) . . . . . [8209-13]

Heartbeat phase-coherent Doppler optical coherence tomography, Tilman Schmoll, Rainer A. Leitgeb, Medizinische Univ. Wien (Austria). . . . . [8209-14]

Feature-based registration of cone photoreceptor images from AO-OCT volumes using iterative Delaunay triangulation, Sangyeol Lee, Omer Kocaoglu, Ravi S. Jonnal, Qiang Wang, Donald T. Miller, Indiana Univ. (USA) . . . . . [8209-15]

Automatic segmentation of closed-contour features in ocular images using graph theory and dynamic programming, Stephanie J. Chiu, Aman Mittal, Catherine Bowes Rickman, Cynthia A. Toth M.D., Joseph A. Izatt, Sina Farsiu, Duke Univ. (USA). . . . . [8209-16]

Automated detection and counting of keratocytes in human corneal stroma from ultrahigh-resolution optical coherence tomograms, Amir-Hossein Karimi, Alexander Wong, Kostadinka K. Bizheva, Univ. of Waterloo (Canada). . . . [8209-17]

Spatial dewarping of ocular posterior segment SDOCT data, Anthony Kuo, Ryan P. McNabb, Cynthia A. Toth, Joseph A. Izatt, Duke Univ. (USA). . [8209-18]

SESSION 5 . . . . . Sat. 4:00 to 5:45 pm

Ophthalmic Imaging: Vasculature and Blood Flow

Session Chairs: **Luigi L. Rovati,** Univ. degli Studi di Modena e Reggio Emilia (Italy); **Kirill V. Larin,** Univ. of Houston (USA)

Visualization of parafoveal capillary network by high-speed swept source optical coherence tomography with volumetric registration and averaging, Zhenguo Wang, Zhijia Yuan, Charles Reisman, Qi Yang, Chih-Yang Chang, Kinpui Chan, Topcon Medical Systems, Inc. (USA) . . . . . [8209-19]

Flow velocity assessment in retinal microvasculature with joint spectral and time domain OCT, Iwona M. Gorczynska, Daniel Ruminski, Maciej Szkulmowski, Daniel Szlag, Marcin Sylwestrzak, Andrzej A. Kowalczyk, Maciej D. Wojtkowski, Nicolaus Copernicus Univ. (Poland). . . . . [8209-20]

Choroidal imaging by one-micrometer dual-beam Doppler optical coherence angiography with adjustable velocity range, Franck Jaillon, Shuichi Makita, Yoshiaki Yasuno, Univ. of Tsukuba (Japan) . . . . . [8209-21]

Using ultrahigh sensitive optical microangiography to achieve comprehensive depth-resolved microvasculature mapping for human retina, Lin An, Univ. of Washington (USA) . . . . . [8209-22]

Differential intensity contrast swept source optical coherence tomography for human retinal and choroidal vasculature visualization, Reza Motaghiannezam, Scott Fraser, California Institute of Technology (USA) . . . . . [8209-23]

Investigation of exudative macular diseases by high-penetration Doppler optical coherence angiography, Young-Joo Hong, Shuichi Makita, Univ. of Tsukuba (Japan); Myeong-Jin Ju, Byeong Ha Lee, Gwangju Institute of Science and Technology (Korea, Republic of); Masahiro Miura, Tokyo Medical Univ. (Japan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan) . . . . . [8209-24]

Ultrahigh-speed wide-field angiography, Cedric Blatter, Tilman Schmoll, Medizinische Univ. Wien (Austria); Thomas Klein, Wolfgang Wieser, Christoph M. Eigenwillig, Robert Huber, Ludwig-Maximilians-Univ. München (Germany); Rainer Leitgeb, Medizinische Univ. Wien (Austria) . . . . . [8209-25]

BiOS Hot Topics
Sat. 7:00 to 9:00 pm
BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 6 . . . . . Sun. 8:00 to 9:30 am

Ophthalmic Tissues: Optics, Mechanics, and Light Interactions

Session Chairs: **Arthur Ho,** Brien Holden Vision Institute (Australia); **Michael Belkin,** Tel Aviv Univ. (Israel)

Swept source OCT with air puff chamber for corneal dynamics measurements, Karol M. Karnowski, Nicolaus Copernicus Univ. (Poland); David Alonso-Caneiro, Nicolaus Copernicus Univ. (Poland) and Queensland Univ. of Technology (Australia); Bartlomiej J. Kaluzny, Andrzej A. Kowalczyk, Maciej D. Wojtkowski, Nicolaus Copernicus Univ. (Poland) . . . . . [8209-26]

Estimation of surface wave propagation in mouse cornea, Ravi Kiran Manapuram, Floredes M. Menodiado, Phiet Truong, Kirill V. Larin, Univ. of Houston (USA). . . . . [8209-27]

Spatially resolved Brillouin spectroscopy for in vivo determination of the biomechanical properties of the crystalline lens, Oliver Stachs, Stephan Reiss, Rudolf F. Guthoff, Heinrich Stolz, Univ. Rostock (Germany) . . . . [8209-28]

Quantitative RNFL attenuation coefficient measurements by RPE-normalized OCT data, Koenraad A. Vermeer, Rotterdam Ophthalmic Institute (Netherlands); Josine Van der Schoot, Rotterdam Ophthalmic Institute (Netherlands) and Rotterdam Eye Hospital (Netherlands); Hans G. Lemij, Rotterdam Ophthalmic Institute (Netherlands); Johannes F. De Boer, Rotterdam Ophthalmic Institute (Netherlands) and Vrije Univ. Amsterdam (Netherlands) . . . . . [8209-29]

Extraction of the optical attenuation coefficient of human corneal stroma from UHROCT tomograms, Shiva Zaboli, Paul W. Fieguth, Kostadinka K. Bizheva, Univ. of Waterloo (Canada). . . . . [8209-30]

Does near infrared radation used for remote control, sensing and diagnotics cause cumulative damage in the lens?, Per G. Söderberg, Z. Yu, K. Galichanin, N. Talebizadeh, Uppsala Univ. (Sweden); Karl Schulmeister, Seibersdorf Labor GmbH (Austria) . . . . . [8209-31]

SESSION 7 . . . . . Sun. 9:30 to 11:15 am

Ophthalmic Surgery: Lasers and Imaging

Session Chairs: **William B. Telfair,** IRIDEX Corp. (USA); **Ralf Brinkmann,** Univ. zu Lübeck (Germany)

Restorative retinal photocoagulation, Daniel V. Palanker, Yannis M. Paulus, Philip Huie, Stanford Univ. School of Medicine (USA); Loh-Shan Leung, Stanford Univ. (USA); Bryan Jones, The Univ. of Utah (USA); Alexander Sher, Univ. of California, Santa Cruz (USA) . . . . . [8209-32]

Precise and fast creation of LASIK flaps with nanosecond laser pulses from a compact 150 kHz UV laser system, Norbert Linz, Sebastian Freidank, Sebastian Eckert, Univ. zu Lübeck (Germany); Kerstin Schlott, Medizinisches Laserzentrum Lübeck GmbH (Germany); Sebastian Faust, Stefan Schwed, SCHWIND eye-tech-solutions GmbH & Co. KG (Germany); Alfred Vogel, Univ. zu Lübeck (Germany) . . . . . [8209-33]

A miniature forward-imaging optical coherence tomography (OCT) probe, Karen M. Joos M.D., Jin-Hui Shen, Vanderbilt Univ. (USA) . . . . . [8209-34]

Intraoperative optical coherence tomography (iOCT) for ophthalmic surgery, Maya Müller M.D., Univ. Medical Ctr. Schleswig-Holstein (Germany); Eva Lankenau, Opto Medical Technologies GmbH (Germany); Philipp Steven, UniversitaetsKlinikum Schleswig-Holstein (Germany); Marc Krug, Emra Acidereli, Opto Medical Technologies GmbH (Germany); Stefan Oelckers, Moeller-Wedel GmbH (Germany); Salvatore Grisanti, UniversitaetsKlinikum Schleswig-Holstein (Germany); Reginald Birngruber, Gereon Hüttmann, Univ. zu Lübeck (Germany) . . . . . [8209-35]

Phase-resolved optical frequency-domain imaging for the evaluation of retinal pigment epithelium and choroid transplantation surgery, Boy Braaf, Elsbeth J. T. van Zeeburg, Koenraad A. Vermeer, Victor Arni D. P. Sicam, Rotterdam Ophthalmic Institute (Netherlands); Jan C. van Meurs, The Rotterdam Eye Hospital (Netherlands); Johannes F. de Boer, Rotterdam Ophthalmic Institute (Netherlands) . . . . . [8209-36]

SESSION 8 . . . . . Sun. 11:15 am to 12:30 pm

Ophthalmic OCT: Technology

Session Chairs: **Wolfgang Drexler,** Medizinische Univ. Wien (Austria); **Daniel V. Palanker,** Stanford Univ. School of Medicine (USA)

Optimization of CSLO design, Francesco LaRocca, Al-Hafeez Dhalla, Sina Farsiu, Duke Univ. (USA); Joseph A. Izatt, Duke Univ. (USA) and Bioptigen Inc. (USA). . . . . [8209-37]

Ophthalmic OCT imaging with new ultrahigh-speed MEMS tunable VCSEL light source technology, Benjamin M. Potsaid, Massachusetts Institute of Technology (USA); James Jiang, Thorlabs, Inc. (USA); Vijaysekhar Jayaraman, Praevium Research, Inc. (USA); Martin Kraus, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); David Huang, Oregon Health & Science Univ. (USA); Joachim Hornegger, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Alex E. Cable, Thorlabs, Inc. (USA); James Fujimoto, Massachusetts Institute of Technology (USA) . . . . . [8209-38]

Comparison of MEMS-based handheld OCT scanner with commercial OCT system in corneal and retinal evaluation, Samir Sayegh, EYE Ctr. (USA); Woonggyu Jung, Univ. of Illinois at Urbana-Champaign (USA); Jeehyun Kim, Kyungpook National Univ. (Korea, Republic of); Daniel McCormick, AdvancedMEMS (USA); Zita Hubler, Eric Chaney, Univ. of Illinois at Urbana-Champaign (USA); Charles Stewart, Blue Highway, LLC (USA); Stephen Boppart, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [8209-39]

Extended depth optical coherence tomography with an optical switch for ocular biometry, Marco Ruggeri, Bascom Palmer Eye Institute (USA) and Univ. of Miami (USA); Carolina De Freitas, Stephen Uhlhorn, Bascom Palmer Eye Institute (USA); Fabrice Manns, Bascom Palmer Eye Institute (USA) and Univ. of Miami (USA); Jean-Marie Parel, Bascom Palmer Eye Institute (USA) and Univ. of Miami (USA) and Vision Cooperative Research Ctr. (Australia) . . . . . [8209-40]

High contrast, eye-tracked optical coherence tomography of retinal and choroidal pathologies at 800/1060 nm, Boris Považay, Medizinische Univ. Wien (Austria); Marieh Esmaeelpour, Medizinische Univ. Wien (Austria) and Ludwig Boltzmann Institute for Retinology (Austria); Christoph Bloch, Daniel Fechtig, Medizinische Univ. Wien (Austria); Ingrid Böttcher, Heidelberg Engineering GmbH (Germany); Angelika Unterhuber, Bernd Hofer, Medizinische Univ. Wien (Austria); Susanne Binder M.D., Ludwig Boltzmann Institute for Retinology (Austria); Ralph Engelhardt, Heidelberg Engineering GmbH (Germany); Wolfgang Drexler, Medizinische Univ. Wien (Austria). . . . . [8209-41]

LunchExhibition Break . . . . . 12:30 to 1:45 pm

SESSION 9 . . . . . Sun. 1:45 to 3:00 pm

Ophthalmic Imaging: Polarization

Session Chairs: **Per G. Söderberg,** Uppsala Univ. (Sweden); **Jerry Sebag,** The Univ. of Southern California (USA)

Detection of inter- and intrafibrillar corneal stroma modifications by the analysis of polarization-modulated second-harmonic generation micrographs, Fulvio Ratto, Paolo Matteini, Istituto di Fisica Applicata Nello Carrara (Italy); Riccardo Cicchi, Univ. degli Studi di Firenze (Italy); Francesca Rossi, Istituto di Fisica Applicata Nello Carrara (Italy); Dimitrios Kapsokalyvas, Francesco S. Pavone, Univ. degli Studi di Firenze (Italy); Roberto Pini, Istituto di Fisica Applicata Nello Carrara (Italy) . . . . . [8209-42]

Ocular biometric factors affecting to scleral birefringence, Masahiro Yamanari, Univ. of Tsukuba (Japan); Satoko Nagase, Tokyo Medical Univ. (Japan); Shinichi Fukuda, Kotaro Ishii, Yiheng Lim, Univ. of Tsukuba (Japan); Masahiro Miura, Tokyo Medical Univ. (Japan); Tetsuro Oshika, Yoshiaki Yasuno, Univ. of Tsukuba (Japan). . . . . [8209-43]

Birefringence measurement of retinal nerve fiber layer using AO-PS-OCT: a comparison with PS-OCT, Qiang Wang, Indiana Univ. (USA); Barry Cense, Utsunomiya Univ. (Japan); Omer P. Kocaoglu, Ravi S. Jonnal, Sangyeol Lee, Zhuolin Liu, Donald T. Miller, Indiana Univ. (USA). . . . . [8209-44]

Polarization-sensitive optical coherence tomography for in vivo phase retardation measurements of basal laminar deposits, Barry Cense, Utsunomiya Univ. (Japan); Qiang Wang, Sangyeol Lee, Liang Zhao, Joel Papay, Donald T. Miller, Ann E. Elsner, Indiana Univ. (USA). . . . . [8209-45]

Wide-field high-definition polarization sensitive optical coherence tomography of the retina, Michael Pircher, Stefan Zotter, Erich Götzinger, Medizinische Univ. Wien (Austria); Hirofumi Yoshida, Futoshi Hirose, Canon Inc. (Japan); Matthias Bolz, Clemens Vass, Ursula Schmidt-Erfruth, Christoph K. Hitzenberger, Medizinische Univ. Wien (Austria). . . . . [8209-46]

POSTER SESSION and COFFEE BREAK . Sun. 3:00 to 4:00 pm

Attendees are invited to view the conference posters, which will be available on Saturday and Sunday for viewing. The poster session, with authors present, will be held from 3:00 to 4:00 PM on Sunday afternoon, in conjunction with the coffee break.

Poster authors: Please put up your poster before the Saturday morning coffee break, and stand with your poster during the poster session on Sunday from 3:00 to 4:00 PM. Please remove it immediately following the session. Posters remaining on the boards after the session will be discarded.

Effect of dehydration in the UV transmittance of "in vitro" corneas, Victor A. Cacciacarro Lincoln, Liliane Ventura, Sidney J. Faria e Sousa, Marcio Makiyama Mello, Univ. de São Paulo (Brazil) . . . . . [8209-54]

A prototype for measurements in visible light transmittance of sunglasses, Marcio M. Makiyama Mello, Victor A. Cacciacarro Lincoln, Liliane Ventura, Univ. de São Paulo (Brazil) . . . . . [8209-55]

Spectroscopic measurements during the corneal collagen cross linking procedure for in vitro human corneas, Liliane Ventura, Victor A. Cacciacarro Lincoln, Sidney J. Faria e Sousa, Marcio Makiyama Mello, Univ. de São Paulo (Brazil) . . . . . [8209-56]

Does tropicamide affect choroidal blood flow in humans? a laser Doppler flowmetry study, Nithiyanantham Palanisamy, Univ. degli Studi di Modena e Reggio Emilia (Italy); Charles E. Riva, Univ. of Lausanne Medical School (Switzerland); Luigi Rovati, Univ. degli Studi di Modena e Reggio Emilia (Italy); Mauro Cellini, Corrado Gizzi, Ernesto Strobbe, Emilio C. Campos, Univ. degli Studi di Bologna (Italy) . . . . . [8209-57]

An ophthalmic instrument to detect nano and micro-aggregates in blood flow, Stefano Cattini, Luigi L. Rovati, Roberta Salvatori, Antonietta M. Gatti, Univ. degli Studi di Modena e Reggio Emilia (Italy). . . . . [8209-58]

'All-Laser' endothelial corneal transplant in human patients, Francesca Rossi, Istituto di Fisica Applicata Nello Carrara (Italy); Luca Menabuoni, Alex Malandrini, Annalisa Canovetti, Ivo Lenzetti, U.O. Oculistica - Ospedale Misericordia e Dolce (Italy); Roberto Pini, Istituto di Fisica Applicata Nello Carrara (Italy) . . . . . [8209-59]

Extracting diagnostic information from optical coherence tomography images of diabetic retinal tissues using depth-dependent attenuation rate and fractal analysis, Delia Cabrera DeBuc, Bascom Palmer Eye Institute (USA) . . . . . [8209-60]

Prospects of the vision correction under non-ablative laser radiation, Emil Sobol, Institute on Laser and Information Technologies (Russian Federation); Andrei Bolshunov M.D., Research Institute of Eye Diseases, RAMS (Russian Federation); Olga Baum, Alexander Omelchenko, Institute on Laser and Information Technologies (Russian Federation) . . . . . [8209-61]

Efficient outer retina cellular simulation, Adi N. Azar, Alice C. Parker, Ko-Chung Tseng, The Univ. of Southern California (USA) . . . . . [8209-62]

Reflectometry technique for characterizing human tear film, Hui Lu, Michael R. Wang, Jianhua Wang, Meixiao Shen, Univ. of Miami (USA). . . . . [8209-63]

Synthesis and photochemical reaction of methacrylate containing coumarin and chalcone derivatives in the side chains as novel materials for intraocular lenses, Martin Schraub, Annegret Busch, Pierre Hillebrecht, Philipp Behrendt, Norbert Hampp, Philipps-Univ. Marburg (Germany) . . . . . [8209-64]

Portable retinal imaging for eye disease screening using a consumer-grade digital camera, E. Simon Barriga, VisionQuest Biomedical, LLC (USA); Andrey V. Larichev, Lomonosov Moscow State Univ. (Russian Federation); Gilberto Zamora, Peter Soliz, VisionQuest Biomedical, LLC (USA) . . . . . [8209-65]

Toward optical coherence topography, Samir Sayegh, Yanshui Jiang, EYE Ctr. (USA). . . . . [8209-66]

Toward the development of a low-cost laser Doppler module for ophthalmic microscopes, Stefano Cattini, Luigi L. Rovati, Univ. degli Studi di Modena e Reggio Emilia (Italy) . . . . . [8209-67]

Corneal tissue ablation using 6.1 µm quantum cascade laser, Yong Huang, Jin Ung Kang, The Johns Hopkins Univ. (USA). . . . . [8209-68]

Test and design of a high-spatial and temporal resolution aberrometer, Bruno Emica, Serge Meimon, ONERA (France); Guillaume Chenegros, Observatoire de Paris à Meudon (France); Jean-Marc Conan, Thierry Fusco, ONERA (France); Michel Paques, Hôpital XVXX (France) . . . . . [8209-69]

In vivo imaging of the fast intrinsic optical signal (fIOS) in chicken retina with functional UHROCT, Alireza Akhlagh Moayed, Sepideh Hariri, Vivian Choh, Kostadinka Bizheva, Univ. of Waterloo (Canada). . . . . [8209-70]

SESSION 10 . . . . . Sun. 4:00 to 5:45 pm

Ophthalmic Adaptive Optics

Session Chairs: **Daniel X. Hammer,** Physical Sciences Inc. (USA);
Peter Soliz, VisionQuest Biomedical, LLC (USA)

LCoS-based adaptive optics visual analyzer in white light, Enrique-Josua Fernández, Pedro M. Prieto, Pablo Artal, Univ. de Murcia (Spain) . . . . . [8209-47]

Adaptive optics line scanning ophthalmoscope: recent progress, Daniel Ferguson, Daniel X. Hammer, David Biss, Emily Plumb, Physical Sciences Inc. (USA); Cynthia Toth M.D., Michelle McCall, Duke Univ. Medical Ctr. (USA). . . . . [8209-48]

Adaptive optics assisted optical coherence tomography using a small stroke deformable mirror, Kenta Sudo, Utsunomiya Univ. (Japan) . . . [8209-49]

Large-field of view lens-based adaptive optics scanning laser ophthalmoscope, Franz Felberer, Julia Sophie Kroishamer, Christoph K. Hitzenberger, Michael Pircher, Medizinische Univ. Wien (Austria) . . . . . [8209-50]

In vivo imaging of inner retinal cellular morphology with adaptive optics/ optical coherence tomography: limitations and challenges, Robert J. Zawadzki, UC Davis Medical Ctr. (USA); Steven M. Jones, Lawrence Livermore National Lab. (USA); Dae Yu Kim, UC Davis Medical Ctr. (USA); Lisa A. Poyneer, Lawrence Livermore National Lab. (USA); Arlie G. Capps, UC Davis Medical Ctr. (USA); Scot S. Olivier, Lawrence Livermore National Lab. (USA); John S. Werner, UC Davis Medical Ctr. (USA). . . . . [8209-51]

Optic nerve head features measured with a multimodal adaptive optics system, Daniel X. Hammer, Robert D. Ferguson, David P. Biss, Mircea Mujat, Nicusor Iftimia, Ankit H. Patel, Emily Plumb, Physical Sciences Inc. (USA); Gadi Wollstein, Univ. of Pittsburgh Medical Ctr. (USA); Larry Kagemann, Univ. of Pittsburgh (USA); Hiroshi Ishikawa, Zach Nadler, Joel S. Schuman, Univ. of Pittsburgh Medical Ctr. (USA) . . . . . [8209-52]

Adaptive optics optical coherence tomography for measuring phase and reflectance dynamics of photoreceptors, Omer P. Kocaoglu, Ravi S. Jonnal, Sangyeol Lee, Qiang Wang, Zhuolin Liu, Donald T. Miller, Indiana Univ. (USA) . . . . . [8209-53]

Pascal RoI Award . . . . . Sun. 5:45 to 6:00 pm

Session Chairs: **Arthur Ho,** Brien Holden Vision Institute (Australia);
Fabrice Manns, Univ. of Miami (USA)

Final Discussion. . . . . Sun. 6:00 to 6:15 pm

Session Chairs: **Arthur Ho,** Brien Holden Vision Institute (Australia);
Fabrice Manns, Univ. of Miami (USA);
Per G. Söderberg, Uppsala Univ. (Sweden)

Conference 8210

Saturday-Sunday 21-22 January 2012 • Proceedings of SPIE Vol. 8210

Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XXI

Conference Chairs: **David H. Kessel,** Wayne State Univ. (USA); **Tayyaba Hasan,** MGH/Harvard Medical School (USA)

Program Committee: **Charles J. Gomer,** Childrens Hospital Los Angeles (USA); **Nancy L. Oleinick,** Case Western Reserve Univ. (USA); **Brian W. Pogue,** Dartmouth College (USA); **Ravi Pandey,** Roswell Park Cancer Institute (USA); **Kenneth K. Wang,** Mayo Clinic (USA)

Saturday 21 January

Welcome Remarks and Introduction . . . . . Sat. 8:50 am

Session Chair: **David H. Kessel,** Wayne State Univ. (USA)

SESSION 1 . . . . . Sat. 9:00 to 10:00 am

Session Chair: **David H. Kessel,** Wayne State Univ. (USA)

Determinants of autophagic cell death after PDT, David H. Kessel, Wayne State Univ. (USA) . . . . . [8210-01]

Topical delivery of preformed photosensitizer for photodynamic therapy of cutaneous lesions, Nancy L. Oleinick, Malcolm E. Kenney, Minh Lam, Thomas S. McCormick, Case Western Reserve Univ. (USA); Kevin D. Cooper M.D., Case Western Reserve Univ. (USA) and Univ. Hospitals Case Medical Ctr. (USA); Elma D. Baron M.D., Case Western Reserve Univ. (USA) and Univ, Hospitals Case Medical Ctr. (USA) . . . . . [8210-02]

Nanoconstructs for combinations based on PDT and oncogenic inhibitors, Tayyaba Hasan, Wellman Ctr. for Photomedicine (USA) . . . . . [8210-03]

SESSION 2 . . . . . Sat. 10:30 to 11:50 am

Session Chair: **Tayyaba Hasan,** Wellman Ctr. for Photomedicine (USA)

Whole-body or local hypothermia enhances the tumor-imaging and phototherapeutic potential of photosensitizers *(Invited Paper)*, Avinash Srivatsan, Elizabeth Repasky, Arindam Sen, Ravindra K. Pandey, Roswell Park Cancer Institute (USA) . . . . . [8210-04]

Targeting stromal influences in pancreatic cancer with photodynamic therapy, Jonathan P. Celli, Imran Rizvi, Iqbal Massodi, Michael Glidden, Massachusetts General Hospital (USA); Stephen P. Pereira, Univ. College London (United Kingdom); Tayyaba Hasan, Massachusetts General Hospital (USA) . . . . . [8210-05]

In vitro 3D tumor model-based screen of EtNBS derivatives to optimize PDT of hypoxic tumor environments, Oliver J. Klein, Brijesh Bhayana, Wellman Ctr. for Photomedicine (USA); Yong Jin Park, KAIST (Korea, Democratic Peoples Republic of); Conor L. Evans, Wellman Ctr. for Photomedicine (USA) . . . . . [8210-06]

Coupling photodynamic therapy with EGFR inhibition improves therapeutic benefit in human tumor xenografts, Shannon Gallagher-Colombo, Joann Miller, Amanda L. Maas, Shirron L. Carter, Min Yuan, Theresa M. Busch, Univ. of Pennsylvania (USA) . . . . . [8210-07]

Assessing heterogeneity and PDT response in head and neck lesions with diffuse optical spectroscopies, Daniel J. Rohrbach, Weirong Mo, Nestor Rigual, Erin Tracy, Ken Keymel, Michele T. Cooper, Heinz Baumann, Barbara W. Henderson, Ulas Sunar, Roswell Park Cancer Institute (USA) . . . . . [8210-08]

Lunch/Exhibition Break . . . . . 11:50 am to 1:30 pm

PANEL DISCUSSION. . . . . Sat. 1:30 to 2:05 pm

NIH Grant Process and PDT

Panel Moderator: **David H. Kessel,** Wayne State Univ. (USA)

Panelists include: **Rosemary Wong,** Program Director, Radiation Research Program, DCTD, NCI, NIH; **Nancy L. Oleinick,** Case Western Reserve Univ. and **Charles J. Gomer,** Childrens Hospital Los Angeles

SESSION 3 . . . . . Sat. 2:05 to 3:05 pm

Session Chair: **Timothy C. Zhu,** The Univ. of Pennsylvania Health System (USA)

A real-time treatment guidance system for pleural PDT, Timothy C. Zhu, Xing Liang, Julia Sandell, Jarod C. Finlay, Andreea Dimofte, Keith A. Cengel, Joseph Friedbergy, Stephen M. Hahn, Eli Glatstein, The Univ. of Pennsylvania Health System (USA) . . . . . [8210-09]

Light dose verification for pleural PDT, Julia Sandell, Xing Liang, Timothy C. Zhu, The Univ. of Pennsylvania Health System (USA) . . . . . [8210-10]

Characterization of tissue optical properties for prostate PDT using interstitial diffuse optical tomography, Xing Liang, Timothy C. Zhu, Univ. of Pennsylvania (USA) . . . . . [8210-11]

Photoacoustic imaging of intravenously injected photosensitizer in rat burn models for efficient antibacterial photodynamic therapy, Yasuyuki Tsunoi, Keio Univ. (Japan); Shunichi Sato, Hiroshi Ashida, National Defense Medical College (Japan); Mitsuhiro Terakawa, Keio Univ. (Japan) . . . . . [8210-12]

POSTER SESSION and COFFEE BREAK . . Sat. 3:05 to 4:05 pm

Attendees are invited to view the conference posters, which will be available on Saturday. The poster session, with authors present, will be held from 3:05 to 4:05 PM on Saturday afternoon, in conjunction with the coffee break.

Poster authors: Please put up your poster before the Saturday morning coffee break, and stand with your poster during the poster session from 3:05 to 4:05 PM. Please remove it immediately following the session. Posters remaining on the boards after the session will be discarded.

Control of burn wound sepsis in rats by methylene blue-mediated photodynamic treatment, Hiroyuki Hasegawa, Keio Univ. (Japan); Shunichi Sato, Daizoh Saitoh, Nariyoshi Shinomiya, Hiroshi Ashida, National Defense Medical College (Japan); Mitsuhiro Terakawa, Keio Univ. (Japan) . . . . . [8210-31]

Thermography for early detection of cancer, Jaeyoung Kim, Haeyoung Choi, SeonYoung Ryu, MyungHo Kook, GhiSeok Kim, GeonHee Kim, KiSoo Chang, Korea Basic Science Institute (Korea, Republic of) . . . . . [8210-32]

Gallium phthalocyanines photosensitizers for photodynamic therapy, Kaminee Maduray, Council for Scientific and Industrial Research (South Africa) . . [8210-33]

Maximizing fluence rate and field uniformity of light blanket for intraoperative photodynamic therapy, Michael Goodwin, Timothy C. Zhu, Jarod Finlay, The Univ. of Pennsylvania Health System (USA) . . . . . [8210-34]

A conservative approach for treatment of lymphangioma, Ahmed A. Sultan, Univ. College London, Eastman Dental Institute (United Kingdom); Kostas Karavidas, Univ. College Hospital (United Kingdom); Dara Muhammad Rashed, Univ. College London, Eastman Dental Instiute (United Kingdom); Jack Lee, Simon Morley, Colin Hopper, Univ. College Hospital (United Kingdom) [8210-35]

Double-excitation technique: eliminating tissue auto-fluorescence from in vivo PPIX measurements, Sason Torosean, Dartmouth College (USA); Johan Axelsson, Brian Pogue, Thayer School of Engineering at Dartmouth (USA). . . . . [8210-36]

Evaluating primary human ovarian cancer using a targeted multimodal theranostic agent, Tracy W. B. Liu, Jocelyn M. Stewart, Univ. of Toronto (Canada) and Ontario Cancer Institute (Canada); Juan Chen, Ontario Cancer Institute (Canada); Jiyun Shi, Univ. of Toronto (Canada); Thomas D. MacDonald, Univ. of Toronto (Canada) and Ontario Cancer Institute (Canada); Brian C. Wilson, Benjamin G. Neel, Gang Zheng, Ontario Cancer Institute (Canada) . . . . . [8210-37]

Photodynamic therapy: diagnostic and treatment applications, Ivy M. Ndhundhuma, Council for Scientific and Industrial Research (South Africa) and Univ. of Johannesburg (South Africa); Heidi Abrahamse, Univ. of Johannesburg (South Africa). . . . . [8210-38]

Optimization of parameters in photodynamic therapy to kill p. aeruginosa with 809-nm diode laser and indocyanine green, Nermin Topaloglu, Sahru Yüksel, Murat Gulsoy, Bogaziçi Univ. (Turkey) . . . . . [8210-39]

Modeling stromal determinants of ovarian cancer growth and response to PDT-chemotherapy combinations, Imran Rizvi, Jonathan P. Celli, Sriram R. Anbil, Stefan A. Elrington, Iqbal Massodi, Massachusetts General Hospital (USA); Umut Gurkan, Utkan Demirci, Brigham and Women's Hospital (USA); Tayyaba Hasan, Massachusetts General Hospital (USA) . . . . . [8210-40]

Histological differences between orthotopic xenograft pancreas models affect verteporfin uptake measured by fluorescence microscopy and spectroscopy, Kimberley S. Samkoe, Dartmouth Hitchcock Medical Ctr. (USA); Julia A. O'Hara, Dartmouth Medical School (USA); Alina Chen, Martin E. Isabelle, Dartmouth College (USA); Paul J. Hoopes, Dartmouth Medical School (USA); Tayyaba Hasan, Wellman Ctr. for Photomedicine (USA); Brian W. Pogue, Dartmouth College (USA) . . . . . [8210-41]

SESSION 4 . . . . . Sat. 4:05 to 5:10 pm

Session Chair: **Jonathan P. Celli,** Massachusetts General Hospital (USA)

The role of bone marrow derived cells in photodynamic therapy responsiveness, Charles J. Gomer, Children's Hospital Los Angeles (USA) and Univ. of Southern California (USA) . . . . . [8210-13]

Microendoscopy guided photodynamic therapy of ovarian cancer, Bryan Q. Spring, Adnan O. Abu-Yousif, Xiang Zheng, Tayyaba Hasan, Massachusetts General Hospital (USA) . . . . . [8210-14]

Mechanistic studies on thiaza and thioxa-based type 1 photosensitizers, Raghavan Rajagopalan, Covidien (USA); Tsien-Sung Lin, Richard Loomis, Jie Wei, Washington Univ. in St. Louis (USA); Amruta R. Poreddy, Amolkumar Karwa, Bethel Asmelash, Richard B. Dorshow, Covidien (USA). . . . . [8210-15]

Comparising three energy delivery devices in porcine pancreatic tissue: Nd:YAG laser, RFA, LED, Tjeerd de Boorder, John Klaessens, Frank Vleggaar, Herke Jan Noordmans, Univ. Medical Ctr. Utrecht (Netherlands); Rudolf M. Verdaasdonk, Vrije Univ. Medical Ctr. (Netherlands) . . . . . [8210-16]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online http://spie.org/x7779.xml

Sunday 22 January

SESSION 5 . . . . . Sun. 9:00 to 10:00 am

Session Chair: **Kenneth K. Wang,** Mayo Clinic (USA)

Development of photodynamic therapy for pancreatic cancer, Kenneth K. Wang M.D., Mayo Clinic (USA). . . . . [8210-17]

Qualitative and quantitative differences in the toxicity of HPPH-mediated PDT with a 24 versus 48-hour drug light interval: moving from the bedside to the bench and back, Keith A. Cengel, Univ. of Pennsylvania School of Medicine (USA); Sai Yendamuri, Todd Demmy, Roswell Park Cancer Institute (USA); Melissa Culligan, The Univ. of Pennsylvania Health System (USA); Maureen Schofield, Debbie Smith, Salman Punekar, Daniel Sterman, James Stevenson, Theresa Busch, Eli Glatstein, Stephen M. Hahn, Joseph S. Friedberg, Univ. of Pennsylvania School of Medicine (USA). . . . . [8210-18]

Activation of p53-mediated apoptosis in squamous cell carcinoma tumors in vivo, during combination treatment with 5-fluorouracil and ALA-photodynamic therapy, Edward V. Maytin M.D., Sanjay Anand, Kishore Rollakanti, Nikoleta Brankov, Karthik Iyer, The Cleveland Clinic (USA) . [8210-19]

SESSION 6 . . . . . Sun. 10:30 to 11:55 am

Session Chair: **Brian W. Pogue,** Dartmouth College (USA)

Light dose mapping in pancreatic PDT trial VERTPAC to compare with volume of necrosis in treatment outcome, Brian W. Pogue, Michael Jermyn, Scott C. Davis, Thayer School of Engineering at Dartmouth (USA); Sandy Mosse, Matthew Huggett, Stephen Pereira, Univ. College London, National Medical Laser Ctr. (United Kingdom); Tayyaba Hasan, Wellman Ctr. for Photomedicine (USA) . . . . . [8210-20]

Induction of cutaneous phototoxicity after photodynamic therapy by over-exposure to CRT and LCD monitor: a simulation study, Tim Lei, Srinivas Pendyala, Larry Scherrer, Zheng Huang, Univ. of Colorado Denver (USA) . . . . . [8210-21]

A compact laparoscope type radiation source for the pin-point cancer treatment using a femtosecond laser, Nobuki Kawashima, Kinki Univ. (Japan) . . . . . [8210-22]

Influence of the photosensitizer photobleaching in the propagation of light during photodynamic therapy, Irene Salas-García, Félix Fanjul-Vélez, Noé Ortega-Quijano, José L. Arce-Diego, Univ. de Cantabria (Spain). . . . . [8210-23]

SESSION 7 . . . . . Sun. 1:30 to 3:15 pm

Session Chair: **Conor L. Evans,** Wellman Ctr. for Photomedicine (USA)

Selectivity of Amphinex® based bleomycin photochemical internalization in the Syrian hamster cheek pouch tumour model, Ahmed A. Sultan, Tzu-Wen Wang, Josephine H. Woodhams, Univ. College London (United Kingdom); Amrita Jay, Univ. College Hospital (United Kingdom); Kristian Berg, Oslo Univ. Hospital (Norway); Anders Høgset, PCI Biotech AS (Norway); Alexander J. MacRobert, Stephen G. Bown, Colin Hopper, Univ. College London (United Kingdom) . . . . . [8210-24]

Photodynamic therapy of pleurally disseminated non-small cell lung carcinoma in an orthotopic murine model, Craig E. Grossman M.D., Stephen Pickup, Amy Durham, E. Paul Wileyto, Mary E. Putt, Theresa M. Busch, Univ. of Pennsylvania (USA) . . . . . [8210-25]

Accurate dosimetry for monitoring response to photodynamic therapy, Madhavi Seetamraju, Rajan Gurjar, Richard Myers, Radiation Monitoring Devices, Inc. (USA); Tayyaba Hasan, Wellman Ctr. for Photomedicine (USA); David E. Wolf, Radiation Monitoring Devices, Inc. (USA) . . . . . [8210-26]

Photodynamic therapy for the management of leukoplakia and oral lichen planus using methylene blue, Chidambaranathan Pravada, Sathyabama Univ. Dental College (India); Ekta Ingle, JayanthKumar Vadivel, Dornadula Koteeswaran, Meenakshi Ammal Dental College & Hospital (India); Wilfred Prasanna Savarimuthu, Ganesan Bharanidharan, Prakasa Rao Aruna, Anna Univ. Chennai (India); Chilakapati Muralikrishna, Advanced Ctr. for Treatment, Research & Education in Cancer (India); Singaravelu Ganesan, Anna Univ. Chennai (India). . . . . [8210-27]

Fluorescence subtracted Raman spectroscopy and its application in cancer therapy, Qun Li, Kerith R. Wang, B&W Tek, Inc. (USA). . . . . [8210-28]

Singlet oxygen dosimetry modeling for photodynamic therapy, Xing Liang, Timothy C. Zhu, Univ. of Pennsylvania (USA) . . . . . [8210-29]

Binding potential can determine tumor epidermal growth factor receptor status in response to photodynamic therapy in pancreatic cancer, Kimberley S. Samkoe, Dartmouth Hitchcock Medical Ctr. (USA); Kenneth M. Tichauer, Thayer School of Engineering at Dartmouth (USA); Jason Gunn, Thayer School of Engineering at Dartmouth; Tayyaba Hasan, Wellman Ctr. for Photomedicine (USA); Brian W. Pogue, Dartmouth College (USA). . . . . [8210-30]

Conference 8211

Saturday 21 January 2012 • Proceedings of SPIE Vol. 8211

Mechanisms for Low-Light Therapy VII

Conference Chairs: **Michael R. Hamblin,** Massachusetts General Hospital (USA); **Juanita Anders,** Uniformed Services Univ. of the Health Sciences (USA); **James D. Carroll,** THOR Photomedicine Ltd. (United Kingdom)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:50 to 10:30 am

Reviews and Dosimetry

Session Chair: **Michael R. Hamblin,**
Massachusetts General Hospital (USA)

Penetration of light into living tissue *(Invited Paper)*, Lars Hode, Irradia AB (Sweden); Peter Jenkins, Irradia USA (USA); Jan Tunér D.D.S., Dala Dental (Sweden); Tomas Hode, Immunophotonics, Inc. (USA) . . . . . [8211-01]

Mechanisms for low level light therapy - what's new? *(Invited Paper)*, Michael R. Hamblin, Ying-Ying Huang, Sulbha K. Sharma, Wellman Ctr. for Photomedicine (USA) . . . . . [8211-02]

LLLT biphasic dose response: update, James D. Carroll, THOR Photomedicine Ltd. (United Kingdom) . . . . . [8211-03]

Red laser attenuation in biological tissues: study of inflammatory process and pigmentation influence, Caetano P. Sabino, Martha S. Ribeiro, Ilka T. Kato, Daiane T. Meneguzzo, Renato A. Prates, Instituto de Pesquisas Energéticas e Nucleares (Brazil) . . . . . [8211-04]

SESSION 2 . . . . . Sat. 11:00 am to 12:20 pm

In Vitro/In Vivo studies

Session Chair: **Juanita Anders,**
Uniformed Services Univ. of the Health Sciences (USA)

Study of the characteristics of a irradiation experimental setup on fibroblast like cell cultures, Taciana D. Magrini, Arnaldo R. dos Santos, Herculano Martinho da Silva, Univ. Federal do ABC (Brazil). . . . . [8211-05]

Antimicrobial activity of new porphyrins of synthetic and natural origin, Grigor V. Gyulkhandanyan, Institute of Biochemistry (Armenia); Robert K. Ghazaryan, Yerevan State Medical Univ. (Armenia); Marina Paronyan, Institute of Biotechnology (Armenia); Ghukas Ulikhanyan, Armenian Pharmaceutical Association (Armenia); Aram Gyulkhandanyan, Institute of Biochemistry (Armenia); Lida Sahakyan, Yerevan State Medical Univ. (Armenia) . . . . [8211-06]

Effects of LED or laser phototherapy on bone defects grafted with MTA and irradiated with laser or LED light: a comparative Raman spectroscopic study, Antônio Luiz B. Pinheiro, Luiz Guilherme P. Soares, Artur Felipe S. Barbosa, Univ. Federal da Bahia (Brazil); Landulfo Silveira, Jr., Univ. do Vale do Paraíba (Brazil). . . . . [8211-07]

Chromophore absorbance change quantification in tissue during low-level light therapy, Daniel Huynh, Carl Fisher, Christine Chung, Ontario Cancer Institute (Canada); Li Qian, Univ. of Toronto (Canada); Lothar Lilge, Ontario Cancer Institute (Canada) . . . . . [8211-08]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

SESSION 3 . . . . . Sat. 1:30 to 3:00 pm

In Vivo Studies

Session Chair: **James D. Carroll,**
THOR Photomedicine Ltd. (United Kingdom)

In vivo studies of LLLT for traumatic brain injury *(Invited Paper)*, Michael R. Hamblin, Weijun Xuan, Qiuhe Wu, Ying-Ying Huang, Sulbha K. Sharma, Liyi Huang, Wellman Ctr. for Photomedicine (USA). . . . . [8211-09]

Effects of polarization in low-level laser therapy of spinal cord injury in rats, Takahiro Ando, Keio Univ. (Japan); Shunichi Sato, Hiroaki Kobayashi, Hiroshi Nawashiro, Hiroshi Ashida, National Defense Medical College (Japan); Michael R. Hamblin, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA) and Harvard-MIT Health Sciences and Technology (USA); Minoru Obara, Keio Univ. (Japan) . . . . . [8211-10]

Control of anoxic depolarization in rat brain by near-infrared laser irradiation and its monitoring by intrinsic optical signal imaging, Satoko Kawauchi, Shunichi Sato, Yoichi Uozumi, Hiroshi Nawashiro, Miya Ishihara, Makoto Kikuchi, National Defense Medical College (Japan). . . . . [8211-11]

Healing effect of low-level laser therapy (LLLT) on bone fracture, Chung-Ku Rhee M.D., Dankook Univ. Hospital (Korea, Republic of); Hee-gon Park, Dankook Univ. (Korea, Republic of); Jin-Chul Ahn, Dankook Univ. Hospital (Korea, Republic of). . . . . [8211-12]

POSTER SESSION and COFFEE BREAK . Sun. 3:00 to 4:00 pm

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Coherence and speckle in photomedicine and photobiology, Zeev Zalevsky, Bar-Ilan Univ. (Israel); Michael Belkin, Tel Aviv Univ. (Israel). . . . . [8211-18]

Mechanism study on mitochondrial fragmentation under oxidative stress caused by high-fluence low-power laser irradiation, Shengnan Wu, South China Normal Univ. (China) . . . . . [8211-19]

Photodynamic action on microorganisms using iron oxide Fe_2O_3 nanoparticles and LED blue (405 nm) light, Elena S. Tuchina, Pavel O. Petrov, Marina V. Kulikova, Vyacheslav I. Kochubey, Valery V. Tuchin, N.G. Chernyshevsky Saratov State Univ. (Russian Federation) . . . . . [8211-20]

Effectiveness of the use of LLLT on disorders of the maxillofacial region, Luiz Guilherme P. Soares, Carolina Montagn Carvalho, Aparecida Maria C. Marques, Maria Cristina T. Cangussú, Antônio Luiz B. Pinheiro, Univ. Federal da Bahia (Brazil) . . . . . [8211-21]

Evaluation of photodynamic antimicrobial therapy (PACT) against promastigotes form of the Leishmania (Viannia) braziliensis: in vitro study, Artur Felipe S. Barbosa, Univ. Federal da Bahia (Brazil); Suely L. Galdino, Univ. Federal de Pernambuco (Brazil); Manoel Barral Netto, Fundacao Oswaldo Cruz (Brazil); Ivan da Rocha Pitta, Univ. Federal de Pernambuco (Brazil); Bruno B. Sangiorgi, Fundacao Oswaldo Cruz (Brazil); Neandder A. Correia, Antônio Luiz B. Pinheiro, Univ. Federal da Bahia (Brazil). . . . . [8211-22]

Effect of non-homogenous thermal stress during sub-lethal photodynamic antimicrobial chemotherapy, Sunil Dehipawala, Nidhi Gadura, Todd Holden, Sumudu Dehipawala, Robert Hong, Dimitrios Kokkinos, George Tremberger, Jr., David Lieberman, Tak D. Cheung, Queensborough Community College (USA) . . . . . [8211-23]

GaAlAs laser therapy on neuropathic pain in rats, Changsu Na M.D., Young-Su Lee M.D., Dae-Hwan Youn M.D., Chan-Hern Choi M.D., Dongshin Univ. (Korea, Republic of); Suk-Hee Lee, Young-Min Moon, Sung-Ho Jeong, Gwangju Institute of Science and Technology (Korea, Republic of); Wang-In Kim, Dongshin Univ. (Korea, Republic of) . . . . . [8211-24]

The effect of the photobiomodulation in the treatment of Bell's palsy: clinical experience, Aparecida Maria C. Marques D.D.S., Fabio Colombo, Carolina Carvalho, Gardênia Paraguassu, José A. Sousa, Luiz G. Soares, Edival Magalhães, Maria C. Cangussú, Antônio Luiz B. Pinheiro, Univ. Federal da Bahia (Brazil) . . . . . [8211-25]

Efficacy of the photodynamic antimicrobial therapy (PACT) with the use of methylene blue associated with the λ660nm laser in Leishmania (Leishmania) amazonesis: in vitro study, Aparecida C. Marques D.D.S., Univ. Federal da Bahia (Brazil); Gustavo M. Pires-Santos, Eliomara Alves, Research Ctr. Gonçalo Moniz (Brazil); Susana C. Oliveira-Sampaio, Juliana S. Monteiro, Artur F. Barbosa, Univ. Federal da Bahia (Brazil); Mariana Azevedo-Silva, Marcos A. Vannier-Santos, Research Ctr. Gonçalo Moniz (Brazil); Antônio Luiz B. Pinheiro, Univ. Federal da Bahia (Brazil). . . . . [8211-26]

SESSION 4 . . . . . Sat. 4:00 to 6:00 pm

Clinical Studies

Session Chair: **Tomas Hode,** Immunophotonics, Inc. (USA)

A novel role of iNOS gene expression in the anti-inflammatory and tissue protective mechanisms of 905 nm superpulsed laser therapy, Arkady Mandel, Theralase, Inc. (Canada); Lothar Lilge, Ontario Cancer Institute (Canada) . . . . . [8211-13]

Pulsed versus CW low-level light therapy on osteoarticular signs and symptoms in patients with limited scleroderma (CREST syndrome) *(Invited Paper)*, Daniel Barolet M.D., Opusmed Inc. (Canada) and McGill Univ. (Canada) . . . . . [8211-14]

Enlightenment and light *(Invited Paper)*, Donald D. Patthoff D.D.S., Academy of Laser Dentistry (USA) . . . . . [8211-15]

No urge to purge, Eleanor d. Laser, Consultant (USA) . . . . . [8211-16]

Aculaser therapy for the treatment of cerebral palsy, Shahzad Anwar, Anwar Shah's First C.P. and Paralysis Clinic and Research Ctr. (Pakistan) . . . [8211-17]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Conference 8212

Saturday-Sunday 21-22 January 2012 • Proceedings of SPIE Vol. 8212

Frontiers in Biological Detection: From Nanosensors to Systems

Conference Chairs: **Benjamin L. Miller,** Univ. of Rochester Medical Ctr. (USA); **Philippe M. Fauchet,** Univ. of Rochester (USA)

Program Committee: **Holger Becker,** microfluidic ChipShop GmbH (Germany); **Xudong Fan,** Univ. of Michigan (USA); **Jiri Homola,** Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic); **Laura Maria Lechuga,** Ctr. d'Investigacions en Nanociència i Nanotecnologia (Spain); **Frances S. Ligler,** U.S. Naval Research Lab. (USA); **Daniel V. Lim,** Univ. of South Florida (USA); **Christopher Myatt,** Precision Photonics Corp. (USA); **Elric W. Saaski,** Research International, Inc. (USA); **Michael Joseph Sailor,** Univ. of California, San Diego (USA); **Sharon M. Weiss,** Vanderbilt Univ. (USA)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:30 to 10:00 am

Membranes and SERS

Session Chair: **Benjamin L. Miller,**
Univ. of Rochester Medical Ctr. (USA)

Stretchable and shapeable nanomembranes for biological detection on and off the chip *(Invited Paper)*, Oliver G. Schmidt, Leibniz-Institut für Festkörper- und Werkstoffforschung Dresden (Germany) . . . . . [8212-01]

Polymer-coated surface enhanced Raman scattering (SERS) gold nanoparticles for multiplexed labeling of chronic lymphocytic leukemia cells, Christina M. MacLaughlin, Nisa Mullaithilaga, Gilbert C. Walker, Univ. of Toronto (Canada); Chen Wang, Mount Sinai Hospital (Canada). . . . . [8212-02]

Lipid-encapsulation of surface enhanced Raman scattering (SERS) nanoparticles and targeting to chronic lymphocytic leukemia (CLL) cells, Shell Y. Ip, Christina M. MacLaughlin, Univ. of Toronto (Canada); Nisa Mullaithilaga, Mount Sinai Hospital (Canada); Michelle Joseph, Univ. of Toronto (Canada); Samantha Wala, Chen Wang, Mount Sinai Hospital (Canada); Gilbert C. Walker, Univ. of Toronto (Canada) . . . . . [8212-03]

A novel nano-enhanced evanescence technique (NEET) for integrated microfluidic biochemical detections in micro-total analysis systems, Arvind Chandrasekaran, Muthukumaran Packirisamy, Concordia Univ. Canada). . . . . [8212-04]

Specific detection of protein aggregates with a Bloch surface wave sensor, Vincent Paeder, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Maria Kolympadi Markovic, Univ. of Neuchâtel (Switzerland); Valeria Musi, Lubos Hvozdara, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Reinhard Neier, Univ. of Neuchâtel (Switzerland); Hans Peter Herzig, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8212-05]

SESSION 2 . . . . . Sat. 10:30 am to 12:00 pm

Interferometry and Porous Silicon

Session Chair: **Philippe M. Fauchet,** Univ. of Rochester (USA)

The potential of back-scattering interferometry for use in diagnostics *(Invited Paper)*, Darryl J. Bornhop, Amanda Kussrow, Ian Olmsted, Carolyn S. Enders, Vanderbilt Univ. (USA); David Cox, Arnold Castro, Ronald Ballard, Ctrs. for Disease Control and Prevention (USA) . . . . . [8212-06]

Resonant porous silicon microcavity for enhanced detection of protease activity in chronic wound fluid, Stephanie Pace, Fransiska S. H. Krismastuti, Flinders Univ. (Australia); Brooke Farrugia, Tim Dargaville, Queensland Univ. of Technology (Australia); Nicolas H. Voelcker, Flinders Univ. (Australia). . [8212-07]

Highly sensitive anisotropic porous silicon-based optical sensors, Jesús Álvarez, Univ. de Valencia (Spain); Paolo Bettotti, Neeraj Kumar, Univ. degli Studi di Trento (Italy); Isaac Suárez, Daniel Hill, Juan Martínez-Pastor, Univ. de Valencia (Spain). . . . . [8212-08]

Photonic crystal microcavity engineering and high-density biopatterning for chip-integrated microarray applications, Wei-Cheng Lai, The Univ. of Texas at Austin (USA); Swapnajit Chakravarty, Omega Optics, Inc. (USA); Yi Zou, Ray T. Chen, The Univ. of Texas at Austin (USA) . . . . . [8212-09]

Experimental demonstration of application of ring-down measurement approach to microcavities for biosensing, Muhammad I. Cheema, Andrew G. Kirk, McGill Univ. (Canada); Ahmad A. Hayat, Francis Vanier, Yves-Alain Peter, Ecole Polytechnique de Montréal (Canada) . . . . . [8212-10]

Lunch/Exhibition Break . . . . . 12:00 to 1:45 pm

SESSION 3 . . . . . Sat. 1:45 to 3:00 pm

Optofluidics and Optical Forces

Session Chair: **Benjamin L. Miller,**
Univ. of Rochester Medical Ctr. (USA)

Optofluidics in bio-chemical analysis *(Invited Paper)*, Xudong Fan, Univ. of Michigan (USA) . . . . . [8212-11]

Demonstration of optical-force assisted particle transport to an optical biosensor, Adam Heiniger, Benjamin L. Miller, Philippe M. Fauchet, Univ. of Rochester (USA) . . . . . [8212-12]

Optoelectronic tweezers for medical diagnostics, Clemens Kremer, Steven Neale, Anoop Menachery, Mike Barrett, Jon Cooper, Univ. of Glasgow (United Kingdom). . . . . [8212-13]

Optofluidic surface-enhanced Raman spectroscopy with nanoparticle-functionalized flow-through nanohole capillary, Yunbo Guo, Maung Kyaw Khaing Oo, Xudong Fan, Univ. of Michigan (USA) . . . . . [8212-14]

POSTER SESSION and COFFEE BREAK . Sun. 3:00 to 4:00 pm

Attendees are invited to view the conference posters, which will be available on Saturday and Sunday for viewing. The poster session, with authors present, will be held from 3:00 to 4:00 PM on Sunday afternoon, in conjunction with the coffee break.

Poster authors: Please put up your poster before the Saturday morning coffee break, and stand with your poster during the poster session on Sunday from 3:00 to 4:00 PM. Please remove it immediately following the session. Posters remaining on the boards after the session will be discarded.

Classification of bacteria by analysis of Fresnel diffraction patterns of bacteria colonies, Igor B. Buzalewicz, Agnieszka Suchwałko, Halina Podbielska, Institute of Biomedical Engineering and Instrumentation (Poland) . . . . . [8212-26]

Impedance spectroscopy of food micotoxins, Oleksandr I. Bilyy, Roman Y. Yaremyk, Ivan Franko National Univ. of L'viv (Ukraine); Ihor Y. Kotsyumbas, SSRCI of Veterinary Preparations and Fodder Additives (Ukraine). . . . . [8212-27]

Quantitative analysis of OCT signal for virus-infected gourd seed distinction, Changho Lee, Seung-Yeol Lee, SeungHoon Han, Hee-Young Jung, Jeehyun Kim, Kyungpook National Univ. (Korea, Republic of) . . . . . [8212-28]

Detection of pancreatic biomarkers by gallium nitride-based high electron mobility transistor, Chia-Chang Tsai, Wen-Ti Hsu, Shu-Fang Jian, Kuang-Hung Cheng, Shuchen Hsieh, Hay-Yan J. Wang, Li-Wei Tu, National Sun Yat-Sen Univ. (Taiwan) . . . . . [8212-29]

SESSION 4 . . . . . Sat. 4:00 to 5:15 pm

Devices and Funding Agency Interests

Session Chair: **Philippe M. Fauchet,** Univ. of Rochester (USA)

Microflow cytometer for optical analysis of phytoplankton, Joel P. Golden, Nastaran Hashemi, Jeffrey S. Erickson, Frances S. Ligler, U.S. Naval Research Lab. (USA) . . . . . [8212-15]

Microflow cytometer with 3D hydrodynamic focusing, Genni Testa, Romeo Bernini, Consiglio Nazionale delle Ricerche (Italy) . . . . . [8212-16]

Demonstration of a microfluidic polarimter, Rajitha P. Rajan, Ambarish Ghosh, Indian Institute of Science (India) . . . . . [8212-17]

Highlights of biosensing program at NSF *(Invited Paper)*, Aleksandr Simonian, National Science Foundation (USA) . . . . . [8212-18]

BiOS Hot Topics
Sat. 7:00 to 9:00 pm
BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 5 . . . . . Sun. 9:00 to 10:00 am

New Optical Methods

Session Chair: **Benjamin L. Miller,**
Univ. of Rochester Medical Ctr. (USA)

Lensless microscopy and sensing on a chip *(Invited Paper)*, Aydogan Ozcan, Univ. of California, Los Angeles (USA) . . . . . [8212-19]

Integrated optical sensor array for biochemical multiparameter analysis, Daniel Pergande, Peter Lützow, Helmut Heidrich, Fraunhofer Heinrich Hertz Institute (Germany) . . . . . [8212-20]

Differential diffractive reflectance modulation sensing, Nityanand Kumawat, Gurusiddhappa R. Prashanth, Manoj M. Varma, Indian Institute of Science (India) . . . . . [8212-21]

SESSION 6 . . . . . Sun. 10:30 am to 12:00 pm

New Materials and Applications

Session Chair: **Philippe M. Fauchet,** Univ. of Rochester (USA)

Xerogel-nanocrystallite hybrids for optical sensing *(Invited Paper)*, Frank V. Bright, Univ. at Buffalo (USA) . . . . . [8212-22]

Design of a gel electrophoresis device with an integrated transmitter/receiver system for power delivery and data communication: toward a wireless lab-on-chip, Philip J. R. Roche, Kevin Greig, Yucai Wang, Maurice C. K. Cheung, Andrew G. Kirk, Vamsy P. Chodavarapu, McGill Univ. (Canada) . . . . . [8212-23]

Morphological change monitoring of CMV infected tobacco leaf in vivo by optical coherence tomography, Changho Lee, Seung-yeol Lee, SeungHoon Han, Hee-Young Jung, Jeehyun Kim, Kyungpook National Univ. (Korea, Republic of) . . . . . [8212-24]

Nano-sensing with a silica micro-toroid *(Invited Paper)*, Tao Lu, Univ. of Victoria (Canada) . . . . . [8212-25]

Conference 8213

Monday-Wednesday 23-25 January 2012 • Proceedings of SPIE Vol. 8213

Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XVI

Conference Chairs: **Joseph A. Izatt,** Duke Univ. (USA); **James G. Fujimoto,** Massachusetts Institute of Technology (USA); **Valery V. Tuchin,** N.G. Chernyshevsky Saratov State Univ. (Russian Federation)

Program Committee: **Peter E. Andersen,** Technical Univ. of Denmark (Denmark); **Stephen Allen Boppart,** Univ. of Illinois at Urbana-Champaign (USA); **Zhongping Chen,** Beckman Laser Institute and Medical Clinic (USA); **Johannes F. de Boer,** Vrije Univ. Amsterdam (Netherlands); **Wolfgang Drexler,** Medizinische Univ. Wien (Austria); **Christoph K. Hitzenberger,** Medizinische Univ. Wien (Austria); **Rainer A. Leitgeb,** Medizinische Univ. Wien (Austria); **Xingde Li,** The Johns Hopkins Univ. (USA); **Adrian Gh. Podoleanu,** Univ. of Kent (United Kingdom); **Andrew M. Rollins,** Case Western Reserve Univ. (USA); **Natalia M. Shakhova,** Institute of Applied Physics (Russian Federation); **Guillermo J. Tearney,** Wellman Ctr. for Photomedicine (USA); **Ruikang K. Wang,** Univ. of Washington (USA); **Maciej Wojtkowski,** Nicolaus Copernicus Univ. (Poland); **Yoshiaki Yasuno,** Univ. of Tsukuba (Japan)

Monday 23 January

SESSION 1 . . . . . Mon. 8:30 to 10:00 am

Imaging Vascular Structure and Flow: Ophthalmology

Session Chair: **Joseph A. Izatt,** Duke Univ. (USA)

Non-invasive optical imaging of true capillary blood flow within microcirculatory tissue beds using supercontinuum light source, Zhongwei Zhi, Ruikang K. Wang, Univ. of Washington (USA) . . . . . [8213-01]

High-resolution three-dimensional vasculature imaging by adaptive optics optical coherence angiography, Kazuhiro Kurokawa, Kazuhiro Sasaki, Shuichi Makita, Yoshiaki Yasuno, Univ. of Tsukuba (Japan) . . . . . [8213-02]

In vivo human retinal and choroidal vasculature visualization using differential phase contrast swept source optical coherence tomography at 1060 nm, Reza Motaghiannezam, Scott E. Fraser, California Institute of Technology (USA) . . . . . [8213-03]

Phase-stabilized optical frequency domain imaging for the measurement of choroidal blood flow, Boy Braaf, Koenraad A. Vermeer, Victor Arni D. P. Sicam, Johannes F. de Boer, Rotterdam Ophthalmic Institute (Netherlands) . . [8213-04]

Measurement of blood flow in 3-D based on intensity information analysis of OCT data, Daniel Ruminski, Iwona M. Gorczynska, Maciej Szkulmowski, Danuta Bukowska, Maciej Wojtkowski, Nicolaus Copernicus Univ. (Poland) . . . . . [8213-05]

Intensity vs. phase-variance optical coherence tomography for visualization of human retinal capillary networks: comparative study, Dae Yu Kim, UC Davis Medical Ctr. (USA); Jeff Fingler, California Institute of Technology (USA); John S. Werner, UC Davis Medical Ctr. (USA); Daniel M. Schwartz, Univ. of California San Francisco (USA); Scott E. Fraser, California Institute of Technology (USA); Robert J. Zawadzki, UC Davis Medical Ctr. (USA) . . . . . [8213-06]

SESSION 2 . . . . . Mon. 10:30 am to 12:00 pm

New Clinical and Pre-Clinical Applications

Session Chair: **James G. Fujimoto,** Massachusetts Institute of Technology (USA)

Handheld OCT probe for advanced diagnostics in primary care medicine, Woonggyu Jung, Univ. of Illinois at Urbana-Champaign (USA); Jeehyun Kim, Kyungpook National Univ. (Korea, Republic of); Daniel T. McCormick, AdvancedMEMS (USA); Cac T. Nguyen, Zita Hubler, Eric J. Chaney, Univ. of Illinois at Urbana-Champaign (USA); Samir I. Sayegh, EYE Ctr. (USA); Michael Novak, Carle Foundation Hospital (USA); Charles N. Stewart, Blue Highway, LLC (USA); Stephen A. Boppart M.D., Univ. of Illinois at Urbana-Champaign (USA) . . . . . [8213-07]

Real-time three-dimensional dynamic imaging of airways reactivity using optical coherence tomography, Jiefeng Xi, Rex Yung M.D., Wayne Mitzner, Robert Brown M.D., Xingde Li, The Johns Hopkins Univ. (USA) . . . . . [8213-08]

Volumetric optical frequency domain imaging of pulmonary pathology, Lida P. Hariri, Matthew B. Applegate, Mari Mino-Kenudson, Eugene J. Mark, Brett E. Bouma, Guillermo J. Tearney, Melissa J. Suter, Massachusetts General Hospital (USA) . . . . . [8213-09]

Studying limb formation defects in mouse model of human diseases with OCT, Kirill V. Larin, Univ. of Houston (USA); Irina V. Larina, Mary E. Dickinson, Paul Overbeek, Baylor College of Medicine (USA) . . . . . [8213-10]

Assessment of collagen changes in ovarian tissue by measuring optical scattering coefficient from OCT images, Yi Yang, Tianheng Wang, Nrusingh C. Biswal, Univ. of Connecticut (USA); Xiaohong Wang, Melinda Sanders, Molly Brewer, Univ. of Connecticut Health Ctr. (USA); Quing Zhu, Univ. of Connecticut (USA) . . . . . [8213-11]

Fourier domain OCT imaging of American cockroach nervous system, Joanna Wyszkowska, Iwona M. Gorczynska, Daniel Ruminski, Karol Karnowski, Andrzej A. Kowalczyk, Maria Stankiewicz, Maciej Wojtkowski, Nicolaus Copernicus Univ. (Poland) . . . . . [8213-12]

Lunch . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Mon. 1:30 to 3:30 pm

Ophthalmic New Technology

Session Chair: **Maciej Wojtkowski,** Nicolaus Copernicus Univ. (Poland)

Probing single cone photoreceptor functionality to green light stimulus with combined SLO/OCT, Stefan Zotter, Michael Pircher, Erich Götzinger, Teresa Torzicky, Marco Bonesi, Christoph K. Hitzenberger, Medizinische Univ. Wien (Austria) . . . . . [8213-13]

Instrument tip-tracking ophthlamic intrasurgical SDOCT, Justin V. Migacz, Paul Hahn, Rachelle V. O'Connell, Chris Thomas, Z. Moustafa, Chunmei Wang, Stephanie J. Chiu, Duke Univ. (USA); Liyi Dai, U.S. Army Research Office (USA); Cynthia A. Toth M.D., Joseph A. Izatt, Duke Univ. (USA) . . . . . [8213-14]

Ultrahigh speed spectral domain OCT for retina imaging at half megahertz A-line capturing rate, Lin An, Oregon Health & Science Univ. (USA); Tueng Shen, Ruikang K. Wang, Univ. of Washington (USA) . . . . . [8213-15]

Visible light optical coherence tomography for in vivo imaging the spectral contrasts of the retinal nerve fiber layer, Xiangyang Zhang, Shuliang Jiao, The Univ. of Southern California (USA) . . . . . [8213-16]

Towards digital holographic imaging of the eye using a partially coherent light source, Amardeep S. G. Singh, Tilman Schmoll, Medizinische Univ. Wien (Austria); Bahram Javidi, Univ. of Connecticut (USA); Rainer Leitgeb, Medizinische Univ. Wien (Austria) . . . . . [8213-17]

Adaptive optics-assisted optical coherence tomography using a single small stroke deformable mirror, Kenta Sudo, Utsunomiya Univ. (Japan); Kazuhiro Kurokawa, Kazuhiro Sasaki, Shuichi Makita, Yoshiaki Yasuno, Univ. of Tsukuba (Japan); Toyohiko Yatagai, Barry Cense, Utsunomiya Univ. (Japan) . . . [8213-18]

Multicolor, integrated light stimulator for in vivo imaging of intrinsic optical signals in light-stimulated chicken retina with functional UHR-OCT, Alireza Akhlagh Moayed, Sepideh Hariri, Vivian Choh, Kostadinka Bizheva, Univ. of Waterloo (Canada) . . . . . [8213-19]

Adaptive optics - optical coherence tomography system for in-vivo imaging of the mouse retina, Yifan Jian, Ali Issaei, Simon Fraser Univ. (Canada); Robert Zawadzki, UC Davis Medical Ctr. (USA); Marinko Sarunic, Simon Fraser Univ. (Canada) . . . . . [8213-20]

SESSION 4 . . . . . Mon. 4:00 to 6:00 pm

New Light Sources and Systems

Session Chair: **Zhongping Chen,**
Beckman Laser Institute and Medical Clinic (USA)

MEMS tunable VCSEL light source for ultrahigh speed 100kHz - 1MHz axial scan rate and long range centimeter class OCT imaging, Benjamin M. Potsaid, Massachusetts Institute of Technology (USA); Vijaysekhar Jayaraman, Praevium Research, Inc. (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA); Peter J. S. Heim, Covega Corp. (USA); James Jiang, Alex E. Cable, Thorlabs Inc. (USA) . . . . . [8213-21]

Dispersion compensated megahertz FDML laser for imaging the anterior segment, Wolfgang Wieser, Thomas Klein, Ludwig-Maximilians-Univ. München (Germany); Desmond C. Adler, LightLab Imaging Inc. (USA); Francois Trépanier, TeraXion Inc. (Canada); Christoph M. Eigenwillig, Sebastian Karpf, Ludwig-Maximilians-Univ. München (Germany); Joseph M. Schmitt, LightLab Imaging Inc. (USA); Robert Huber, Ludwig-Maximilians-Univ. München (Germany) . . . . . [8213-22]

Coherence length extension of Fourier-domain mode locked lasers, Desmond C. Adler, LightLab Imaging Inc. (USA); Wolfgang Wieser, Ludwig-Maximilians-Univ. München (Germany); Francois Trepanier, TeraXion Inc. (Canada); Joseph M. Schmitt, LightLab Imaging Inc. (USA); Robert A. Huber, Ludwig-Maximilians-Univ. München (Germany) . . . . . [8213-23]

Polarization maintaining buffered Fourier domain mode-locked swept source for optical coherence tomography, Jun Zhang, Joe Jing, Pinghe Wang, Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) . . . . . [8213-24]

Comb spacing-swept multi-wavelength source for deeper OCT imaging, So-Young Park, Jae Seok Park, Chang-Seok Kim, Pusan National Univ. (Korea, Republic of) . . . . . [8213-25]

Broadband Fourier domain mode-locked laser for optical coherence tomography at 1060 nm, Sebastian Marschall, Technical Univ. of Denmark (Denmark); Thomas Klein, Wolfgang Wieser, Benjamin R. Biedermann, Ludwig-Maximilians-Univ. München (Germany); Christian Pedersen, Technical Univ. of Denmark (Denmark); Robert A. Huber, Ludwig-Maximilians-Univ. München (Germany); Peter E. Andersen, Technical Univ. of Denmark (Denmark) . [8213-26]

Dual-wavelength-swept active mode locking laser for multiband OCT imaging, Hwidon Lee, Chang-Seok Kim, Myung-Young Jeong, Zhongping Chen, Pusan National Univ. (Korea, Republic of) . . . . . [8213-27]

A monolithic semiconductor laser with long coherence length for fast and inexpensive optical coherence tomography, Jason R. Ensher, Paul Boschert, Katherine Featherston, Jonathan Huber, Michael Crawford, Michael Minneman, Insight Photonic Devices (USA); Chris Chiccone, Dennis Derickson, California Polytechnic State Univ., San Luis Obispo (USA). . . . . [8213-28]

POSTERS-MONDAY . . . . . Mon. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Using surface wave to assess mechanical properties of skin and skin diseases as measured by phase-sensitive OCT, Chunhui Li, Guangying Guan, Univ. of Washington (USA); Zhihong Huang, Univ. of Dundee (United Kingdom); Ruikang K. Wang, Univ. of Washington (USA). . . . . [8213-85]

Discretely swept optical coherence tomography system using super-structure grating distributed Bragg reflector lasers at 1561-1639 nm, Donghak Choi, Reiko Yoshimura, Hideaki Hiro-Oka, Hiroyuki Furukawa, Kitasato Univ. (Japan); Atsushi Goto, Canon Inc. (Japan); Nobuyuki Satou, Akihito Igarashi, Motoi Nakanishi, Kimiya Shimizu, Kitasato Univ. (Japan); Kohji Ohbayashi, Kitasato Univ. School of Medicine (Japan) . . . . . [8213-86]

Depth profile absorber concentration reconstruction using photothermal optical coherence tomography, Roberto Reif, Guangying Guan, Ruikang K. Wang, Univ. of Washington (USA). . . . . [8213-87]

Imaging of breast cancer tumor margins with an OCT needle probe, Robert A. McLaughlin, Andrea Curatolo, Boon Y. Yeo, Kelsey M. Kennedy, Bryden C. Quirk, Rodney W. Kirk, Dirk Lorenser, The Univ. of Western Australia (Australia); Benjamin A. Wood, PathWest Lab. Medicine WA (Australia); Anita G. Bourke, Sir Charles Gairdner Hospital (Australia); Christobel M. Saunders, David D. Sampson, The Univ. of Western Australia (Australia) . . . . . [8213-88]

High resolution long imaging range SSOCT system based on a multi-spectral band Fourier domain mode-locked swept source, Jun Zhang, Pinghe Wang, Joe Jing, Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA) . . . . . [8213-89]

Frequency-domain coherence-gated Shack-Hartmann wavefront sensor, Jingyu Wang, Adrian Podoleanu, Univ. of Kent (United Kingdom) . . . . . [8213-90]

Automated three-dimensional registration of intra-vascular optical coherence tomography images for the clinical evaluation of stent implantation over time, Giovanni Ughi, Tom Adriaenssens, Katholieke Univ. Leuven (Belgium); Matilda Larsson, Royal Institute of Technology (Sweden); Christophe Dubois, Peter Sinnaeve, Mark Coosemans, Walter Desmet, Jan D'hooge, Katholieke Univ. Leuven (Belgium) . . . . . [8213-91]

Motion-insensitive optical coherence tomography based microangiography, Ting-Ta Chi, Cheng-Kung Lee, Chiung-Ting Wu, Hung-Yu Tseng, Yean-Woei Kiang, Chih-Chung Yang, Chun-Pin Chiang D.D.S., National Taiwan Univ. (Taiwan); Meng-Tsan Tsai, Chang Gung Univ. (Taiwan) . . [8213-92]

Resolution improvement in dual-band OCT by filling the spectral gap, Peter Cimalla, Maria Gaertner, Julia Walther, Edmund Koch, Universitätsklinikum Carl Gustav Carus Dresden (Germany). . . . . [8213-93]

Partially coherent reconstruction for optical coherence tomography, Martin L. Villiger, Guillermo Tearney, Brett E. Bouma, Wellman Ctr. for Photomedicine (USA) . . . . . [8213-94]

High-speed spectroscopic OCT around 1550 nm based on dual-band swept laser source, Rui Zhu, Jianbing Xu, Chi Zhang, Kenneth K. Y. Wong, Edmund Y. Lam, The Univ. of Hong Kong (Hong Kong, China) . . . . . [8213-95]

Wide tuning range wavelength-swept laser at 1020 nm for ultra-high resolution FD-OCT, Sang-Won Lee, Hyun-Woo Song, Moon-Youn Jung, Seung-Hwan Kim, Electronics and Telecommunications Research Institute (Korea, Republic of). . . . . [8213-96]

Gold nanocages with enhanced scattering as OCT contrast agents, Yong-Ping Chen, Jiefeng Xi, Jiasong Li, Jessica Mavadia, The Johns Hopkins Univ. (USA); Jessica C. Ramella-Roman, The Catholic Univ. of America (USA); Xingde D. Li, The Johns Hopkins Univ. (USA). . . . . [8213-97]

Microfluidics analysis of blood using spectral and time domain optical coherence tomography, Danuta Bukowska, Maciej Szkulmowski, Iwona M. Gorczynska, Andrzej A. Kowalczyk, Maciej Wojtkowski, Nicolaus Copernicus Univ. (Poland) . . . . . [8213-98]

Limited effect of phase modulation amplitude on polarization-sensitive optical coherence tomography measurements with continuous polarization modulation, Zenghai Lu, Deepa K. Kasaragod, Steve Matcher, The Univ. of Sheffield (United Kingdom) . . . . . [8213-99]

Lateral resolution improvement in oversampled optical coherence tomography images assuming weighted multiscatterer contributions, Evgenia Bousi, Costas Pitris, Univ. of Cyprus (Cyprus) . . . . . [8213-100]

Brownian motion quantification of micro- and nanoparticles using phase resolved Doppler Optical coherence tomography, Chang Soo Kim, Wenjuan Qi, Jun Zhang, Beckman Laser Institute and Medical Clinic (USA); Young Jik Kwon, Univ. of California, Irvine (USA); Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA). . . . . [8213-101]

Correction of phase-error for phase-resolved k-clocked optical frequency domain imaging, Jianhua Mo, Jianan Li, Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands) . . . . . [8213-102]

High-speed polarization sensitive optical coherence tomography for retinal diagnostics, Biwei Yin, Bingqing Wang, The Univ. of Texas at Austin (USA); Kalyanramu Vemishetty, Jim Nagle, National Instruments Corp. (USA); Shuang Liu, Tianyi Wang, Henry Rylander III, Thomas Milner, The Univ. of Texas at Austin (USA) . . . . . [8213-103]

Estimating external beam radiation damage of the esophagus in mice using endoscopic OCT, Daniel M. de Bruin, Academic Medical Ctr. (Netherlands); Marcel van Herk, Alessia Gasparini, Jan Jakob Sonke, Netherlands Cancer Institute (Netherlands); Ton G. van Leeuwen, Dirk J. Faber, Academic Medical Ctr. (Netherlands) . . . . . [8213-104]

Evaluation of polypyrrole nanoparticles as an absorptive contrast agent for optical coherence tomography imaging beyond 1 micron, Kinman Au, Zenghai Lu, Stephen J. Matcher, Steven P. Armes, The Univ. of Sheffield (United Kingdom). . . . . [8213-105]

Speckle reduction in swept source optical coherence tomography images with slow-axis averaging, Ou Tan, Yan Li, Yimin Wang, Casey Eye Institute (USA); Martin F. Kraus, Massachusetts Institute of Technology (USA) and Univ. Erlangen-Nuremberg (Germany); Jonathan J. Liu, Massachusetts Institute of Technology (USA); Benjamin Potsaid, Massachusetts Institute of Technology (USA) and Thorlabs Inc. (USA); Bernhard Baumann, James G. Fujimoto, Massachusetts Institute of Technology (USA); David Huang M.D., Casey Eye Institute (USA) . . . . . [8213-106]

Tuesday 24 January

SESSION 5 . . . . . Tues. 8:30 to 10:00 am

Cardiovascular New Technology

Session Chair: **Guillermo J. Tearney,** Massachusetts General Hospital (USA)

SESSION 6 . . . . . Tues. 10:30 am to 12:00 pm

Imaging Vascular Structure and Flow: New Technology

Session Chair: **Ruikang K. Wang,** Univ. of Washington (USA)

Multiple blood flow imaging modes by ultrahigh speed dual-beam Doppler optical coherence angiography, Shuichi Makita, Franck Jaillon, Univ. of Tsukuba (Japan); Barry Cense, Utsunomiya Univ. (Japan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan). . . . . [8213-35]

Real-time, angle-insensitive total axial flow measurement using transversal scanning Doppler OCT, Hansford C. Hendargo, Al-Hafeez Dhalla, Joseph A. Izatt, Duke Univ. (USA) . . . . . [8213-36]

Strain rate measurement of embryonic chick heart in vivo using spectral domain optical coherence tomography, Peng Li, Univ. of Washington (USA); Xin Yin, Liang Shi, Sandra Rugonyi, Oregon Health & Science Univ. (USA); Ruikang K. Wang, Univ. of Washington (USA) . . . . . [8213-37]

Real-time speckle variance swept-source optical coherence tomography using a graphics processing unit, Kenneth K. C. Lee, Univ. of Toronto (Canada) and Ryerson Univ. (Canada); Adrian Mariampillai, Beau A. Standish, Victor X. D. Yang M.D., Ryerson Univ. (Canada). . . . . [8213-38]

Simultaneous in-vivo structural and functional assessment of the microcirculation using correlation mapping optical coherence tomography (cmOCT), Joey G. Enfield, Enock Jonathan, Univ. of Limerick (Ireland); Martin Leany, National Univ. of Ireland, Galway (Ireland). . . . . [8213-39]

Intensity-based modified Doppler variance algorithm dedicated for phase instable optical coherence tomography systems, Gangjun Liu, Danny Chou, Wangcun Jia, Wenjuan Qi, Bernard Choi, Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA). . . . . [8213-40]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 7 . . . . . Tues. 1:30 to 3:30 pm

Catheter/Endoscopic and Cancer

Session Chair: **Natalia M. Shakhova,**
Institute of Applied Physics (Russian Federation)

All-fiber optically based catheter system for simultaneous endoscopic optical coherence tomography and fluorescence imaging, Jessica Mavadia, The Johns Hopkins Univ (USA); Jiefeng Xi, Xingde D. Li, The Johns Hopkins Univ. (USA) . . . . . [8213-41]

Ultra-thin 30-gauge needle probe for minimally invasive 3D optical coherence tomography, Dirk Lorenser, Xiao Jie Yang, Rodney W. Kirk, Bryden C. Quirk, Robert A. McLaughlin, The Univ. of Western Australia (Australia); David Sampson, The Univ. of Western Australia (Australia) and Ctr. for Microscopy, Characterisation and Analysis (Australia) . . . . . [8213-42]

Preclinical study on breast cancer using full-field optical coherence tomography, Osnath Assayag, Ecole Supérieure de Physique et de Chimie Industrielles (France); Martine Antoine, Hôpital de Paris (France); Brigitte Sigal-Zafrani, Institut Curie (France); Fabrice Harms, LLTECH SAS (France); Adriano Burcheri, Ecole Supérieure de Physique et de Chimie Industrielles (France); Bertrand de Poly, LLTECH SAS (France); A. Claude Boccara, Ecole Supérieure de Physique et de Chimie Industrielles (France) and LLTech SAS (France). . . . . [8213-43]

Catheter designs for magnetomotive optical coherence tomography, Jong S. Kim, Beckman Institute for Advance Science and Technology (USA); Di Li, Adeel Ahmad, Beckman Institute for Advance Science and Technology (USA) and Univ. of Illinois at Urbana-Champaign (USA); Steven G. Adie, Beckman Institute for Advance Science and Technology (USA); Stephen A. Boppart, Beckman Institute for Advance Science and Technology (USA) and Univ. of Illinois at Urbana-Champaign (USA) . . . . . [8213-44]

Cellular resolution imaging using a full-field optical coherence tomography endoscopic probe, Anne Latrive, Claude Boccara, Institut Langevin, ESPCI (France) and LLTech (France) . . . . . [8213-45]

Optical frequency domain imaging as a diagnostic method and interactive tool for marking-guided biopsy in patients referred for screening or surveillance of Barrett's esophagus, Michalina Gora, Melissa J. Suter, Massachusetts General Hospital (USA); Emmanuel Coron M.D., Massachusetts General Hospital (USA) and Institute of Digestive Diseases (France); Kevin Gallagher, Gregory Y. Lauwers, Massachusetts General Hospital (USA); Brett E. Bouma, Massachusetts General Hospital (USA) and Massachusetts Institute of Technology (USA); Norman S. Nishioka M.D., Massachusetts General Hospital (USA); Guillermo J. Tearney, Massachusetts General Hospital (USA) and Massachusetts Institute of Technology (USA) . . . . . [8213-46]

Image guided 3D OCT for early diagnosis of carcinoma in situ of the bladder, Hugang Ren, Ki Park, Stony Brook Univ. (USA); Kenneth Shroyer, Wayne C. Waltzer, Stony Brook Univ. Medical Ctr. (USA); Yingtian Pan, Stony Brook Univ. (USA) . . . . . [8213-47]

Elastic and optical tomography for the intraoperative diagnosis of tumors, Adriano Burcheri, Amir Nahas, Claude Boccara, Ecole Supérieure de Physique et de Chimie Industrielles (France) . . . . . [8213-48]

SESSION 8 . . . . . Tues. 4:00 to 6:00 pm

OCT New Technology

Session Chair: **Stephen A. Boppart,** Univ. of Illinois at Urbana-Champaign (USA)

Multi-MHz FDML OCT: snapshot retinal imaging at 6.7 million axial-scans per second, Thomas Klein, Wolfgang Wieser, Raphael J. André, Christoph M. Eigenwillig, Robert A. Huber, Ludwig-Maximilians-Univ. München (Germany) . . . . . [8213-49]

Optical amplification of the signal and performance of the ultrafast spectral domain optical coherence tomography at an A-scan rate of 12.5 MHz in a wavelength region of 1300 nm, Donghak Choi, Hideaki Hiro-Oka, Kimiya Shimizu, Kitasato Univ. (Japan); Kohji Ohbayashi, Kitasato Univ. School of Medicine (Japan) . . . . . [8213-50]

Dual-depth SSOCT for simultaneous complex conjugate resolved anterior segment and conventional retinal imaging, Al-Hafeez Z. Dhalla, Theresa Bustamante, Hansford C. Hendargo, Ryan P. McNabb, Anthony N. Kuo, Joseph A. Izatt, Duke Univ. (USA) . . . . . [8213-51]

Streak-mode Fourier domain optical coherence tomography, Rui Wang, Julie X. Yun, Clemson Univ. (USA); Xiaocong Yuan, Nankai Univ. (China); Richard L. Goodwin, Univ. of South Carolina (USA); Roger R. Markwald, Medical Univ. of South Carolina (USA); Bruce Z. Gao, Clemson Univ. (USA) . . . [8213-52]

Dispersion encoded full-range swept source OCT at 1060 nm, Bernd Hofer, Medizinische Univ. Wien (Austria); Ling Wang, Katholieke Univ. of Leuven (Belgium); Boris Hermann, René Werkmeister, Boris Povazay, Aneesh Alex, Wolfgang Drexler, Medizinische Univ. Wien (Austria) . . . . . [8213-53]

Depth-ambiguity free or polarization sensitive optical frequency domain imaging using the Pancharatnam-Berry phase, Norman Lippok, Stephane Coen, Rainer Leonhardt, Poul M. F. Nielsen, Frédérique Vanholsbeeck, The Univ. of Auckland (New Zealand) . . . . . [8213-54]

Influence of image detectors on the signal fall-off in spectral domain optical coherence tomography systems, Martin Hagen-Eggert, Univ. zu Lübeck (Germany); Peter Koch, Thorlabs GmbH (Germany); Gereon Hüttmann, Univ. zu Lübeck (Germany) . . . . . [8213-55]

Multiple-depth en face optical coherence tomography using active recirculation loops in the non-stationary state, John A. Rogers, Adrian Bradu, Adrian Podoleanu, Univ. of Kent (United Kingdom) . . . . . [8213-56]

Wednesday 25 January

SESSION 9 . . . . . Wed. 8:30 to 10:00 am

OCT Novel Applications

Session Chair: **Wolfgang Drexler,** Medizinische Univ. Wien (Austria)

Simultaneous dark-bright field swept source OCT for ultrasound detection, Cedric Blatter, Branislav Grajciar, Boris Hermann, Medizinische Univ. Wien (Austria); Robert Huber, Ludwig-Maximilians-Univ. München (Germany); Wolfgang Drexler, Rainer Leitgeb, Medizinische Univ. Wien (Austria) . . [8213-57]

Optimizing magnetomotive contrast of SPIO-labeled platelets for thrombosis imaging in optical coherence tomography, Amy L. Oldenburg, Dmitry Spivak, Frank Tsui, The Univ. of North Carolina at Chapel Hill (USA); Thomas Fischer, The Univ. of North Carolina at Chapel Hill School of Medicine (USA) . . . . . [8213-58]

Conformal laser therapy, Martin L. Villiger, David Arruda, Milen Shishkov, Benjamin Vakoc, Guillermo Tearney M.D., Brett E. Bouma, Wellman Ctr. for Photomedicine (USA) . . . . . [8213-59]

In vivo measurement of differential motion within the organ of Corti under sound stimulation using optical coherence tomography, Niloy Choudhury, Michigan Technological Univ. (USA); Fangyi Chen, Dingjun Zha, Anders Fridberger, Oregon Health & Science Univ. (USA); Ruikang Wang, Univ. of Washington (USA); Steven L. Jacques, Alfred L. Nuttall, Oregon Health & Science Univ. (USA) . . . . . [8213-60]

Measuring the vibrational response of the mouse ear using coherently interleaved optical coherence tomography, Ryan L. Shelton, Texas A&M Univ. (USA); Simon S. Gao, John S. Oghalai M.D., Stanford Univ. (USA); Brian E. Applegate, Texas A&M Univ. (USA). . . . . [8213-61]

Spectral and time domain OCT - a tool for optimal imaging of biological samples, Maciej Szkulmowski, Iwona M. Gorczynska, Daniel Szlag, Maciej D. Wojtkowski, Nicolaus Copernicus Univ. (Poland) . . . . . [8213-62]

SESSION 10 . . . . . Wed. 10:30 am to 12:00 pm

Phase and Polarization Sensitive OCT

Session Chair: **Christoph K. Hitzenberger,** Medizinische Univ. Wien (Austria)

Imaging of photothermal tissue expansion via phase sensitive Optical Coherence Tomography, Hendrik Spahr, Linda Rudolph, Heike H. Müller, Reginald Birngruber, Gereon Hüttmann, Univ. zu Lübeck (Germany) . . [8213-63]

Ultrahigh speed swept source / Fourier domain polarization sensitive optical coherence tomography, Bernhard Baumann, Massachusetts Institute of Technology (USA) and Univ. of Pittsburgh Medical Ctr. (USA); Woo Jhon Choi, Massachusetts Institute of Technology (USA); Benjamin M. Potsaid, Massachusetts Institute of Technology (USA) and Thorlabs Inc. (USA); David M. Huang, Oregon Health & Science Univ. (USA); Joel S. Schuman M.D., Univ. of Pittsburgh Medical Ctr. (USA); Jay S. Duker, Tufts Medical Ctr. (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA) . . . . . [8213-64]

Automated measurement of choroidal thickness by polarization sensitive optical coherence tomography, Teresa Torzicky, Erich Götzinger, Michael Pircher, Stefan Zotter, Marco Bonesi, Christoph K. Hitzenberger, Medizinische Univ. Wien (Austria) . . . . . [8213-65]

Absolute measurement of subnanometer scale vibration of cochlear partition of an excised guinea pig cochlea using spectral-domain phase-sensitive optical coherence tomography, Hrebesh M. Subhash, Oregon Health & Science Univ. (USA) . . . . . [8213-66]

Automated detection of chorio-scleral interface using polarization-sensitive optical coherence tomography, Lian Duan, Masahiro Yamanari, Yoshiaki Yasuno, Univ. of Tsukuba (Japan) . . . . . [8213-67]

Polarimetry noise analysis and compensation in polarization sensitive optical coherence tomography, Ziyi Zhang, Benjamin J. Vakoc, Massachusetts General Hospital (USA) and Harvard Medical School (USA) . . . . . [8213-68]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 11 . . . . . Wed. 1:30 to 3:30 pm

Novel Coherence Microscopy

Session Chair: **Rainer Leitgeb,** Medizinische Univ. Wien (Austria)

Optical coherence microscopy for deep tissue imaging of the cerebral cortex with intrinsic contrast, Vivek J. Srinivasan, Harsha Radhakrishnan, Massachusetts General Hospital (USA); James Y. Jiang, Scott Barry, Thorlabs Inc. (USA); Alex E. Cable, Thorlabs, Inc. (USA) . . . . . [8213-69]

Structural and functional imaging of the pathology of Alzheimer's disease in a mouse model using extended-focus optical coherence microscopy, Arno Bouwens, Tristan Bolmont, Christophe Pache, Patrick C. Fraering, Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8213-70]

Sub-cellular resolution imaging of coronary arteries and respiratory mucosa using micro-optical coherence tomography (μOCT), Linbo Liu, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Joseph A. Gardecki, Massachusetts General Hospital (USA); Brett E. Bouma, Massachusetts General Hospital (USA) and Massachusetts Institute of Technology (USA) and Harvard Medical School (USA); Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA) and Massachusetts Institute of Technology (USA) . . . . . [8213-71]

Interferometric synthetic aperture microscopy with virtual adaptive optics aberration correction, Steven G. Adie, Benedikt Graf, Adeel Ahmad, P. Scott Carney, Stephen Boppart, Univ. of Illinois at Urbana-Champaign (USA) [8213-72]

Combined two-photon microscopy and optical coherence tomography for in vivo tissue imaging, Bosu Jeong, Hyoseok Nam, Min Seong Jang, Taejun Wang, Junsang Doh, Bo-Gie Yang, Myoung Ho Jang, Ki Hean Kim, Pohang Univ. of Science and Technology (Korea, Republic of) . . . . . [8213-73]

Quantifying sub-diffractional tissue mass density correlation function by spectroscopic optical coherence tomography, Ji Yi, Jeremy D. Rogers, Ilker R. Capoglu, Andrew Radosevich, Yolanda Stypula, Northwestern Univ. (USA); Hemant K. Roy, Northshore Univ. Health Systems (USA); Allen Taflove, Vadim Backman, Northwestern Univ. (USA) . . . . . [8213-74]

High resolution holoscopy, Gesa L. Franke, Univ. zu Lübeck (Germany); Dierck Hillmann, Thorlabs GmbH (Germany) and Medizinisches Laserzentrum Lübeck (Germany); Thorsten Claußen, Christian Lührs, Peter Koch, Thorlabs GmbH (Germany); Gereon Hüttmann, Univ. zu Lübeck (Germany) . . . . . [8213-75]

Development and dynamics of 3D mammary epithelial-stromal co-cultures using optical coherence tomography, Raghav K. Chhetri, Amanda C. Sullivan, The Univ. of North Carolina at Chapel Hill (USA); Melissa A. Troester, The Univ. of North Carolina at Chapel Hill (USA) and Lineberger Comprehensive Cancer Ctr. (USA); Amy L. Oldenburg, The Univ. of North Carolina at Chapel Hill (USA) and 4Biomedical Research Imaging Ctr. (USA) . . . . . [8213-76]

SESSION 12 . . . . . Wed. 4:00 to 6:00 pm

Signal/Image Processing

Session Chair: **Valery V. Tuchin,** N.G. Chernyshevsky Saratov State Univ. (Russian Federation)

Anterior segment and retinal 3D-OCT motion correction using image registration and orthogonal scan patterns, Martin F. Kraus, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) and Massachusetts Institute of Technology (USA); Ireneusz Grulkowski, Massachusetts Institute of Technology (USA) and Nicolaus Copernicus Univ. (Poland); Benjamin M. Potsaid, Massachusetts Institute of Technology (USA) and Thorlabs Inc. (USA); Bernhard Baumann, Massachusetts Institute of Technology (USA) and Tufts Univ. (USA); Joel S. Schuman, Univ. of Pittsburgh Medical Ctr. (USA); Jay S. Duker, New England Eye Ctr. (USA); David M. Huang, Oregon Health & Science Univ. (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA); Joachim Hornegger, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . [8213-77]

Holoscopy image reconstruction, Dierck Hillmann, Thorlabs GmbH (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany); Gesa L. Franke, Univ. zu Lübeck (Germany); Christian Lührs, Thorsten Claußen, Peter Koch, Thorlabs GmbH (Germany); Gereon Hüttmann, Univ. zu Lübeck (Germany) and Medizinisches Laserzentrum Lübeck GmbH (Germany) . . . . . [8213-78]

Morphological image analysis for classification of gastrointestinal tissues using optical coherence tomography, Pilar Beatriz García-Allende, Helmholtz Zentrum München GmbH (Germany) and Imperial College London (United Kingdom); Iakovos Amygdalos, Hiruni Dhanapala, Robert D. Goldin, George B. Hanna, Daniel S. Elson, Imperial College London (United Kingdom) . . . [8213-79]

Hybrid FPGA and GPU acceleration of optical frequency domain angiography computation, William Chun Yip Lo, Harvard Medical School (USA) and Wellman Ctr. for Photomedicine (USA) and Massachusetts General Hospital (USA); Hongying Tang, Tianjin Univ. (China) and Wellman Ctr. for Photomedicine (USA) and Massachusetts General Hospital (USA); Ellen Ziyi Zhang, Wellman Ctr. for Photomedicine (USA); Brett Bouma, Harvard Medical School (USA) and Wellman Ctr. for Photomedicine (USA) and Massachusetts General Hospital (USA); Ben Vakoc, Wellman Ctr. for Photomedicine (USA) . . . . . [8213-80]

Joint spectral and time domain processing applied to optical coherence elastography, Brendan F. Kennedy, Kelsey M. Kennedy, The Univ. of Western Australia (Australia); Karol M. Karnowski, Maciej Szkulmowski, Maciej D. Wojtkowski, Nicolaus Copernicus Univ. (Poland); David D. Sampson, The Univ. of Western Australia (Australia) . . . . . [8213-81]

Graphics processing unit-based ultra-high-speed real-time multidimensional Fourier domain optical coherence tomography, Kang Zhang, Jin Ung Kang, The Johns Hopkins Univ. (USA) . . . . . [8213-82]

Digital refocusing in optical coherence tomography, Alexander A. Moiseev, Grigory V. Gelikonov, Pavel A. Shilyagin, Dmitry A. Terpelov, Valentine M. Gelikonov, Institute of Applied Physics (Russian Federation) . . . . . [8213-83]

Graphics processing unit based dispersion encoded full-range frequency domain OCT, Ling Wang, Cardiff Univ. (United Kingdom) and Katholieke Univ. of Leuven (Belgium); Boris Povazay, Medizinische Univ. Wien (Austria); Jeremy A. Guggenheim, Cardiff Univ. (United Kingdom); Wolfgang Drexler, Bernd Hofer, Medizinische Univ. Wien (Austria) . . . . . [8213-84]

Courses of Related Interest

SC312 Principles and Applications of Optical Coherence Tomography (Fujimoto) Sunday, 1:30 to 5:30 pm

SC1054 Bio-Interferometry (Nolte) Sunday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Conference 8214

Sunday-Tuesday 22-24 January 2012 • Proceedings of SPIE Vol. 8214

Advanced Biomedical and Clinical Diagnostic Systems X

Conference Chairs: **Tuan Vo-Dinh,** Duke Univ. (USA); **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA); **Warren Grundfest,** Univ. of California, Los Angeles (USA)

Program Committee: **Maurice C. G. Aalders,** Univ. van Amsterdam (Netherlands); **Francesco Baldini,** Istituto di Fisica Applicata Nello Carrara (Italy); **Jennifer K. Barton,** The Univ. of Arizona (USA); **Stephen Allen Boppart,** Univ. of Illinois at Urbana-Champaign (USA); **Daniel S. Gareau,** Oregon Health & Science Univ. (USA); **Hong Liu,** The Univ. of Oklahoma (USA); **Laura Marcu,** Univ. of California, Davis (USA); **Mary-Ann Mycek,** Univ. of Michigan (USA); **Jianan Y. Qu,** Hong Kong Univ. of Science and Technology (Hong Kong, China); **Urs Utzinger,** The Univ. of Arizona (USA); **Georges A. Wagnières,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Sunday 22 January

SESSION 1 . . . . . Sun. 1:50 to 3:10 pm

Fluorescence Systems

Session Chair: **Tuan Vo-Dinh,** Duke Univ. (USA)

A compact fluorescence and white light imaging system for intraoperative visualization of nerves, Daniel C. Gray, Evgenia Kim, Victoria Cotero, Paul Staudinger, Siavash Yazdanfar, Cristina Tan Hehir, GE Global Research (USA) . . . . . [8214-01]

Tracking ophthalmic drugs in the eye using confocal fluorescence microscopy, Kim K. Buttenschoen, John M. Girkin, Durham Univ. (United Kingdom); Daniel Daly, Lein Applied Diagnostics Ltd. (United Kingdom)[8214-02]

Novel compact endoscope design for simultaneous wide-field multispectral fluorescence lifetime imaging (FLIM), Shuna Cheng, Joey Jabbour, Kristen Maitland, Javier A. Jo, Texas A&M Univ. (USA) . [8214-03]

Determining limitations of protoporphyrin IX for resolving depth of tumors during fluorescence-guided neurosurgery, Kolbein Kolste, Pablo A. Valdes, Keith D. Paulsen, Thayer School of Engineering at Dartmouth (USA); David W. Roberts, Dartmouth Hitchcock Medical Ctr. (USA); Frederic Leblond, Thayer School of Engineering at Dartmouth (USA). . . . . [8214-04]

SESSION 2 . . . . . Sun. 3:40 to 5:40 pm

Scattering and Reflectance Techniques

Session Chair: **Tuan Vo-Dinh,** Duke Univ. (USA)

Plasmonic coupling interference: a new approach for cancer diagnostics using SERS detection, Hsin-Neng Wang, Tuan Vo-Dinh, Duke Univ. (USA) . . . . . [8214-05]

Estimation of diffuse reflectance spectrum from RGB values by the synthesis of new colors for tissue measurements, Quan Liu, Shuo Chen, Nanyang Technological Univ. (Singapore) . . . . . [8214-06]

Design, validation, and implementation of a diffuse reflectance spectroscopic imaging system for tissue absorption and scattering, Justin Y. Lo, Sulochana Dhar, Martin Brooke, Bing Yu, Duke Univ. (USA); Thomas F. Kuech, Univ. of Wisconsin-Madison (USA); Nan M. Jokerst, Nimmi Ramanujam, Duke Univ. (USA). . . . . [8214-07]

Diffuse reflectance imaging system for spatial mapping of tissue optical properties, Sheldon F. Bish, Youmin Wang, Xiaojing Zhang, James W. Tunnell, The Univ. of Texas at Austin (USA) . . . . . [8214-08]

Discrimination of selected species of pathogenic bacteria using near-infrared Raman spectroscopy and principal components analysis, Landulfo Silveira, Jr., Universidade Camilo Castelo Branco (Brazil); Hector E. Giana, Lab. Oswaldo Cruz (Brazil); Fernanda S. d. S. Oliveira, Univ. Paulista (Brazil) . . . . . [8214-09]

Effect of hormonal variation on in vivo high-wavenumber Raman spectra improves cervical precancer detection, Shiyamala Duraipandian, Zhiwei Huang, Wei Zheng, National Univ. of Singapore (Singapore); Joseph Ng, Jeffrey J. Low, Ilancheran A, National Univ. Hospital (Singapore) and National Univ. of Singapore (Singapore) . . . . . [8214-10]

POSTERS - SUNDAY . . . . . Sun. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

The cervical cancer detection system based on an endoscopic rotary probe, Yanshuang Yang, Huijuan Zhao, Zhuanping Qin, Feng Gao, Tianjin Univ. (China) . . . . . [8214-44]

Fluorescence yield and lifetime tomography from time-resolved transmittances of a breast tumor phantom, Yiming Lu, Wei Zhang, Linhui Wu, Feng Gao, Huijuan Zhao, Tianjin Univ. (China) . . . . . [8214-45]

Prokaryotic expression and polyclonal antibody preparation of autophagy-related gene ATG5 in arabidopsis, Wen Li Chen, Jing Zhou, South China Normal Univ. (China) . . . . . [8214-46]

A multichannel time-resolved system for fluorescence diffusion optical tomography, Wei Zhang, Feng Gao, Linhui Wu, Yiming Lu, Wenjuan Ma, Huijuan Zhao, Tianjin Univ. (China) . . . . . [8214-47]

Axial accuracy correction for FDK algorithm in digital tomosynthesis imaging, Hui Miao, Huijuan Zhao, Feng Gao, Tianjin Univ. (China) . . . . [8214-48]

Toward surface analysis on diabetic feet soles to predict ulcerations using photometric stereo, Chanjuan Liu, Univ. Twente (Netherlands); Ferdi van der Heijden, Univ. of Twente (Netherlands); Jaap van Netten, Hospital Group Twente, Almelo (Netherlands) . . . . . [8214-49]

A novel technique for x-ray source size determination based on wavelet transformation, Zhongxing Zhou, Feng Gao, Huijuan Zhao, Lixin Zhang, Tianjin Univ. (China) . . . . . [8214-50]

Fiber-based full-field optical coherence tomography, Hye Joon Ma, Seung Suk Lee, Chosun Univ. (Korea, Republic of); Byeong Il Lee, Swook Hann, Korea Photonics Techonolgy Institute (Korea, Republic of); Eun-Seo Choi, Chosun Univ. (Korea, Republic of) . . . . . [8214-51]

Low-cost/high-accuracy transcutaneous bilirubin meter for neonatal jaundice using laser diodes or LEDs, Mostafa Hamza, Mansoura Univ. (Egypt); Mohammad H. Sayed El-Ahl, Military Medical Academy (Egypt); Ahmad M. Hamza, National Research Ctr. (Egypt); Aya M. Hamza, Yahya M. Hamza, Tabarak Children's Hospital (Egypt) . . . . . [8214-52]

Bacterial biofilm disruption using laser-generated shockwaves, Artemio Navarro, Jr., Zachary Taylor, Univ. of California, Los Angeles (USA); Anthony Z. Matolek D.V.M., VA Greater Los Angeles Healthcare System (USA); Ahuva Weltman, UCLA, Department of Bioengineering (USA); Vidyunmala Ramaprasad, Sean Huang, Univ. of California, Los Angeles (USA); David O. Beenhouwer M.D., David A. Haake M.D., UCLA School of Medicine (USA); Vijay Gupta, Warren S. Grundfest M.D., Univ. of California, Los Angeles (USA) . . . . . [8214-53]

Monday 23 January

SESSION 3 . . . . . Mon. 8:40 to 10:00 am

Microscopy and Confocal Imaging

Session Chair: **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA)

Field-portable reflection and transmission microscopy based on lensless digital holography, Myungjun Lee, Oguzhan Yaglidere, Aydogan Ozcan, Univ. of California, Los Angeles (USA) . . . . . [8214-11]

Cellular pattern recognition discriminates normal skin from melanoma in non-invasive confocal imaging, Amy Swerdlin, Eric Simpson, Steven Jacques, Daniel S. Gareau, Oregon Health & Science Univ. (USA) . . . . . [8214-12]

Tri-modal confocal margin screening for the presence of residual squamous cell carcinoma in Mohs surgical excisions, Anna Bar, Nicholas Snavely, Nathaniel Chen, Steven Jacques, Daniel S. Gareau, Oregon Health & Science Univ. (USA) . . . . . [8214-13]

Comparing combined Raman spectroscopy: in vivo confocal microscopy related to age and location in human skin, Mark A. Mackanos, Vanderbilt Univ. (USA); Chetan Patil, Vanderbilt Univ (USA); Chris Arrasmith, Montana State Univ. (USA); Constantine Paras, Vanderbilt Univ. (USA); David Dickensheets, Montana State Univ. (USA); Anita Mahadevan-Jansen, Vanderbilt Univ. (USA) . . . . . [8214-14]

SESSION 4 . . . . . Mon. 10:30 to 11:50 am

Biosensing and Imaging I

Session Chair: **Francesco Baldini,**
Istituto di Fisica Applicata Nello Carrara (Italy)

Haematic pH sensor for extracorporeal circulation, Luca Ferrari, Paola Fabbri, Luigi Rovati, Francesco Pilati, Univ. degli Studi di Modena e Reggio Emilia (Italy) . . . . . [8214-15]

In vivo dynamic breast tumor oxygenation imaging for assessing response to neoadjuvant chemotherapies, Shudong Jiang, Brian W. Pogue, Michael Jermyn, Kelly E. Michaelsen, Dartmouth College (USA); Tracy E. Frazee, Peter A. Kaufman, Wendy A. Wells, Roberta M. diFlorio-Alexander, Dartmouth Hitchcock Medical Ctr. (USA); Keith D. Paulsen, Dartmouth College (USA) . . . . . [8214-16]

Measuring the mechanical properties of blood clots using resonant acoustic spectroscopy with optical vibrometry, Gongting Wu, Alisa Wolberg, Amy Oldenburg, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [8214-17]

Comparison of performance of commercial vessel imaging systems in a tissue phantom, Herke Jan Noordmans, Natascha Cuper, Univ. Medical Ctr. Utrecht (Netherlands); Rudolf Verdaasdonk, Vrije Univ. Medical Ctr. (Netherlands) . . . . . [8214-18]

Lunch Break . . . . . 11:50 am to 1:20 pm

SESSION 5 . . . . . Mon. 1:20 to 3:00 pm

Biosensing and Imaging II

Session Chair: **Francesco Baldini,**
Istituto di Fisica Applicata Nello Carrara (Italy)

Multimodality 3D imaging for histology 3D reconstruction, Yukako Yagi, Maristela Onozato, Pinky A. Bautista, Mari Mino-Kenudson, Massachusetts General Hospital (USA) . . . . . [8214-19]

Multispectral image enhancement by spectral shifting, Pinky A. Bautista, Yukako Yagi, Massachusetts General Hospital (USA) . . . . . [8214-20]

Multidepth imaging by chromatic dispersion confocal microscopy, Cory Olsovsky, Ryan Shelton, Meagan Saldua, Oscar Carrasco-Zevallos, Brian Applegate, Kristen Maitland, Texas A&M Univ. (USA) . . . . . [8214-21]

Stroboscopic illumination scheme for seamless 3D endoscopy, Neil T. Clancy, Danail Stoyanov, Guang-Zhong Yang, Daniel S. Elson, Imperial College London (United Kingdom) . . . . . [8214-22]

Recent advances in optical chemo/biosensing for biomedical applications at IFAC-CNR, Francesco Baldini, Ambra Giannetti, Folco Senesi, Cosimo Trono, Istituto di Fisica Applicata Nello Carrara (Italy) . . . . . [8214-23]

SESSION 6 . . . . . Mon. 3:30 to 6:10 pm

Medical Devices and Methods

Session Chair: **Warren S. Grundfest,**
Univ. of California, Los Angeles (USA)

Optical sensor system for continuous non-invasive monitoring of total hemoglobin concentration in real time in patients in the clinical environment, Elfed Lewis, Univ. of Limerick (Ireland); Ulrich Timm, Univ. of Rostock (Germany) and Univ. of Limerick (Ireland); Gabriel Leen, Univ. of Limerick (Ireland); Jens Kraitl, Hartmut Ewald, Univ. of Rostock (Germany); Deirde McGrath, Univ. of Limerick (Ireland); George Shorten, Alan Broderick, Cork Univ. Hospital (Ireland) . . . . . [8214-24]

New technique for easy registration of visual (multispectral) and thermal images to evaluate tissue perfusion, Rudolf M. Verdaasdonk, Britt Kunnen, Liselot Vink, Albert van der Veen, Vrije Univ. Medical Ctr. (Netherlands); Herke Jan Noordmans, John Klaessens, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [8214-25]

Non-invasive surface and tomographic imaging of breast cancer using a hand-held optical device, Sarah J. Erickson, Manuela Roman, Jean Gonzalez, Florida International Univ. (USA); Richard Kiszonas, Univ. of Miami, Sylvester Comprehensive Cancer Ctr. (USA); Cristina Lopez-Penalver, Advanced Medical Specialities (USA); Anuradha Godavarty, Florida International Univ. (USA) . . . . . [8214-26]

Development and evaluation of a light-emitting diode endoscopic light source, Neil T. Clancy, Rui Li, Imperial College London (United Kingdom); Kevin Rogers, Univ. of Glamorgan (United Kingdom) and Cymtec Ltd. (United Kingdom); Paul Driscoll, Cymtec Ltd. (United Kingdom); Peter Excell, Glyndwr Univ. (United Kingdom); Ron Yandle, Cymtec Ltd. (United Kingdom); George Hanna, Imperial College London (United Kingdom); Nigel Copner, Univ. of Glamorgan (United Kingdom) and Cymtec Ltd. (United Kingdom); Daniel S. Elson, Imperial College London (United Kingdom) . . . . . [8214-27]

An in-vitro cell system for studying molecular mechanisms of action associated with low intensity focused ultrasound, Meghedi Babakhanian, Universtiy of California, Los Angeles, Biomedical Engineering IDP (USA) and Center for Advanced Surgical and Interventional Technology (USA); Richard Fan, Univ. of California, Los Angeles (USA) and Center for Advanced Surgical and Interventional Technology (CASIT) (USA); Amit P. Mulgaonkar, Rahul Singh, Univ. of California, Los Angeles (USA) and Center for Advanced Surgical and Interventional Technology (USA); Martin O. Culjat, Univ. of California, Los Angeles (USA) and Center for Advanced Surgical and Interventional Technology (USA) and University of California, Los Agneles, Surgery Dept. (USA); Shahab Danesh, Ligia Toro, Univ. of California, Los Angeles (USA); Warren Grundfest, Univ. of California, Los Angeles (USA) and Center for Advanced Surgical and Interventional Technology (CASIT) (USA); William P. Melega, Univ. of California, Los Angeles (USA). . . . . [8214-28]

Optical measurements of microvascular circulatory function in the foot for detection of peripheral neuropathy, Gilberto Zamora, Simon Barriga, VisionQuest Biomedical, LLC (USA); Shuang Luan, Viktor Checkh, Phillip H. Heintz, Mark R. Burge, Univ. of New Mexico (USA); Peter Soliz, VisionQuest Biomedical, LLC (USA) . . . . . [8214-29]

An all fiberized portable cytometer for cellular and molecular biology analysis in space and other remote environments, Ozzy Mermut, Christophe Riviere, Sebastien Leclair, INO (Canada); Michel Fortin, Handyem (Canada); Genevieve Dubeau-Laramee, Daniel Provencal, Luchino Y. Cohen, Canadian Space Agency (Canada) . . . . . [8214-30]

Clinical study for spectral diagnosis of in vivo melanoma and non-melanoma skin cancer diagnosis, Liang Lim, Brandon Nichols, The Univ. of Texas at Austin (USA); Narasimhan Rajaram, Duke Univ. (USA); Jason S. Reichenberg M.D., The Univ. of Texas Medical Branch (USA); Michael R. Migden M.D., The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); James W. Tunnell, The Univ. of Texas at Austin (USA) . . . . . [8214-31]

Tuesday 24 January

SESSION 7 . . . . . Tues. 8:40 to 10:00 am

Coherence Techniques I

Session Chair: **Claude Boccara,**
Ecole Supérieure de Physique et de Chimie Industrielles (France)

Toward a real-time core-needle biopsy assessment with full-field OCT, Adriano Burcheri, ESPCI, Ecole Supérieure de Physique et Chimie de Paris (France); Vincent Servois, Brigitte Sigal-Zafrani, Institut Curie (France); A. Claude Boccara, ESPCI, Ecole Supérieure de Physique et Chimie de Paris (France) and LLTech SAS (France). . . . . [8214-32]

In-vitro observation of induced cartilage-degeneration progression by Fourier-domain OCT, Ulrich Marx, Robert Schmitt, Fraunhofer-Institut für Produktionstechnologie (Germany); Björn Rath, Sven Nebelung, Markus Tingart, Christian Lüring, Universitätsklinikum Aachen (Germany) . . . . . [8214-33]

Office-based multifunctional anterior eye segment optical coherence tomography, Yiheng Lim, Masahiro Yamanari, Youngjoo Hong, Shuichi Makita, Univ. of Tsukuba (Japan); Masahiro Miura, Tokyo Medical Univ. (Japan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan) . . . . . [8214-34]

Dual-wavelength photothermal (DWP) OCT for in vivo depth-resolved measurement of oxygen saturation (SaO_2) in murine brain arterioles, Roman V. Kuranov, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Austin B. McElroy, Syed M. S. Kazmi, The Univ. of Texas at Austin (USA); Jeffrey W. Kiel, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Andrew K. Dunn, The Univ. of Texas at Austin (USA); Timothy Q. Duong, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Thomas E. Milner, The Univ. of Texas at Austin (USA) . . . . . [8214-35]

SESSION 8 . . . . . Tues. 10:30 to 11:30 am

Coherence Techniques II

Session Chair: **Jennifer K. Barton,** The Univ. of Arizona (USA)

Live OCT display on an intraoperative surgical microscope featuring augmented reality, Kyungun Kim, Changho Lee, Hyosang Jung, Unsang Jung, Namhyun Jo, Jeehyun Kim, Kyungpook National Univ. (Korea, Republic of); Hongkyun Kim, Kyungpook National Univ. Hospital (Korea, Republic of) . . . . . [8214-36]

Simultaneous cornea and retina OCT imaging with dual-wavelength band swept source lasers and wavelength division multiplexing methods, Tae Joong Eom, Hoon Sup Kim, Young-Chul Noh, Gwangju Institute of Science and Technology (Korea, Republic of) . . . . . [8214-37]

In vivo measurements of local hemoglobin absorption in the dermal microcirculation by low-coherence spectroscopy, Nienke Bosschaart, Dirk Faber, Ton van Leeuwen, Maurice C. G. Aalders, Univ. van Amsterdam (Netherlands) . . . . . [8214-38]

Lunch/Exhibition Break . . . . . 11:30 am to 1:00 pm

SESSION 9 . . . . . Tues. 1:00 to 2:40 pm

Digital Pathology

Session Chair: **Daniel S. Gareau,** The Rockefeller Univ. (USA)

Rapid confocal imaging of large areas of excised tissue with strip mosaicing, Sanjeewa Abeytunge, Bjorg Larson, Yongbiao Li, Memorial Sloan-Kettering Cancer Ctr. (USA); Emily Seltzer, Livingston High School (USA); Brian Parks, New York Univ. School of Medicine (USA); Ricardo Toledo-Crow, Milind Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. (USA). . . . [8214-39]

Large-area reflectance confocal microscopy for intraoperative lumpectomy margin assessment, DongKyun Kang, Elena F. Brachtel, Barbara L. Smith, Massachusetts General Hospital (USA); Jeong Hyun Lee, KAIST (Korea, Republic of); Brett E. Bouma, Guillermo J. Tearney, Massachusetts General Hospital (USA) . . . . . [8214-40]

Photoacoustic detection of induced melanoma in vitro using a mouse model, Sagar K. Gupta, Andrew Janosik, Kiran K. Bhattacharyya, Thomas P. Quinn, John A. Viator, Univ. of Missouri-Columbia (USA). . . . . [8214-41]

Optical color-coding for automated detection of skin cancers, Anna N. Yaroslavsky, Univ. of Massachusetts (USA) . . . . . [8214-42]

Multimodal full-field optical coherence tomography on biological tissue: toward all optical digital pathology, Fabrice Harms, Bertrand de Poly, LLTECH SAS (France); Claude Boccara, ESPCI, Institut Langevin (France) and LLTECH SAS (France) . . . . . [8214-43]

Conference 8215

Saturday-Sunday 22-23 January 2011 • Proceedings of SPIE Vol. 8215

Design and Quality for Biomedical Technologies V

Conference Chairs: **Ramesh Raghavachari,** U.S. Food and Drug Administration (USA); **Rongguang Liang,** College of Optical Sciences, The Univ. of Arizona (USA)

Conference Co-Chair: **Joshua Pfefer,** U.S. Food and Drug Administration (USA)

Program Committee: **Anthony J. Durkin,** Beckman Laser Institute and Medical Clinic (USA); **Kazuhiro Gono,** Olympus Medical Systems Corp. (Japan); **Jeeseong Hwang,** National Institute of Standards and Technology (USA); **Stephen P. Morgan,** The Univ. of Nottingham (United Kingdom); **Robert J. Nordstrom,** National Institutes of Health (USA); **Jannick P. Rolland,** Univ. of Rochester (USA); **Eric J. Seibel,** Univ. of Washington (USA); **Tomasz S. Tkaczyk,** Rice Univ. (USA); **Rudolf M. Verdaasdonk,** Vrije Univ. Medical Ctr. (Netherlands)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:30 to 10:20 am

Development of Imaging Techniques

Session Chair: **Joshua Pfefer,**
U.S. Food and Drug Administration (USA)

Scanning nonlinear endomicroscopy technology and potential applications *(Invited Paper)*, Xingde Li, The Johns Hopkins Univ. (USA) . . . . . [8215-01]

OCT-based freeze-drying microscopy, Mircea Mujat, Physical Sciences Inc. (USA); Krystin Greco, Univ. of Connecticut (USA); Kristin L. Galbally-Kinney, R. D. Ferguson, Nicusor Iftimia, Dan X. Hammer, Phillip A. Mulhall, William J. Kessler, Physical Sciences Inc. (USA); Michael J. Pikal, Univ. of Connecticut (USA) . . . . . [8215-02]

Interferometer for measuring the dynamic surface topography of a human tear film, Brian C. Primeau, John E. Greivenkamp, The Univ. of Arizona (USA) . . [8215-03]

Visualization of mucosal vasculature with narrow-band imaging: a theoretical study, Quanzeng Wang, U.S. Food and Drug Administration (USA); Du Le, U.S. Food and Drug Administration (USA) and The Catholic Univ. of America (USA); Anant Agrawal, U.S. Food and Drug Administration (USA); Jessica Ramella-Roman, The Catholic Univ. of America (USA); Joshua Pfefer, U.S. Food and Drug Administration (USA) . . . . . [8215-04]

Precision limit analysis for optimized DOT imaging probe, Ling Chen, Nanguang Chen, National Univ. of Singapore (Singapore) . . . . . [8215-05]

SESSION 2 . . . . . Sun. 10:50 am to 12:30 pm

Quality and System Calibration

Session Chair: **Rudolf M. Verdaasdonk,**
Vrije Univ. Medical Ctr. (Netherlands)

Monitoring of biofilm formation on different material surfaces of medical devices using hyperspectral imaging method, Do-Hyun Kim, U.S. Food and Drug Administration (USA); Moon S. Kim, U.S. Dept. of Agriculture (USA); Jeeseong Hwang, National Institute of Standards and Technology (USA) . . . . . [8215-06]

Comparison of the measurements of an experimental endoscope tester with the Dovideq MDE endoscope test system for two hospitals, Herke Jan Noordmans, Univ. Medical Ctr. Utrecht (Netherlands); Menno de Braak, Bert Dommerholt, DOVIDEQ medical BV (Netherlands); Henk van den Brink, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [8215-07]

Numerical comparison of thermal damage threshold from pulsed and scanned laser in a measurement aperture, Do-Hyun Kim, U.S. Food and Drug Administration (USA) . . . . . [8215-08]

Automated model-based calibration of imaging spectrographs, Matja? Kosec, Sensum, Computer Vision Systems (Slovenia); Dejan Toma?evič, Sensum, Computer Vision Systems (Slovenia) and Univ. of Ljubljana (Slovenia); Franjo Pernu?, Bo?tjan Likar, Univ. of Ljubljana (Slovenia) and Sensum, Computer Vision Systems (Slovenia) . . . . . [8215-09]

Optical fibers with polyimide coatings for medical applications, Andrei A. Stolov, Brian Slyman, Debra A. Simoff, Adam S. Hokansson, R. Steve Allen, John Earnhardt, OFS (USA) . . . . . [8215-10]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 3 . . . . . Sun. 1:30 to 3:30 pm

Joint Session with Conference 8229B

Session Chairs: **Robert J. Nordstrom,**
National Institutes of Health (USA); **Ramesh Raghavachari,**
U.S. Food and Drug Administration (USA)

Calibration and validation of chemical imaging spectrometry for clinical use *(Invited Paper)*, Maritoni Litorja, National Institute of Standards and Technology (USA) . . . . . [8215-11]

Standard test methods for established medical imaging modalities and their implications for optical coherence tomography *(Invited Paper)*, Joshua Pfefer, Anant Agrawal, Alex Beylin, U.S. Food and Drug Administration (USA) . . . . . [8215-12]

Challenges in manufacturing optical tissue phantoms: an industrial perspective *(Invited Paper)*, Jean-Pierre Bouchard, Isabelle Noiseux, Ozzy Mermut, INO (Canada) . . . . . [8229B-16]

Report on a recent workshop: Standards for Phantoms for the Performance Evaluation and Validation of Optical Medical Imaging Devices *(Invited Paper)*, Jeeseong Hwang, National Institute of Standards and Technology (USA); Robert J. Nordstrom, National Cancer Institute (USA) . . . . . [8229B-17]

PANEL DISCUSSION. . . . . Sun. 4:00 to 5:00 pm

Session Chair: **Robert J. Nordstrom,**
National Institutes of Health (USA)

Monday 23 January

SESSION 4 . . . . . Mon. 8:30 to 10:20 am

Clinical Systems

Session Chair: **Rongguang Liang,** College of Optical Sciences,
The Univ. of Arizona (USA)

Primary care imaging using a handheld OCT-video scanner *(Invited Paper)*, Stephen A. Boppart M.D., Univ. of Illinois at Urbana-Champaign (USA) [8215-13]

Clinical dissemination of near-infrared fluorescence imaging using the FLARE imaging system, Sylvain Gioux, Nicholas J. Durr, Alan Stockdale, Conor J. Cross, Yoshitomo Ashitate, John V. Frangioni, Beth Israel Deaconess Medical Ctr. (USA) . . . . . [8215-14]

Fluorescence goggle device for intraoperative oncologic imaging, Yang Liu, Adam Bauer, Walter Akers, Gail Sudlow, Kexian Liang, Tauseef Charanya, Suman Mondal, Joseph Culver, Samuel Achilefu, Washington Univ. in St. Louis (USA) . . . . . [8215-15]

Visualization technique for air flows in a live operating room in view of infection prevention, Rudolf M. Verdaasdonk, Robin van den Berg, Albert van der Veen, Vrije Univ. Medical Ctr. (Netherlands); Herke Jan Noordmans, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [8215-16]

Speckle reduction of swept source optical coherence tomography with frame averaging, Ou Tan, Yan Li, Janice Norman, David Huang, Casey Eye Institute (USA) . . . . . [8215-17]

SESSION 5 . . . . . Mon. 10:40 am to 12:30 pm

Design of Imaging Techniques

Session Chair: **Ramesh Raghavachari,**
U.S. Food and Drug Administration (USA)

Parallel 3D confocal/OCM imaging system with adaptive objective lens *(Invited Paper)*, Guoqiang Li, Univ. of Missouri-St. Louis (USA) . . . . . [8215-18]

An afocal beam relay for laser XY scanning systems *(Invited Paper)*, David Kessler, Kessler Optics & Photonics Solutions, Ltd. (USA). . . . . [8215-19]

Instrumentation considerations for measurement of early-arriving photons in diffuse fluorescence tomography, Niksa Valim, Mark Niedre, Northeastern Univ. (USA) . . . . . [8215-20]

Comparison of divided-pupil and full-pupil configurations for line-scanning confocal microscopy of skin, Yogesh G. Patel, Charles A. DiMarzio, Northeastern Univ. (USA); Milind Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. (USA) . . . . . [8215-21]

Development of low-cost webcam-based biomedical monitoring system over a network for real-time physiological assessment, Sijung Hu, Vicente Azorin-Peris, Loughborough Univ. (United Kingdom); Charlotte Papin, Univ. Paris-Sud 11 (France); Sun Yu, Aayush Karki, Roy Kalawsky, Ron Summers, Loughborough Univ. (United Kingdom). . . . . [8215-22]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 6 . . . . . Mon. 1:30 to 3:10 pm

Hyperspectral Imaging

Session Chair: **Jeeseong Hwang,**
National Institute of Standards and Technology (USA)

Hyperspectral projection of a skin flap animal model for use as a digital tissue phantom, David W. Allen, Steven W. Brown, Joseph P. Rice, Jeeseong Hwang, Maritoni Litorja, National Institute of Standards and Technology (USA); Ron Xu, Ohio State Univ. (USA) . . . . . [8215-23]

Multispectral imaging approach for simplified non-invasive in vivo evaluation of gingival erythema, Timo Eckhard, Eva Maria Valero, Juan Luis Nieves, Univ. of Granada (Spain) . . . . . [8215-24]

Hyperspectral imaging and analysis of subcellular substances in single cells, Ji Youn Lee, National Institute of Standards and Technology (USA); Fuyuki Tokumasu, National Institute of Standards and Technology (USA) and National Institute of Health (USA); Daniel Samarov, David W. Allen, Maritoni Litorja, National Institute of Standards and Technology (USA); Dan Sackett, Ralph Nossal, National Institute of Health (USA); Jeeseong Hwang, National Institute of Standards and Technology (USA). . . . . [8215-25]

Intercomparison of EMCCD- and sCMOS-based imaging spectrometers for biomedical applications in low-light conditions, Julio E. Hernandez-Palacios, Norsk Elektro Optikk AS (Norway); Lise L. Randeberg, Norwegian Univ. of Science and Technology (Norway); Trond Løke, Norsk Elektro Optikk AS (Norway); Torbjørn Skauli, Norwegian Defence Research Establishment (Norway) . . . . . [8215-26]

Characterization and modeling of the spatially and spectrally varying point-spread function in hyperspectral imaging systems for computational correction of axial optical aberrations, Žiga Špiclin, Miran Bürmen, Franjo Pernuš, Boštjan Likar, Univ. of Ljubljana (Slovenia) . . . . . [8215-27]

POSTERS-MONDAY . . . . . Mon. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

On the spectral sensitivity calibration of fluorescence spectrometers: extension to the NIR, polarization, and grating effects, Samantha Fore, PicoQuant Photonics North America Inc. (USA); Sebastian Tannert, Peter Kapusta, Alexander Glatz, Uwe Ortmann, Felix Koberling, Rainer Erdmann, PicoQuant GmbH (Germany). . . . . [8215-28]

A new phototherapy unit for neonatal hyperbilirubinemia using computer controlled laser diodes or LEDs, Mostafa Hamza, Mansoura Univ. (Egypt); Mohammad H. Sayed El-Ahl, Military Medical Academy (Egypt); Ahmad M. Hamza, National Research Ctr. (Egypt); Aya M. Hamza, Yahya M. Hamza, Tabarak Children's Hospital (Egypt) . . . . . [8215-29]

The evaluation model of the physiological lag parameter between the glucose concentration in blood and the glucose concentration in interstitial fluid, Ting Shi, Dachao Li, Yongjie Ji, Kexin Xu, Tianjin Univ. (China) . . [8215-30]

Conference 8216

Saturday-Sunday 21-22 January 2012 • Proceedings of SPIE Vol. 8216

Multimodal Biomedical Imaging VII

Conference Chairs: **Fred S. Azar,** Philips Medical Systems (USA); **Xavier Intes,** Rensselaer Polytechnic Institute (USA)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:00 to 10:10 am

Functional Diffuse Optical Imaging

Session Chairs: **Fred S. Azar,** Philips Medical Systems (USA); **Xavier Intes,** Rensselaer Polytechnic Institute (USA)

Wide-field optical tomography *(Invited Paper)*, Xavier Intes, Rensselaer Polytechnic Institute (USA) . . . . . [8216-01]

Multimodal fluorescence DOT-SPECT/CT for in vivo sentinel lymph node imaging, Metasebya Solomon, Washington Univ. in St. Louis (USA); Ralph E. Nothdruft, Walter Akers, Kexian Liang, Washington Univ. School of Medicine in St. Louis (USA); Baogang Xu, Washington Univ. in St. Louis (USA); Samuel Achilefu, Joseph P. Culver, Washington Univ. School of Medicine in St. Louis (USA) . . . . . [8216-02]

Heat-sensitive microbubbles for therapeutic margin assessment in liver ablation surgery, Jiwei X. Huang, Carl Schmidt, Ronald X. Xu, The Ohio State Univ. (USA) . . . . . [8216-03]

Multimodality imaging using double clad fiber challenges and solutions, Ehsan Hamidi, Hongki Yoo, Hao Wang, Joseph A. Gardecki, Paulino Vacas-Jacques, Mireille Rosenberg, Milen Shishkov, Brett E. Bouma, Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) . . . . . [8216-04]

PH-sensitive fluorescence detection by fluorescence diffuse optical tomography, Jiao Li, Feng Gao, Linjing Duan, Limin Zhang, Huijuan Zhao, Tianjin Univ. (China) . . . . . [8216-05]

Mammogram-based diffuse optical tomography, Hung-Chih Chiang, Jhao-Ming Yu, Liang-Yu Chen, National Central Univ. (Taiwan); Min-Cheng Pan, Tung Nan Institute of Technology (Taiwan); Min-Chun Pan, National Central Univ. (Taiwan); Sheng-Yih Sun, TaoYuan General Hospital (Taiwan) . . . [8216-06]

SESSION 2 . . . . . Sat. 10:30 am to 12:10 pm

Microscopic Imaging

Session Chairs: **Fred S. Azar,** Philips Medical Systems (USA); **Frederic Leblond,** Dartmouth College (USA)

In vivo quantification of human dermal skin aging using SHG and autofluorescence, Stefan Puschmann, Christian-Dennis Rahn, Horst Wenck, Stefan Gallinat, Frank F. Fischer, Beiersdorf AG (Germany) . . . . . [8216-07]

Optical biopsy on breast tissue using Light-CT: toward OCT-based diagnosis in pathology, Fabrice Harms, LLTECH SAS (France); Osnath Assayag, Adriano Burcheri, Ecole Supérieure de Physique et de Chimie Industrielles (France); Martine Antoine, Hôpital de Paris (France); Brigitte Sigal-Zafrani, Institut Curie (France); Bertrand de Poly, LLTECH SAS (France); Claude Boccara, Ecole Supérieure de Physique et de Chimie Industrielles (France) and LLTECH SAS (France) . . . . . [8216-08]

Combined macroscopic FLIM and microscopic reflectance confocal microscopy for epithelial imaging, Joey M. Jabbour, Shuna Cheng, Javier A. Jo, Kristen C. Maitland, Texas A&M Univ. (USA) . . . . . [8216-09]

Optical characters and texture maps of skin and the aging mechanism by use of multiphoton microscopy and optical coherence tomography, Shulian Wu, Hui Li, Xiaoman Zhang, Fujian Normal Univ. (China) . . . . . [8216-10]

Combined SECM and OCT using a dual-band wavelength-swept laser, Etienne De Montigny, Nadir Goulamhoussen, David Banville, Ecole Polytechnique de Montréal (Canada); Mathias Strupler, Sainte-Justine Mother and Child Univ. Hospital Ctr. (Canada) and Ecole Polytechnique de Montréal (Canada); Caroline Boudoux, Ecole Polytechnique de Montréal (Canada) and Sainte-Justine Mother and Child Univ. Hospital Ctr. (Canada) . . . . . [8216-11]

Lunch/Exhibition Break . . . . . 12:10 to 1:40 pm

SESSION 3 . . . . . Sat. 1:40 to 6:10 pm

Imaging Algorithms

Session Chairs: **Xavier Intes,** Rensselaer Polytechnic Institute (USA); **Brian W. Pogue,** Thayer School of Engineering at Dartmouth (USA)

Compression-induced changes in breast hemodynamics, David R. Busch, Univ. of Pennsylvania (USA); Regine Choe, Univ. of Rochester Medical Ctr. (USA); Wesley Baker, Univ. of Pennsylvania (USA); Turgut Durduran, ICFO - Institut de Ciències Fotòniques (Spain); Mark A. Rosen M.D., Hospital of the Univ. of Pennsylvania (USA); Arjun Yodh, Univ. of Pennsylvania (USA) . [8216-12]

Multi-modality monitoring of response to rapamycin in colorectal neoplasia with optical-MR imaging *(Invited Paper)*, Thomas Wang, Univ. of Michigan (USA) . . . . . [8216-13]

Quantification of the cortical contribution to the NIRS signal over the motor cortex using concurrent NIRS-fMRI measurements, Louis Gagnon, Meryem A. Yucel, Mathieu Dehaes, Robert J. Cooper, Katherine L. Perdue, Massachusetts Institute of Technology (USA); Juliette Selb, David A. Boas, Massachusetts General Hospital (USA) . . . . . [8216-14]

Temperature-modulated fluorescence tomography, Yuting Lin, Univ. of California, Irvine (USA); Rashmi B. Dalvi, InnoSense LLC (USA); Michael T. Ghijsen, Gultekin Gulsen, Univ. of California, Irvine (USA) . . . . . [8216-15]

In vivo 3D image reconstruction from limited view projection fluorescence molecular signals by means of registration with x-ray computed tomography, Karin Radrich, Angelique B. F. Ale, Vladimir Ermolayev, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany) . . . . . [8216-16]

Cerenkov emission spectroscopy during radiation therapy treatment to plan fractionation *(Invited Paper)*, Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA) . . . . . [8216-17]

Fluorescence-enhanced optical tomography and nuclear imaging system for small animals, I-Chih Tan, Yujie Lu, Chinmay D. Darne, John C. Rasmussen, Banghe Zhu, Ali Azhdarinia, The Univ. of Texas Health Science Ctr. at Houston (USA); Shikui Yan, Anne Smith, Siemens Medical Solutions USA, Inc. (USA); Eva M. Sevick-Muraca, The Univ. of Texas Health Science Ctr. at Houston (USA) . . . . . [8216-18]

Time-reversal optical tomography: detecting and locating extended targets in a turbid medium, Binlin Wu, Wei Cai, The City College of New York (USA); Min Xu, Fairfield Univ. (USA); Swapan K. Gayen, The City College of New York (USA) . . . . . [8216-19]

Toward single-shot multispectral skin assessment, Janis Spigulis, Dainis Jakovels, Uldis Rubins, Univ. of Latvia (Latvia) . . . . . [8216-20]

Co-axial electrohydrodynamic atomization for multimodal imaging and image-guided therapy, Ting Si, Laibin Jia, Guangbin Li, Xiezhen Yin, Univ. of Science and Technology of China (China); Leilei Zhang, Ronald X. Xu, The Ohio State Univ. (USA) . . . . . [8216-21]

Combined three-dimensional computer vision and epi-illumination fluorescence imaging system, Dimitris S. Gorpas, Dido Yova, Kostas Politopoulos, National Technical Univ. of Athens (Greece) . . . . . [8216-22]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

POSTER SESSION and COFFEE BREAK. Sun. 3:00 to 4:00 pm

Attendees are invited to view the conference posters, which will be available on Saturday and Sunday for viewing. The poster session, with authors present, will be held from 3:00 to 4:00 PM on Sunday afternoon, in conjunction with the coffee break.

Poster authors: Please put up your poster before the Saturday morning coffee break, and stand with your poster during the poster session on Sunday from 3:00 to 4:00 PM. Please remove it immediately following the session. Posters remaining on the boards after the session will be discarded.

Single-pass construction of the Jacobian matrix for fluorescence diffuse optical tomography using a perturbation Monte Carlo method, Xiaofeng Zhang, Duke Univ. (USA). . . . . [8216-23]

Near-infrared brain volumetric imaging for neurodegenerative diseases diagnosis: a feasibility study based on Monte Carlo simulation, Ching-Cheng Chuang, National Taiwan Univ. (Taiwan); Tsuo-Hung Lan, National Yang-Ming Univ. (Taiwan); Chung-Ming Chen, National Taiwan Univ. (Taiwan); Yao-Sheng Hsieh, Chun-Yang Wang, National Chiao Tung Univ. (Taiwan); Ching-Po Lin, Chia-Wei Sun, National Yang-Ming Univ. (Taiwan) . . . . . [8216-24]

Hybrid light transport model-based bioluminescence tomography reconstruction for early gastric cancer detection, Xueli Chen, Jimin Liang, Xidian Univ. (China); Hao Hu, Xijing Hospital, Fourth Military Medical Univ. (China); Xiaochao Qu, Xidian Unv. (China); Defu Yang, Duofang Chen, Shouping Zhu, Jie Tian, Xidian Univ. (China). . . . . [8216-25]

Bimodal BLT source reconstruction based on adjoint diffusion equations, Yanbin Hou, Jimin Liang, Xiaochao Qu, Duofang Chen, Shouping Zhu, Jie Tian, Xidian Univ. (China) . . . . . [8216-26]

Visualization of subcutaneous veins using modulated hyperspectral imaging, Jaka Katrasnik, Franjo Pernu?, Bo?tjan Likar, Univ. of Ljubljana (Slovenia). . . . . [8216-27]

Improvement of blood perfusion signal in brain cortex by using depth selective filtering method, Hiroshi Kawamoto, Mamiko Fujii, Sophia Univ. (Japan). . . . . [8216-28]

GPU-accelerated Monte Carlo simulation for fluorescence modeling in turbid medium, Xi Yi, Weiting Chen, Linhui Wu, Wenjuan Ma, Wei Zhang, Jiao Li, Wang Xin, Feng Gao, Tianjin Univ. (China). . . . . [8216-29]

A CT-analogous mode for diffuse fluorescence tomography, Xin Wang, Jiao Li, Xi Yi, Linhui Wu, Wenjuan Ma, Wei Zhang, Feng Gao, Tianjin Univ. (China) . . . . . [8216-30]

CT-analogous method for high-resolution fluorescence molecular tomography, Jiao Li, Feng Gao, Fenghui Li, Limin Zhang, Huijuan Zhao, Tianjin Univ. (China) . . . . . [8216-31]

Investigations on shape-based reconstruction method for diffuse fluorescence tomography of breast cancer, Linhui Wu, Yiming Lu, Wei Zhang, Xi Yi, Wenjuan Ma, Jiao Li, Xin Wang, Huijuan Zhao, Feng Gao, Tianjin Univ. (China) . . . . . [8216-32]

Time-domain diffuse fluorescence tomography of CT-analogous scheme: an experimental validation, Feng Gao, Pingping Zhu, Tianjin Univ. (China) . . . . . [8216-33]

A time-domain noncontact fluorescence tomography system for breast cancer diagnosis, Huijuan Zhao, Hui Guo, Tingting Wang, Feng Gao, Tianjin Univ. (China) . . . . . [8216-34]

Fluorescence-guided diffusion optical tomography based on wavelet transform and singular value decomposition, Limin Zhang, Wei Zhang, Feng Gao, Jiao Li, Huijuan Zhao, Tianjin Univ. (China) . . . . . [8216-35]

Development of multimodal microscope combined with confocal imaging and two-photon imaging, Wanhee Chun, Dukho Do, Dae-Gab Gweon, KAIST (Korea, Republic of). . . . . [8216-36]

Orientational characterization of fibrillar collagen in histopathological samples by SHG microscopy and Mueller polarimetry, Noé Ortega-Quijano, Univ. de Cantabria (Spain); Bicher H. Haj Ibrahim, Stéphane Bancelin, Marie-Claire Schanne-Klein, Ecole Polytechnique (France); André Nazac, CHU Bicêtre (France); Petr Dokladal, Etienne Decencière, École Nationale Supérieure des Mines de Paris (France); José L. Arce-Diego, Univ. de Cantabria (Spain); Antonello De Martino, Ecole Polytechnique (France) . . . . . [8216-37]

Examination of a demyelinated fiber by action-potential-encoded second-harmonic generation, Xinguang Chen, Zhihui Luo, Hongqin Yang, Yimei Huang, Shusen Xie, Fujian Normal Univ. (China) . . . . . [8216-38]

Combined intravascular photoacoustic and ultrasound imaging of atheromatous human artery, Wei Wei, Univ. of California, Irvine (USA); Xiang Li, Qifa Zhou, The Univ. of Southern California (USA); Zhongping Chen, Beckman Laser Institute and Medical Clinic (USA). . . . . [8216-39]

Quantitative measurements and longitudal study of retinal autofluorescence in the ABCA4 knockout mouse using the combined optical coherence tomography and scanning laser ophthalmoscopy, Ali Issaei, Lukasz Szczygiel, Nima Hossein-Javaheri, Mei Young, Simon Fraser Univ. (Canada); Laurie L. Molday, Robert S. Molday, The Univ. of British Columbia (Canada); Marinko V. Sarunic, Simon Fraser Univ. (Canada) . [8216-40]

Simultaneous dual-band rapidly wavelength-swept laser for real-time endoscopic imaging, Nadir Goulamhoussen, Ecole Polytechnique de Montréal (Canada); Mathias Strupler, Sainte-Justine Mother and Child Univ. Hospital Ctr. (Canada) and Ecole Polytechnique de Montréal (Canada); Etienne De Montigny, Ecole Polytechnique de Montréal (Canada); Caroline Boudoux, Ecole Polytechnique de Montréal (Canada) and Sainte-Justine Mother and Child Univ. Hospital Ctr. (Canada). . . . . [8216-41]

Conference 8217

Sunday-Monday 22-23 January 2012 • Proceedings of SPIE Vol. 8217

Endoscopic Microscopy VII

Conference Chairs: **Guillermo J. Tearney,** Wellman Ctr. for Photomedicine (USA); **Thomas D. Wang,** Univ. of Michigan (USA)

Program Committee: **David L. Dickensheets,** Montana State Univ. (USA); **Arthur F. Gmitro,** The Univ. of Arizona (USA); **Ralf Kiesslich,** Johannes Gutenberg Univ. Mainz (Germany); **Francois Lacombe,** Mauna Kea Technologies (France); **Stephen Lam,** The BC Cancer Agency Research Ctr. (Canada); **Hiroshi Mashimo,** VA Boston Healthcare System (USA); **Kenzi Murakami,** Olympus Corp. (Japan); **Norman S. Nishioka,** Massachusetts General Hospital (USA); **Wibool Piyawattanametha,** National Electronics and Computer Technology Ctr. (Thailand); **Mark J. Schnitzer,** Stanford Univ. School of Medicine (USA); **Peter T. C. So,** Massachusetts Institute of Technology (USA); **Melissa J. Suter,** Massachusetts General Hospital (USA)

Sunday 22 January

Keynote Session . . . . . Sun. 8:10 to 8:40 am

Session Chair: **Thomas Wang,** Univ. of Michigan (USA)

Standards in endoscopic microscopy *(Invited Paper)*, Guillermo J. Tearney M.D., Massachusetts General Hospital (USA) . . . . . [8217-01]

SESSION 2 . . . . . Sun. 8:40 to 10:00 am

Novel Techniques

Session Chair: **Peter T. C. So,**
Massachusetts Institute of Technology (USA)

Fluorescence-based SMC and OCT endoscope, Richard A. Wall, Jennifer K. Barton, The Univ. of Arizona (USA) . . . . . [8217-02]

Development of a wide-field SERS imaging endoscope, Patrick McVeigh, Univ. of Toronto (Canada); Rupananda Mallia, Israel Veilleux, University Health Network (Canada); Brian Wilson, Univ. of Toronto (Canada) and University Health Network (Canada) . . . . . [8217-03]

Self-interference fluorescence microscopy, Mattijs de Groot, Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands) . . . . . [8217-04]

Compact clinical high-NA multiphoton endoscopy, Martin Weinigel, Hans G. Breunig, Peter Fischer, Marcel Kellner-Hoefer, Rainer Bückle, Karsten Koenig, JenLab GmbH (Germany) . . . . . [8217-05]

SESSION 3 . . . . . Sun. 10:30 to 11:50 am

Spectral Encoding

Session Chair: **Dvir Yelin,**
Technion-Israel Institute of Technology (Israel)

Spectrally encoded flow cytometry for high-resolution microscopy of flowing blood cells in vivo, Lior Golan, Technion-Israel Institute of Technology (Israel); Daniella Yeheskely-Hayon, Limor Minai, Technion Israel Institute of Technology (Israel); Dvir Yelin, Technion-Israel Institute of Technology (Israel) . . . . . [8217-06]

Esophageal endoscopic probe optics for spectrally encoded confocal microscopy, DongKyun Kang, Parama Pal, Robert W. Carruth, Simon Schlacter, Brett E. Bouma, Guillermo J. Tearney, Massachusetts General Hospital (USA) . . . . . [8217-07]

High-speed spectrally encoded confocal microscopy, Simon Schlachter, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA); Dongkyun Kang, Parama Pal, Robert Carruth, Kevin Woods, Brett Bouma, Gary Tearney, Wellman Ctr. for Photomedicine (USA) . . . . . [8217-08]

Spectrally encoded confocal microscopy using a multi-mode, large-core optical fiber, Parama Pal, DongKyun Kang, Simon Schlachter, Robert Carruth, Brett E. Bouma, Guillermo J. Tearney, Massachusetts General Hospital (USA) . . . . . [8217-09]

Lunch/Exhibition Break . . . . . 11:50 pm to 1:30 am

SESSION 4 . . . . . Sun. 1:30 to 3:10 pm

OCT I

Session Chair: **Guillermo J. Tearney,**
Massachusetts General Hospital (USA)

Endoscopic probes for combined optical frequency domain imaging and laser ablation therapy, David L. Arruda, Harvard/MIT Division of Health Sciences and Technology (USA); Milen Shishkov, Martin Villiger, Benjamin Vakoc, Guillermo J. Tearney, Brett E. Bouma, Wellman Center for Photomedicine (USA) . . . . . [8217-10]

Endoscopic probe for in vivo and in situ cellular imaging using full-field optical coherence tomography, Anne Latrive, Claude Boccara, Institut Langevin, ESPCI (France) and LLTech (France) . . . . . [8217-11]

Autoregulation of ciliary beat frequency in swine oviduct ex vivo: a micro-optical coherence tomography study, Linbo Liu, Wellman Ctr. for Photomedicine (USA); Brett E. Bouma, Wellman Ctr. for Photomedicine (USA) and Harvard-MIT Health Sciences and Technology (USA); Steven M. Rowe, Univ. of Alabama Birmingham (USA); Guillermo J. Tearney, Wellman Ctr. for Photomedicine (USA) . . . . . [8217-12]

Endoscopic spectral domain optical coherence tomography of murine colonic morphology to determine effectiveness of chemopreventive and chemotherapeutic agents in colorectal cancer, Susan LeGendre-McGhee, Photini F. Rice, Justin Klein, Amber Luttman, Jennifer K. Barton, The Univ. of Arizona (USA) . . . . . [8217-13]

Characterization of sub-squamous intestinal metaplasia (SSIM) pre- and post-radio frequency ablation using three-dimensional optical coherence tomography, Chao Zhou, Tsung-Han Tsai, Hsiang-Chieh Lee, Massachusetts Institute of Technology (USA); Marisa Figueiredo, Tejas Kirtane, VA Boston Healthcare System (USA); Yuankai K. Tao, Osman A. Ahsen, Massachusetts Institute of Technology (USA); Desmond C. Adler, Joseph M. Schmitt, LightLab Imaging - St Jude Medical, Inc. (USA); Qin Huang, VA Boston Healthcare System (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA); Hiroshi Mashimo, VA Boston Healthcare System (USA) . . . . . [8217-14]

SESSION 5 . . . . . Sun. 3:40 to 5:00 pm

Fluorescence Imaging

Session Chair: **Thomas Wang,** Univ. of Michigan (USA)

Wide-field near-infrared fluorescence endoscope for real-time in vivo imaging, Zhongyao Liu, Sharon J. Miller, Bishnu Joshi, Thomas D. Wang, Univ. of Michigan (USA) . . . . . [8217-15]

Development of a miniature fibre-based rotary interstitial probe for live deep brain structures fluorescence imaging, Joël Crépeau, Yves De Koninck, Daniel Côté, Univ. Laval (Canada) . . . . . [8217-16]

MEMS-based hand-held imaging probe for multispectral fluorescence lifetime imaging, Sebina Shrestha, Chih-Hsien Huang, Jesung Park, Javier Jo, Jun Zou, Brian E. Applegate, Texas A&M Univ. (USA) . . . . . [8217-17]

Targeted detection of murine colonic dysplasia in vivo with flexible multispectral scanning fiber endoscopy, Bishnu Joshi, Sharon Miller, Univ. of Michigan (USA); Cameron Lee, Univ. of Washington (USA); Adam Gustad, Univ. of Michigan (USA); Eric Seibel, Univ. of Washington (USA); Thomas Wang, Univ. of Michigan (USA) . . . . . [8217-18]

POSTERS - SUNDAY . . . . . Sun. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

2D resonant in-plane MEMS scanner for dual-axes confocal microendoscope, Haijun Li, Zhen Qiu, Zhongyao Liu, Chris Rhee, Kenn Oldham, Katsuo Kurabayashi, Thomas D. Wang, Univ. of Michigan (USA) . . . . . [8217-26]

Study of tactile endoscope using silicone rubber membrane based on image processing, Kenji Yamada, Osaka Univ. (Japan); Hideya Takahashi, Osaka City Univ. (Japan); Toshiaki Nagakura, Ken Ishihara, Yuko Ohno, Osaka Univ. (Japan) . . . . . [8217-27]

Monday 23 January

SESSION 6 . . . . . Mon. 8:40 to 10:00 pm

OCT II

Session Chair: **Melissa J. Suter,** Massachusetts General Hospital (USA)

Correction of astigmatism in endoscopic OCT for esophageal and coronary imaging, Tianshi Wang, Erasmus MC (Netherlands); Antonius van der Steen, Erasmus MC (Netherlands) and Interuniversity Cardiology Institute of The Netherlands (Netherlands); Gijs van Soest, Erasmus MC (Netherlands). [8217-19]

Transnasal OFDI catheter for unsedated gastrointestinal imaging, Michalina Gora, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Emmanuel Coron, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Institute of Digestive Diseases, University Hospital, Nantes (France); Kevin Gallagher, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA); Brett E. Bouma, Guillermo J. Tearney, Wellman Ctr. for Photomedicine, Massachusetts General Hospital (USA) and Harvard-MIT Health Science and Technology (USA). . . . . [8217-20]

Wide-field of view OCT needle probe, Bryden C. Quirk, Rodney W. Kirk, Peter B. Noble, Robert A. McLaughlin, David D. Sampson, Univ. of Western Australia (Australia). . . . . [8217-21]

Scanning fiber optic endomicroscope with precise focal-spot localization, Kartikeya Murari, Wenxuan Liang, Yuying Zhang, Jiefeng Xi, Xingde Li, The Johns Hopkins Univ. (USA) . . . . . [8217-22]

SESSION 7 . . . . . Mon. 10:30 to 11:30 am

Confocal Microscopy

Session Chair: **Arthur F. Gmitro,** The Univ. of Arizona (USA)

Confocal microlaparoscope for imaging the fallopian tube, Tzu-Yu Wu, Rachel Schafer, Andrew R. Rouse, Arthur F. Gmitro, Univ. of Arizona (USA) . . . . . [8217-23]

Vertical cross-sectional imaging by handheld dual-axes confocal microscope, Zhen Qiu, Zhongyao Liu, Choong-Ho (Chris) Rhee, Haijun Li, Kenn Oldham, Katsuo Kurabayashi, Thomas Wang, Univ. of Michigan (USA) [8217-24]

Novel peptide for in vivo confocal imaging of neoplasia in the esophagus, Matthew B. Sturm, Bishnu Joshi, Danielle K. Turgeon, Henry D. Appelman, Thomas D. Wang, Univ. of Michigan (USA). . . . . [8217-25]

Courses of Related Interest

SC1051 Fundamentals of Microscope Design (Seward) Wednesday, 8:30 am to 12:30 pm

SC978 Light Microscopy (Tkaczyk) Sunday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications XII

Conference Chair: **Israel Gannot,** Tel Aviv Univ. (Israel)

Program Committee: **James P. Clarkin,** Polymicro Technologies, A Subsidiary of Molex Incorporated (USA); **Ilko K. Ilev,** U.S. Food and Drug Administration (USA); **Jin Ung Kang,** The Johns Hopkins Univ. (USA); **Karl-Friedrich Klein,** Technsiche Hochschule Mittelhessen (Germany); **Pierre Lucas,** The Univ. of Arizona (USA); **Yuji Matsuura,** Tohoku Univ. (Japan)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:30 to 10:30 am

Session 1

Session Chair: **Israel Gannot,** Tel Aviv Univ. (Israel)

Investigation of tapered silver/silver halide coated hollow glass waveguides for the transmission of CO_2 laser radiation, Carlos M. Bledt III, Rutgers, The State University of New Jersey (USA); James A. Harrington, Rutgers, The State Univ. of New Jersey (USA); Saiko Kino, Yuji Matsuura, Tohoku Univ. (Japan); Jason M. Kriesel, Opto-Knowledge Systems, Inc. (USA) . . . . . [8218-01]

Microsphere chain fiber tips for multimode filtering of erbium:YAG laser beam during contact tissue ablation, Thomas Hutchens, Arash Darafsheh, The Univ. of North Carolina at Charlotte (USA); Howard S. Ying M.D., The Johns Hopkins Univ. (USA); Vasily N. Astratov, Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA) . . . . . [8218-02]

Uniform polymer-film formation in 100-µm-bore hollow fiber for Er:YAG laser transmission, Katsumasa Iwai, Masanao Suzuki, Sendai National College of Technology (Japan); Mitsunobu Miyagi, School Corp. of Tohoku Gakuin (Japan); Yi-Wei Shi, Fudan Univ. (China); Yuji Matsuura, Tohoku Univ. (Japan). . . . . [8218-03]

Silica hollow-core photonic crystal fibres for mid-infrared applications, Artur Urich, Robert R. J. Maier, Duncan P. Hand, Heriot-Watt Univ. (United Kingdom); Jonathan Knight, Brian J. Mangan, Univ. of Bath (United Kingdom); Jonathan D. Shephard, Heriot-Watt Univ. (United Kingdom) . . . . . [8218-04]

Motion artifact handling of forehead photoplethysmograms using a self-mixing interferometric motion reference, Ralph Wijshoff, Massimo Mischi, Technische Univ. Eindhoven (Netherlands); Alexander Van der Lee, Pierre Woerlee, Paul Aelen, Niek Lambert, Philips Research (Netherlands); Ronald Aarts, Technische Univ. Eindhoven (Netherlands) . . . . . [8218-05]

Picoliter-volume glucose concentration microsensor based on miniature abrupt-tapered Mach-Zehnder interferometer, Zhi-Zheng Feng, Tsung-Hsun Yang, Nan-Kuang Chen, Yi-Ning Chen, National United Univ. (Taiwan); Yu-Chung Chang, National Changhua Univ. of Education (Taiwan). . . . . [8218-06]

SESSION 2 . . . . . Sat. 11:00 am to 1:00 pm

Session 2

Session Chair: **Israel Gannot,** Tel Aviv Univ. (Israel)

Raman spectral imaging using hollow flexible fiber bundles, Takashi Katagiri, Tatsuhiro Tomiyama, Yuji Matsuura, Tohoku Univ. (Japan) . . . [8218-07]

Silver/polystyrene coated hollow glass waveguides for the transmission of visible and infrared radiation, Carlos M. Bledt III, James A. Harrington, Rutgers, The State Univ. of New Jersey (USA) . . . . . [8218-08]

Lifetime prediction for 405-nm single-mode delivery systems for therapeutic laser applications, Cornell P. Gonschior, Karl-Friedrich Klein, Technische Hochschule Mittelhessen (Germany); Eric J. Seibel, Mark R. Kirshenbaum, Univ. of Washington (USA); Tong Sun, City Univ. London (United Kingdom) . . . . . [8218-09]

Image-guided intervention in the human bile duct using scanning fiber endoscope system, Eric J. Seibel, Univ. of Washington (USA); Javier A. Jo, Texas A&M Univ. (USA); Charles D. Melville, Richard S. Johnston, Christopher R. Naumann, Michael D. Saunders, Univ. of Washington (USA). . . . . [8218-10]

Infrared spectral imaging by hollow-optical fiber bundle, Chenhui Huang, Saiko Kino, Takashi Katagiri, Yuji Matsuura, Tohoku Univ. (Japan) . . . . [8218-11]

TBD, Israel Gannot, Tel Aviv Univ. (Israel). . . . . [8218-12]

Lunch/Exhibition Break . . . . . 1:00 to 2:00 pm

SESSION 3 . . . . . Sat. 2:00 to 3:20 pm

Session 3

Session Chair: **Israel Gannot,** Tel Aviv Univ. (Israel)

Small-diameter hollow waveguides based on silver-clad stainless steel tube for infrared laser light transmission, Akihito Hongo, Masahiro Ohkawa, Noribumi Shiina, Shinobu Sato, Hitachi Cable, Ltd. (Japan). . . . . [8218-13]

Effects of high humidity and high temperature on failure of optical fiber for high-power delivery, Xiaoguang Sun, Jie Li, OFS (USA). . . . . [8218-14]

Metal-assisted guided-mode resonance device for biosensing, Sheng-Fu Lin, Wen-Yih Chen, Jenq-Yang Chang, National Central Univ. (Taiwan) [8218-15]

Multilayer silver/dielectric thin-film coated hollow waveguides for sensor and laser power delivery applications, Carlos M. Bledt III, James A. Harrington, Rutgers, The State Univ. of New Jersey (USA); Jason M. Kriesel, Opto-Knowledge Systems, Inc. (USA) . . . . . [8218-16]

SESSION 4 . . . . . Sat. 3:50 to 5:30 pm

Session 4

Session Chair: **Israel Gannot,** Tel Aviv Univ. (Israel)

Microtapered long-period fiber gratings for application to a radiation dosimeter, Young-Geun Han, Hyun-Joo Kim, Hanyang Univ. (Korea, Republic of); Younghum Ji, Korea Institute of Radiological & Medical Sciences (Korea, Republic of) . . . . . [8218-17]

Design and fabrication of hollow fiber-based Raman tweezers for bioparticle measurement, Yoshitake Morisaki, Takashi Katagiri, Yuji Matsuura, Tohoku Univ. (Japan). . . . . [8218-18]

An implantable fiber optic surface plasmon resonance glucose sensor utilizing fiber grating for temperature compensation, Peng Wu, Dachao Li, Jia Yang, Rui Zhu, Kexin Xu, Tianjin Univ. (China) . . . . . [8218-19]

Real-time bio(chemical)sensing with clad etched fiber Bragg grating, Gurusiddhappa R. Prashanth, Shivananju B. Nanjunda, Sundarrajan Asokan, Manoj M. Varma, Indian Institute of Science (India) . . . . . [8218-20]

Highly birefrengent terahertz hollow fiber: design, fabrication, and experimental characterization, Xiao-Li Tang, Yi-Wei Shi, Fudan Univ. (China) . . . . . [8218-21]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 5 . . . . . Sun. 8:00 to 10:00 am

Session 5

Session Chair: **Israel Gannot,** Tel Aviv Univ. (Israel)

Highly efficient excitation and detection of whispering gallery modes in a dye-doped microsphere using a microstructured optical fiber, Kristopher J. Rowland, Alexandre Francois, Tanya Monro, The Univ. of Adelaide (Australia). . . . . [8218-22]

Label-free DNA biosensor based on double tilted fiber Bragg grating, Alessandro Candiani, Michele Sozzi, Annamaria Cucinotta, Stefano Selleri, Rosanna Veneziano, Roberto Corradini, Rosangela Marchelli, Univ. degli Studi di Parma (Italy); Paul Childs, Stavros Pissadakis, Foundation for Research and Technology-Hellas (Greece) . . . . . [8218-23]

Miniature fiber optic force sensor for vitreoretinal microsurgery based on low-coherence Fabry-Pérot interferometry, Xuan Liu, Iulian Iordachita, Russell H. Taylor, Jin U. Kang, The Johns Hopkins Univ. (USA). . . . . [8218-24]

Dispersive Fourier transform using few-mode fibers for real-time and high-speed spectroscopy, Yi Qiu, Chi Zhang, Kenneth K. Y. Wong, Kevin K. Tsia, The Univ. of Hong Kong (Hong Kong, China) . . . . . [8218-25]

Optimal design for hollow fiber inner-coated by dielectric layers with surface roughness, Bang-Shan Sun, Xiao-Li Tang, Yi-Wei Shi, Fudan Univ. (China); Katsumasa Iwai, Sendai National College of Technology (Japan); Mitsunobu Miyagi, School Corporation of Tohoku Gakuin (Japan) . . . . [8218-26]

Dy:PbGa2S4 laser radiation and its delivery by hollow waveguide, Helena Jelinkova, Michal Němec, Czech Technical Univ. in Prague (Czech Republic); Mitsunobu Miyagi, Katsumasa Iwai, Hiroyuki Takaku, Sendai National College of Technology (Japan); Maxim Doroshenko, Tasoltan Basiev, A. M. Prokhorov General Physics Institute (Russian Federation); Valerii Badikov, Dmitri Badikov, Kuban State Technological Univ. (Russian Federation). [8218-27]

SESSION 6 . . . . . Sun. 10:20 am to 12:20 pm

Session 6

Session Chair: **Israel Gannot,** Tel Aviv Univ. (Israel)

Characterization of atherosclerotic plaque depositions in vivo by fiber optic Raman spectroscopy and ex vivo by FTIR imaging, Christian Matthäus, Sebastian Dochow, Christoph Krafft, Institut für Photonische Technologien e.V. (Germany); Annika Lattermann, Friedrich-Schiller-Univ. Jena (Germany); Bernhard R. Brehm, Universitätsklinikum Jena (Germany); Jürgen Popp, Institut für Photonische Technologien e.V. (Germany) . . . . . [8218-28]

Spectral ATR-sensor with variable pass lengths, Karl-Friedrich Klein, Cornell P. Gonschior, Technische Hochschule Mittelhessen (Germany) . . . . . [8218-29]

Behavior of polymer cladding materials under extremely high temperatures, Timothy E. Clark, SSCP USA (USA); Selee Chang, SSCP Co., Ltd. (China); Jung-Hyun Oh, SSCP Co., Ltd. (Korea, Republic of) . . . . . [8218-30]

Microbending fiber optic based heart-rate monitor for finger and toe applications, Dimitrios Kokkinos, Sunil Dehipawala, Mukhtar Musa, George Tremberger, Jr., Todd Holden, David Lieberman, Tak D. Cheung, Queensborough Community College (USA) . . . . . [8218-31]

Force sensing microforceps with integrated fiber Bragg grating for vitreoretinal surgery, Xingchi He, Marcin Balicki, Jin Kang, Peter Gehlbach, James Handa, Russell Taylor, Iulian Iordachita, The Johns Hopkins Univ. (USA) . . . . . [8218-32]

Portable fiber optic ballistocardiogram sensor for home use, Zhihao Chen, Ju Teng Teo, Soon Huat Ng, Xiufeng Yang, Institute for Infocomm Research (Singapore) . . . . . [8218-33]

Courses of Related Interest

SC981 Biomedical Fiber Optic Sensors and Applications (Mendez, McLaughlin) Monday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Conference 8219

Saturday-Sunday 21-22 January 2012 • Proceedings of SPIE Vol. 8219

Biomedical Vibrational Spectroscopy VII: Advances in Research and Industry

Conference Chairs: **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA); **Wolfgang Petrich,** Roche Diagnostics GmbH (Germany)

Program Committee: **Andrew J. Berger,** Univ. of Rochester (USA); **Rohit Bhargava,** Univ. of Illinois at Urbana-Champaign (USA); **Airton A. Martin,** Univ. do Vale do Paraíba (Brazil); **Michael D. Morris,** Univ. of Michigan (USA); **Dieter Naumann,** Robert Koch-Institut (Germany); **Jürgen Popp,** Institut für Photonische Technologien e.V. (Germany); **Nicholas Stone,** Gloucestershire Royal Hospital (United Kingdom)

Saturday 21 January

SESSION 1 . . . . . Sat. 1:00 to 3:20 pm

Novel Methodologies

Session Chair: **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA)

Combining optoacoustics and resonance Raman spectroscopy for quantification of biomolecules in situ, Merve Wollweber, Leibniz Univ. Hannover (Germany) . . . . . [8219-01]

High-throughput Raman and surface-enhanced Raman microscopy, Wei-Chuan Shih, Ji Qi, Univ. of Houston (USA) . . . . . [8219-02]

Multifocal laser tweezers Raman spectroscopy for high-throughput functional analysis of red blood cells, Rui Liu, Noriko Satake, Dennis L. Matthews, James Chan, NSF Ctr. for Biophotonics Science and Technology (USA) . . . . . [8219-03]

Ultralow-frequency Stokes and anti-Stokes Raman spectroscopy at 785 nm with volume holographic grating filters, James T. Carriere, Frank Havermeyer, Ondax, Inc. (USA) . . . . . [8219-04]

Mid-IR laser-based vibrational circular dichroism spectroscopy, Marcel Pfeifer, Fraunhofer Institute for Physical Measurement Techniques (Germany); Steffen Lüdeke, Univ. of Freiburg (Germany); Peer Fischer, Fraunhofer Institute for Physical Measurement Techniques (Germany) . [8219-05]

Integration of nanostructures and waveguide core for surface enhanced Raman spectroscopy: a novel excitation method, Stuart J. Pearce, Martin D. B. Charlton, Michael E. Pollard, Swezin Oo, Ruiqi Chen, Univ. of Southampton (United Kingdom) . . . . . [8219-06]

Transmission versus reflection diffraction gratings for detector array based spectrometers, Romuald Pawluczyk, Arash Rohani, P&P Optica Inc. (Canada) . . . . . [8219-07]

SESSION 2 . . . . . Sat. 3:50 to 5:30 pm

Analysis Methods

Session Chair: **Wolfgang Petrich,** Roche Diagnostics GmbH (Germany)

Analyzing near infrared scattering from human skin to monitor changes in hematocrit, Joseph Chaiken, Bin Deng, Jerry Goodisman, Syracuse Univ. (USA); George Shaheen, Rebecca J. Bussjager, LighTouch Medical, Inc. (USA) . . . . . [8219-08]

Multivariate analysis methods for spectroscopic blood analysis, Michael F. G. Wood, Arash Rohani, Rashid Ghazalah, Romuald Pawluczyk, P&P Optica Inc. (Canada) . . . . . [8219-09]

Univariate and multivariate methods for chemical mapping and imaging of cervical cancer cells, Shiyamala Duraipandian, Wei Zheng, Zhiwei Huang, National Univ. of Singapore (Singapore) . . . . . [8219-10]

Thinking outside the black box regime: an alternate chemometric prediction framework for minor component quantification in biological Raman spectroscopy, Narahara Chari Dingari, Ishan Barman, Jeon Woong Kang, Ramachandra R. Dasari, Massachusetts Institute of Technology (USA) . . . . . [8219-11]

Singlet oxygen induced advanced glycation end product photobleaching of in vivo human fingertip autofluorescence, Bin Deng, Anabel Simental, Patrick S. Lutz, Syracuse Univ. (USA); George Shaheen, LighTouch Medical, Inc. (USA); Joseph Chaiken, Syracuse Univ. (USA) . . . . . [8219-12]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online http://spie.org/x7779.xml

Sunday 22 January

SESSION 3 . . . . . Sun. 8:30 to 10:10 am

Cells and Constructs

Session Chair: **Andrew J. Berger,** Univ. of Rochester (USA)

Classification of Raman spectra of single cells with autofluorescence suppression by modulated wavelength excitation, Sebastian Dochow, Norbert Bergner, Christoph Krafft, Institut für Photonische Technologien e.V. (Germany); Joachim H. Clement, Universitätsklinikum Jena (Germany); Michael Malizu, Robert F. Marchington, Kishan Dholakia, Univ. of St. Andrews (United Kingdom); Jürgen Popp, Institut für Photonische Technologien e.V. (Germany) . . . . . [8219-13]

Effect of photodynamic therapy on single cancer cells studied by integrated Raman and angular scattering microscopy, Dustin W. Shipp, Soumya Mitra, Thomas H. Foster, Andrew J. Berger, Univ. of Rochester (USA) . . . . . [8219-14]

Raman study of power-dependent oxygenation state transition of red blood cells in a single-beam optical trap, Rui Liu, Lena Zheng, Dennis L. Matthews, Noriko Satake, James Chan, NSF Ctr. for Biophotonics Science and Technology (USA) . . . . . [8219-15]

Raman spectroscopy of fiber-optically manipulated cells, Nelson Cardenas, The Univ. of Texas at Arlington (USA); Ishan Barman, Massachusetts Institute of Technology (USA); Bryan Black, The Univ. of Texas at Arlington (USA); Narahara C. Dingari, Ramachandra R. Dasari, Massachusetts Institute of Technology (USA); Samarendra K. Mohanty, The Univ. of Texas at Arlington (USA). [8219-16]

Raman spectroscopic analysis of human tissue engineered oral mucosa constructs (EVPOME) perturbed by physical and biochemical methods, Michael D. Morris, Arindam Ganguly, Mekhala Raghavan, Shiuhyang Kuo, Jacqueline H. Cole, Cynthia L. Marcelo, Stephen E. Feinberg, Univ. of Michigan, Ann Arbor (USA); Kenji Izumi, Niigata Univ. (Japan) . . . . . [8219-17]

SESSION 4 . . . . . Sun. 10:40 am to 12:00 pm

Cancer Applications

Session Chair: **Joseph Chaiken,** Syracuse Univ. (USA)

In vivo Raman spectroscopy methods for oral cancers diagnosis, S. P. Singh, Atul Deshmukh, Pankaj Chaturvedi, C. Murali Krishna, Advanced Ctr. for Treatment, Research & Education in Cancer (India) . . . . . [8219-18]

High-wavenumber Raman spectroscopy for in vivo cancer detection in larynx, Lin Kan, Wei Zheng, National Univ. of Singapore (Singapore); David Lau, Singapore General Hospital (Singapore); Zhiwei Huang, National Univ. of Singapore (Singapore). . . . . [8219-19]

On-line detection of malignant lesions in vivo in the upper gastrointestinal tract using image-guided Raman endoscopy, Mads Sylvest Bergholt, Wei Zheng, Lin Kan, National Univ. of Singapore (Singapore); Khek Yu Ho, Ming Teh, National Univ. of Singapore (Singapore) and National Univ. Hospital (Singapore); Khay Guan Yeoh, National Univ. of Singapore (Singapore); Jimmy Bok Yan So, National Univ. of Singapore (Singapore) and National Univ. Hospital (Singapore); Zhiwei Huang, National Univ. of Singapore (Singapore) . . . . . [8219-20]

Rapid intra-operative analysis of human brain tumor tissue with infrared spectroscopy, Allison L. Stelling, Technische Univ. Dresden (Germany); Matthias Kirsch, Kathrin D. Geiger, Ortrud Uckerman, Univ. Hospital, Technische Univ. Dresden (Germany); Holger Cramm, Gerald Steiner, Technische Univ. Dresden (Germany). . . . . [8219-21]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 5 . . . . . Sun. 1:30 to 3:50 pm

Non-Cancer Applications

Session Chair: **Anita Mahadevan-Jansen,** Vanderbilt Univ. (USA)

Raman spectroscopy of bone infections in diabetic foot wounds, Karen A. Esmonde-White, Univ. of Michigan Medical School (USA); Francis Esmonde-White, Karen Flannagan, Univ. of Michigan (USA); Crystal Holmes, Univ. of Michigan Medical School (USA); Michael D. Morris, Univ. of Michigan (USA); Blake Roessler, Univ. of Michigan Medical School (USA) . . . . . [8219-22]

Transcutaneous monitoring of steroid-induced osteoporosis with Raman spectroscopy, Jason R. Maher, Hani A. Awad, Andrew J. Berger, Univ. of Rochester (USA) . . . . . [8219-23]

Development of Raman spectroscopy for discrimination of inflammatory bowel disease, Isaac J. Pence, Daniel Balikov, David Schwartz, Xiaohong Bi, Alan Herline, Anita Mahadevan-Jansen, Vanderbilt Univ. (USA). . . . . [8219-24]

High-resolution mid-infrared imaging for disease diagnosis, Michael J. Walsh, David Mayerich, Univ. of Illinois at Urbana-Champaign (USA); Andre Kajdacsy-Balla, Univ. of Illinois at Chicago (USA); Rohit Bhargava, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [8219-25]

Raman spectroscopy: an effective method of detecting biochemical changes of the pregnant cervix, Elizabeth Vargis, Charles N. Webb, Kent Williams, Kelly Bennett, Jeff Reese, Vanderbilt Univ. (USA); Ayman Al-Hendy, Meharry Medical College (USA); Anita Mahadevan-Jansen, Vanderbilt Univ. (USA) . . . . . [8219-26]

Vibrational Raman spectroscopic signature from skin and other biofluids in autism spectrum disorder (ASD): biomarkers in early diagnosis and prevention, Nihal DeSilva M.D., Tipu Sultan M.D., Washington Univ. in St. Louis (USA) . . . . . [8219-27]

Toward minimally invasive, continuous glucose monitoring in vivo, Christian Vrancic, Norbert Gretz, Niels Kröger, Sabine Neudecker, Annemarie Pucci, Wolfgang Petrich, Ruprecht-Karls-Univ. Heidelberg (Germany). . . . . [8219-28]

POSTERS - SUNDAY . . . . . Sun. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Identification of paracoccidioides brasiliensis by gold nanoprobes, Leandro Raniero, Maiara L. Castilho, Maria A. G. Cardoso, Renata A. Canevari, Airton A. Martin, Univ. do Vale do Paraíba (Brazil). . . . . [8219-29]

A rheumatoid arthritis study by Fourier transform infrared spectroscopy, Carolina S. Carvalho, Ana Carla A. Silva, Tatiano J. P. S. Santos, Airton A. Martin, Univ. do Vale do Paraíba (Brazil); Luís E. C. Andrade, Univ. Federal de São Paulo (Brazil); Leandro Raniero, Univ. do Vale do Paraíba (Brazil) . [8219-30]

Biochemical differentiation of mycelium and yeast forms of paracoccidioides brasiliensis by Fourier transform infrared spectroscopy, Maiara L. Castilho, Geraldo M. Alves de Abreu, Tatiana G. F. Matos, Univ. do Vale do Paraíba (Brazil); Claudia B. L. Campos, Univ. Federal de São Paulo (Brazil); Airton A. Martin, Leandro Raniero, Univ. do Vale do Paraíba (Brazil) . . . . . [8219-31]

Bucal microbiology analyzed by infrared spectroscopy (FT-IR), Geraldo M. Alves de Abreu, Gislene R. Oliveira, Sônia Khouri, Priscila P. Favero, Leandro J. Raniero, Airton A. Martin, Univ. do Vale do Paraíba (Brazil) . . . . . [8219-32]

Gold and silver nanostructures for SERS, Madhab Pokhrel, Ajith Gangadharan, Brian Yust, Dhiraj K. Sardar, The Univ. of Texas at San Antonio (USA) . . . . . [8219-33]

Study of aggressiveness prediction of mammary adenocarcinoma by Raman spectroscopy, Renata Andrade Bitar, Univ. Federal do ABC (Brazil); Airton A. Martin, Univ. do Vale do Paraíba (Brazil); Herculano da Silva Martinho, Univ. Federal do ABC (Brazil); Leandra N. Z. Ramalho, Univ. de São Paulo (Brazil); Arnaldo R. Junior, Univ. Federal do ABC (Brazil); Leandro Raniero, Univ. do Vale do Paraíba (Brazil); Fernando S. Ramalho, Univ. de São Paulo (Brazil) . . . . . [8219-34]

Conference 8220

Tuesday-Wednesday 24-25 January 2012 • Proceedings of SPIE Vol. 8220

Optical Biopsy X

Conference Chair: **Robert R. Alfano,** The City College of New York (USA)

Conference Co-Chair: **Stavros G. Demos,** Lawrence Livermore National Lab. (USA)

Program Committee: **Stefan Andersson-Engels,** Lund Univ. (Sweden); **Christopher H. Contag,** Stanford Univ. School of Medicine (USA); **Jason M. Eichenholz,** Ocean Optics, Inc. (USA); **Amir H. Gandjbakhche,** National Institutes of Health (USA); **Israel Gannot,** Tel Aviv Univ. (Israel); **Xiaohui Ni,** Harvard Univ. (USA); **Yang Pu,** The City College of New York (USA); **Kestutis Sutkus,** The City College of New York (USA); **Urs Utzinger,** The Univ. of Arizona (USA); **Wubao Wang,** The City College of New York (USA); **Siavash Yazdanfar,** GE Global Research (USA)

Tuesday 24 January

SESSION 1 . . . . . Tues. 8:00 to 10:00 am

Scanning, Diffuse Reflectance, and Hyper-Spectral Imaging

Session Chair: **Wubao Wang,** The City College of New York (USA)

Screening prostate cancer using a portable near infrared scanning imaging unit with an optical fiber-based rectal probe, Yang Pu, Wubao Wang, Guichen Tang, Yury Budansky, Mikhail Sharonov, The City College of New York (USA); Min Xu, Fairfield Univ. (USA); Samuel Achilefu, Washington Univ. School of Medicine in St. Louis (USA); James A. Eastham, Memorial Sloan Kettering Cancer Center (USA); Robert Alfano, The City College of New York (USA) . . . . . [8220-01]

Angular domain spectroscopic imaging for breast cancer margin assessment after lumpectomy, Fartash Vasefi, Lawson Health Research Institute (Canada); Mohamadreza Najiminaini, Simon Fraser University (Canada); Astrid Chamson-Reig, Muriel Brackstone, Lawson Health Research Institute (Canada); Bozena Kaminska, Simon Fraser University (Canada); Jeffrey Carson, Lawson Health Research Institute (Canada) . . . . . [8220-02]

Diffuse reflectance imaging: a tool for guided biopsy, J L Jayanthi, Centre for Earth Science Studies (India); Subhash Narayanan, Ctr. for Earth Science Studies (India); Stephen Manju, Govt Dental College (India); G U Nisha, Centre for Earth Science Studies (India); V T Beena, Govt Dental College (India) . . . . . [8220-03]

Statistical image analysis of neo-adjuvant chemotherapy monitoring with diffuse optical tomography, David R. Busch, Univ. of Pennsylvania (USA); Regine Choe, Univ. of Rochester (USA); Turgut Durduran, ICFO - Institut de Ciències Fotòniques (Spain); Wensheng Guo, Mark A. Rosen, Arjun G. Yodh, Univ. of Pennsylvania (USA) . . . . . [8220-04]

Quantification of scattering and absorption coefficients of oral mucosa with hyperspectral imaging and Monte Carlo modeling, Hsiang-Chen Pi, Yi-Shan Li, Te-Yu Tseng, Hsi-Hsun Chen, Graduate Institute of Biomedical Electronic and Bioinformatics, National Taiwan University. (Taiwan); Chun-Yu Chen, Kung-Bin Sung, National Taiwan Univ. (Taiwan) . . . . . [8220-05]

Analysis of soft tissue near-infrared spectra under dynamic pressure effects, Blaž Cugmas, Franjo Pernuš, Boštjan Likar, Faculty of Electrical Engineering, University of Ljubljana (Slovenia) . . . . . [8220-06]

SESSION 2 . . . . . Tues. 10:30 am to 12:00 pm

Pump-Probe and Time-Resolved Imaging

Session Chair: **Stavros G. Demos,** Lawrence Livermore National Lab. (USA)

Pump-probe imaging of melanoma, Warren S. Warren, Sr., Duke Univ. (USA) . . . . . [8220-07]

Time-resolved optical biopsy spectroscopy of normal, benign, and malignant tissues, Vadivel Masilamani, King Saud Univ. (Saudi Arabia); Jeff Secor, Bidyut B. Das, The City College of New York (USA); Mohamad Al Salhi, King Saud Univ. (Saudi Arabia); Suad Bint Amer, King Faisal Specialist Hospital (Saudi Arabia); Danny Rabah, K. Farhat, Princess Johara Al-Ibrahim Center for Cancer Research (Saudi Arabia); Robert R. Alfano, The City College of New York (USA) . . . . . [8220-08]

Fluorescence lifetime techniques for tissue diagnosis: challenges and solutions *(Invited Paper)*, Laura Marcu, Univ. of California, Davis (USA) [8220-09]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Tues. 1:30 to 5:20 pm

Diagnostic Spectroscopy and Endoscopy

Session Chair: **Warren S. Warren, Sr.,** Duke Univ. (USA)

Clinical requirements for optical imaging in medical robotics *(Invited Paper)*, Jonathan Sorger, Intuitive Surgical, Inc. (USA) . . . . . [8220-10]

In vivo imaging of bladder cancer using prototype endoscope-adaptable system providing parallel RGB and NIR autofluorescence image acquisition, Stavros G. Demos, Lawrence Livermore National Lab. (USA); Michael C. Jacobson, Ralph d. White, UC Davis Medical Center (USA) [8220-11]

Correction for melanin absorption in a two-layer skin model using an artificial neural network in the spatial frequency domain, Dmitry Yudovsky, Anthony J. Durkin, Univ. of California, Irvine (USA). . . . . [8220-12]

An intraoperative probe combining positron detection and OCT imaging for ovarian cancer detection and characterization, Yi Yang, Tianheng Wang, Nrusingh C. Biswal, Patrick D. Kumavor, Univ. of Connecticut (USA); Xiaohong Wang, Mozafareddin Karimeddini, John Vento, Melinda Sanders, Molly Brewer, University of Connecticut Health Center (USA); Quing Zhu, Univ. of Connecticut (USA) . . . . . [8220-13]

Evaluating limb ischemia using a non-invasive multimodal spectroscopic system *(Invited Paper)*, Rajiv Luthra, Nicole J. Crane, Naval Medical Research Center (USA); Eric A. Elster, Naval Medical Research Center (USA) and Walter Reed National Medical Center (USA) and Uniformed Services University Health Sciences (USA) . . . . . [8220-14]

Fluorescence anisotropy characterization of oral tissues, Sivabalan Shanmugam, Anna Univ. Chennai (India); Dornadula Koteeswaran, Meenakshi Ammal Dental College & Hospital (India); Muthuvelu K, Stanley Medical College and Hospital (India); Ganesan Bharanidharan, Prakasa Rao Aruna, Anna Univ. Chennai (India); Chilakapati Muralikrishna, Advanced Ctr. for Treatment, Research and Education in Cancer (India); Singaravelu Ganesan, Anna Univ. Chennai (India). . . . . [8220-15]

Fibre optic fluorescence spectroscopy for monitoring fish freshness, Tzu-Chien Hsiao, National Chiao Tung Univ (Taiwan) . . . . . [8220-16]

Compact Stokes shift and fluorescence spectroscopic diagnostics ratiometer unit with no moving parts for cancer detection, Laura A. Sordillo, Yury Budansky, R.R. Alfano, University (USA) . . . . . [8220-17]

Spectral grading and Gleason index of malignant prostate tissue using optical biopsy fluorescence and Stokes shift, Mohamad Al Salhi, Vadivel Masilamani, King Saud Univ. (Saudi Arabia); Danny Rabah, K. Farhat, Princess Johara Al-Ibrahim Ctr. for Cancer Research (Saudi Arabia); Cheng-Hui Liu, Yang Pu, Robert R. Alfano, The City College of New York (USA) . . . . . [8220-18]

Wednesday 25 January

SESSION 4 . . . . . Wed. 8:00 to 10:00 am

Multi-Modal Spectroscopy and Imaging for Cancer Detection I

Session Chair: **Singaravelu Ganesan,** Anna Univ. Chennai (India)

Terahertz imaging of nonmelanoma skin cancers *(Invited Paper)*, Cecil S. Joseph, Univ. of Massachusetts Lowell (USA); Anna N. Yaroslavsky, Univ. of Massachusetts Lowell (USA) and Massachusetts General Hospital (USA); Victor A. Neel, Massachusetts General Hospital (USA); Thomas M. Goyette, Robert H. Giles, Univ. of Massachusetts Lowell (USA). . . . . [8220-19]

Breast biopsy guidance with OCT: an in vivo study in a mouse model of breast cancer, Nicusor V. Iftimia, Mircea Mujat, Daniel X. Hammer, Physical Sciences Inc. (USA). . . . . [8220-20]

Use of Mueller polarimetric imaging for early detection of uterine cervix cancer, Angelo Pierangelo, Sandeep Manhas, Maria Rosaria Antonelli, Tatiana Novikova, Antonello De Martino, Ecole Polytechnique (France); Abdelali Benali, Pierre Validire, Henri Cohen, Institut Mutualiste Montsouris (France); André Nazac, Hospital Le Kremlin Bicêtre (France). . . . . [8220-21]

Advances in optogenetics, Karl Deisseroth, Stanford Univ.. . . . . [8220-22]

SESSION 5 . . . . . Wed. 10:30 am to 12:00 pm

Multi-modal Spectroscopy and Imaging for Cancer Detection II

Session Chair: **Laura Marcu,** Univ. of California, Davis (USA)

Discovery in translation: near-infrared fluorescence imaging *(Invited Paper)*, Eva M. Sevick-Muraca, The Univ. of Texas Health Science Ctr. at Houston (USA) . . . . . [8220-23]

Multimodal optical imaging for detecting breast cancer, Anna N. Yaroslavsky, Univ. of Massachusetts, Lowell (USA); Rakesh Patel, University of Massachusetts, Lowell (USA); Ashraf Khan M.D., Michal Kamionek M.D., UMass Memorial Medical Center (USA); Dennis Wirth, University of Massachusetts, Lowell (USA); Robert Quinlan M.D., UMass Memorial Medical Center (USA) . . . . . [8220-24]

A dual-modality imaging approach to early diagnosis of cancer in a hamster cheek pouch model, Paritosh Pande, Sebina Shrestha, Jesung Park, Javier A. Jo, Texas A&M Univ. (USA); Irma Gimenez-Conti, Jimi L. Brandon, UT MD Anderson Cancer Center (USA); Brian E. Applegate, Texas A&M Univ. (USA) . . . . . [8220-25]

Monitoring the morphochemistry of laryngeal carcinoma by multimodal imaging, Tobias Meyer, Friedrich-Schiller-Univ. Jena (Germany); Christoph Krafft, Orlando Guntinas-Lichius, ; Benjamin Dietzek, Friedrich-Schiller-Univ. Jena (Germany); Jürgen Popp, Institut für Photonische Technologien e.V. (Germany) . . . . . [8220-26]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 6 . . . . . Wed. 1:30 to 3:00 pm

Optical Tissue and Body Liquid Biopsy

Session Chair: **Yang Pu,** The City College of New York (USA)

Profiling wound healing with wound effluent: Raman spectroscopic indicators of infection *(Invited Paper)*, Nicole J. Crane, Rajiv Luthra, Naval Medical Research Center (USA); Eric A. Elster, Naval Medical Research Center (USA) and Walter Reed National Medical Center (USA) and Uniformed Services University of Health Sciences (USA) . . . . . [8220-27]

Fluorescence emission and excitation spectroscopic characterization of blood plasma protein, Prakasa Rao Aruna, Sivabalan Shanmugam, Anna Univ. Chennai (India); Kulandaivel Muthuvelu, Stanley Medical College and Hospital (India); Ganesan Bharanidharan, Anna Univ. Chennai (India); Dornadula Koteeswaran, Meenakshi Ammal Dental College and Hospital (India); Chilakapati Muralikrishna, Advanced Ctr. for Treatment, Research & Education in Cancer (India); Singaravelu Ganesan, Anna Univ. Chennai (India) . . . . . [8220-28]

Synchronous luminescence spectroscopic characterization of urine of normal and cancerous patients, Rajasekaran Ramu, Yuvaraj Manoharan, Anna Univ. Chennai (India); Kulandaivel Muthuvelu, Stanley Medical College and Hospital (India); Dornadula Koteeswaran, Meenakshi Ammal Dental College and Hospital (India); Thamilkumar T, Dr. Rai Memorial Cancer Institute (India); Ganesan Bharanidharan, Prakasa Rao Aruna, Anna Univ. Chennai (India); Chilakapati Muralikrishna, Advanced Ctr. for Treatment, Research & Education in Cancer (India); Singaravelu Ganesan, Anna Univ. Chennai (India) . . . [8220-29]

Time-resolved fluorescence spectroscopic characteristics of normal and cancerous blood, Yuvaraj Manoharan, Udayakumar Kanniappan, Anna Univ. Chennai (India); JayanthKumar Vadivel, Meenakshi Ammal Dental College and Hospital (India); Sripriya Suresh, Arignar Anna Memorial Cancer Hospital (India); Koteeswaran Dornadula, Meenakshi Ammal Dental College and Hospital (India); Kulandaivel Muthuvelu, Stanley Medical College and Hospital (India); Chidambaranathan Pravada, Sathyabama Univ. Dental College and Hospital (India); Ganesan Bharanidharan, Prakasa Rao Aruna, Anna Univ. Chennai (India); Chilakapati Muralikrishna, Advanced Ctr. for Treatment, Research & Education in Cancer (India); Singaravelu Ganesan, Anna Univ. Chennai (India) . . . [8220-30]

SESSION 7 . . . . . Wed. 3:30 to 4:10 pm

Advanced Optical Biopsy

Session Chair: **Stavros G. Demos,** Lawrence Livermore National Lab. (USA)

Novel ratiometric imaging techniques and 280-nm-excited autofluorescence for improved visualization of adenocarcinoma in human colon specimens, Timothy Renkoski, Logan Graves, Urs Utzinger, Vassiliki L. Tsikitis M.D., Nathaniel S. Rial, Piyush Tiwari M.D., Hemanth Gavini M.D., Bhaskar Banerjee M.D., The Univ. of Arizona (USA) . . . . . [8220-31]

Time-resolved picosecond fluorescence spectroscopy for cancer detection in human breast tissues, Yang Pu, The City College of New York (USA); Asima Pradhan, Indian Institute of Technology (India); G.C. Tang, C.-H. Liu, Bidyut B. Das, Robert R. Alfano, The City College of New York (USA) . . . . . [8220-32]

PANEL DISCUSSION. . . . . .Wed. 4:10 to 5:00 pm

Tools for Advanced Optical Biopsy

Panel Moderator: **Stavros G. Demos,** Lawrence Livermore National Lab. (USA)

POSTERS - WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Optical spectroscopic characteristics of lactate and mitochondrion as new biomarkers in cancer diagnosis: understanding Warburg effect, Cheng-Hui Liu, Xiao Hui Ni, Yang Pu, Yu Long Yang, Feng Zhou, Robert Zuzolo, Wubao Wang, The City College of New York (USA); V Masilamani, King Saud University (Saudi Arabia); Asif Rizwan, Weill Cornell Medical College (USA); Robert R. Alfano, The City College of New York (USA). . . . . [8220-34]

Improving the accuracy of quantifying epithelial scattering coefficient in a two-layered tissue model by using a beveled fiber bundle probe, Hsi-Hsun Chen, Yi-Shan Li, Hsiang-Chen Pi, Chun-Yu Chen, Graduate Institute of Biomedical Electronic and Bioinformatics, National Taiwan University (Taiwan); Kung-Bin Sung, National Taiwan Univ. (Taiwan). . . . . [8220-33]

Conference 8221

Monday-Wednesday 23-25 January 2012 • Proceedings of SPIE Vol. 8221

Optical Interactions with Tissue and Cells XXIII

Conference Chairs: **E. Duco Jansen,** Vanderbilt Univ. (USA); **Robert J. Thomas,** Air Force Research Lab. (USA)

Program Committee: **Randolph D. Glickman,** The Univ. of Texas Health Science Ctr. at San Antonio (USA); **Steven L. Jacques,** Oregon Health & Science Univ. (USA); **Duncan J. Maitland,** The Texas A&M Univ. System (USA); **Jessica Ramella-Roman,** The Catholic Univ. of America (USA); **William P. Roach,** U.S. Air Force (USA); **Marissa N. Rylander,** Virginia Polytechnic Institute and State Univ. (USA); **Alfred Vogel,** Univ. zu Lübeck (Germany); **Lihong V. Wang,** Washington Univ. in St. Louis (USA); **Gerald J. Wilmink,** Air Force Research Lab. (USA)

Monday 23 January

SESSION 1 . . . . . Mon. 8:00 to 10:00 am

Photothermal Interactions

Session Chair: **E. Duco Jansen,** Vanderbilt Univ. (USA)

Optical and laser treatments: What now? What next? *(Invited Paper)*, R. Rox Anderson M.D., Massachusetts General Hospital (USA) . . . . . [8221-01]

Nanoparticle supported laser-tissue-soldering for closure of natural orifices for transluminal endoscopic surgery *(Invited Paper)*, Martin Frenz, Serge Bogni, Univ. Bern (Switzerland); A. Schönbächler, Bern Univ. Hospital (USA); Uwe Pieles, Bern Univ. Hospital (Switzerland); Michael Reinert, I. Vaytai, Bern Univ. Hospital (USA); M. Ortner, Univ. Hospital Zürich (USA); B. Dallamagne, Les Hôpitaux Univ. de Strasbourg (France). . . . . [8221-02]

Optical and thermal effects of diode lasers in tissues at 810, 940, and 980 nm with clean and coated fiber tips, Rudolf M. Verdaasdonk, Albert van der Veen, Martin Visser, Vrije Univ. Medical Ctr. (Netherlands); Vladimir Lemberg, Dmitri Boutoussov, BIOLASE Technology, Inc. (USA) . . . . . [8221-03]

Comparison of excimer laser angioplasty with long-wavelength laser angioplasty, Vahid Mosallanejad, Shahid Bahonar Univ. of Kerman (Iran, Islamic Republic of) . . . . . [8221-04]

Assessment of thermal lensing in ocular media using an articial eye, Erica L. Weber, The Univ. of Texas at Austin (USA) and Consortium Research Fellows Program (USA) and Air Force Research Lab. (USA); Mike Rickman, TASC, Inc. (USA); Andrew K. Dunn, The Univ. of Texas at Austin (USA); Robert J. Thomas, Air Force Research Lab. (USA) . . . . . [8221-05]

SESSION 2 . . . . . Mon. 10:20 am to 12:00 pm

Photochemical Interactions

Session Chair: **Randolph D. Glickman,**
The Univ. of Texas Health Science Ctr. at San Antonio (USA)

Fundamental study on photodynamic therapy for atrial fibrillation: effect of photosensitization reaction parameters on myocardial necrosis in vitro, Emiyu Ogawa, Arisa Ito, Tsunenori Arai, Keio Univ. (Japan). . . . . [8221-06]

NF-kB activation as a laser biomarker of injury using a transgenic mouse model, Ginger M. Pocock, Air Force Research Lab. (USA); Adam R. Boretsky, Massoud Motamedi, The Univ. of Texas Medical Branch (USA) . . . . . [8221-07]

Biomedical effect in vivo photodissociation of blood oxyhemoglobin, Mustafo M. Asimov, B.I. Stepanov Institute of Physics (Belarus); Rustam M. Asimov, Sensotronica Ltd. (Belarus); Anatoli N. Rubinov, B.I. Stepanov Institute of Physics (Belarus) . . . . . [8221-08]

Optical modulation of astrocyte network using ultrashort pulsed laser, Jonghee Yoon, Taeyun Ku, Kyuha Chong, Seung-Wook Ryu, Chulhee Choi, KAIST (Korea, Republic of) . . . . . [8221-09]

Effect of femtosecond laser radiation on morphofunctional state of neoplasm in vitro, Dinara Arslanova, Tatyana Gening, Ulyanovsk State Univ. (Russian Federation); Alexei Sysolyatin, Russian Academy of Sciences (Russian Federation); Tatyana Abakumova, Vyacheslav Svetukhin, Inna Antoneeva, Ulyanovsk State Univ. (Russian Federation) . . . . . [8221-10]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Mon. 1:30 to 3:20 pm

Photomechanical: Photodisruption and Photomanipulation

Session Chair: **Duncan J. Maitland,**
The Texas A&M Univ. System (USA)

Femtosecond and nanosecond laser nanosurgery: new perspectives for controlled nonlinear energy deposition exemplified on ophthalmic surgery *(Invited Paper)*, Norbert Linz, Sebastian Freidank, Univ. zu Lübeck (Germany); Xiao Xuan Liang, ; Sebastian Eckert, Univ. zu Lübeck (Germany); Sebastian Faust, Stefan Schwed, SCHWIND eye-tech-solutions GmbH & Co. KG (Germany); Alfred Vogel, Univ. zu Lübeck (Germany) . . . . . [8221-11]

Effect of microsecond pulse length and tip shape on explosive bubble formation of 2.78 µm Er,Cr;YSGG and 2.94 µm Er:YAG laser, Rudolf M. Verdaasdonk, Marja Verleng, Albert van der Veen, Vrije Univ. Medical Ctr. (Netherlands); Vladimir Lemberg, Peter Pham, Werner Landgraf, Dmitri Boutoussov, BIOLASE Technology, Inc. (USA). . . . . [8221-12]

Numerical aperture dependence of optical forces for stretching and trapping red blood cells, Mariana Potcoava, Colorado School of Mines (USA) and JILA (USA); Ralph Jimenez, JILA (USA); David Marr, Colorado School of Mines (USA). . . . . [8221-13]

Temperature measurement during Laser Brain Ablation by Thulium fiber Laser, Burcu Tunç, Murat Gülsoy, Bogaziçi Üniv. (Turkey) . . . . . [8221-14]

Optical properties measurement of the laser-ablated tissues for the combined laser ablation with photodynamic therapy, Norihiro Honda, Katsunori Ishii, Kunio Awazu, Osaka Univ. (Japan). . . . . [8221-15]

SESSION 4 . . . . . Mon. 3:50 to 5:30 pm

Photomechanical: Acoustics and Cellular Response

Session Chair: **Robert J. Thomas,** Air Force Research Lab. (USA)

Microtensile test of electrochemically aligned collagen fibres on MEMS device under SHG microscope, Keisuke Yoshiki, Nobutaka Goami, Takahiro Namazu, Shozo Inoue, Univ. of Hyogo (Japan). . . . . [8221-16]

Monitoring micrometer-scale deformation of collagenous tissues under controlled mechanical strain using SHG microscopy, Yannick Goulam Houssen, Ecole Supérieure de Physique et de Chimie Industrielles (France); Ivan Gusachenko, Stéphane Bancelin, Gaël Latour, Viet Tran, Jean-Marc Allain, Marie-Claire Schanne-Klein, Ecole Polytechnique (France) . . . . . [8221-17]

Photomechanical targeting of transvascular drug delivery, Shunichi Sato, National Defense Medical College (Japan); Kazue Oyama, Japan Self-Defense Force (Japan); Takuya Akiyama, Keio Univ. (Japan); Hiroshi Nawashiro, National Defense Medical College (Japan); Mitsuhiro Terakawa, Keio Univ. (Japan). . . . . [8221-18]

Human teeth model using photoacoustic frequency response, Yasser H. El-Sharkawy, Cairo Univ. (Egypt) . . . . . [8221-19]

Photomechanical model of tooth enamel ablation by Er-laser radiation, Andrey Belikov, Ksenia V. Shatilova, Alexei Skrypnik, Roman Vostryakov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) . . . . . [8221-20]

POSTERS-MONDAY . . . . . Mon. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Simulation the temperature increase in porcine cadaver iris during direct illumination by femtosecond laser pulses, Hui Sun, Univ. of California, Irvine (USA); Nora Hosszufalusi, Semmelweis Univ. (Hungary); Eric Mikula, Univ. of California, Irvine (USA); Tibor Juhasz, LenSx Lasers, Inc. (USA) . . . . . [8221-50]

Optical study of aligned collagen fiber matrix as anisotropic biological substrate, Cheng Guo, Columbia Univ. (USA) . . . . . [8221-51]

Optical parameters of turbid media in a new kinetic light propagation model: extraction from diffuse reflectance measurements, Alexander V. Lappa, Artem Kulikovskiy, Anton Kulikovskiy, Tamara A. Makarova, Chelyabinsk State Univ. (Russian Federation) . . . . . [8221-52]

Optical properties measurement of laser coagulated tissues with double integrating sphere and inverse Monte Carlo technique in the wavelength range from 350 to 2100 nm, Kunio Awazu, Norihiro Honda, Takuya Nanjo, Katsunori Ishii, Osaka Univ. (Japan) . . . . . [8221-53]

Fundamental research in laser Doppler method for cerebral blood flow measurement, Hirofumi Nagano, Mamiko Fujii, Furuyama Taiki, Sophia Univ. (Japan) . . . . . [8221-54]

Analysis of bacterial growth by spectroscopy and laser reflectometry, Rafael Gallegos, Mary Carmen Peña-Gomar, Gonzalo Viramontes-Gamboa, Univ. Michoacana de San Nicolás de Hidalgo (Mexico) . . . . . [8221-55]

Delayed photolysis of liposomes: a strategy for the precision timing of bolus drug release using ex vivo photochemical sensitization, Raymond T. Kozikowski, Brian S. Sorg, Univ. of Florida (USA) . . . . . [8221-56]

Incoherent source angular domain imaging through complex three-dimensional scattering structures, Rongen Cheng, Gary Chiang, Glenn Chapman, Simon Fraser Univ. (Canada) . . . . . [8221-57]

Determine the optical properties of fibrous biological tissue using anisotropic diffuse model, Ali S. Shuaib, Gang Yao, Univ. of Missouri-Columbia (USA) . . . . . [8221-58]

Optical diffusion property of cerumen from ear canal and correlation to metal content measured by synchrotron x-ray absorption, Todd Holden, Sumudu Dehipawala, Eric Cheung, Pat Schneider, Sunil Dehipawala, George Tremberger, Dimitrios Kokkinos, David Lieberman, Tak D. Cheung, Queensborough Community College (USA) . . . . . [8221-59]

Protection and sensitization of benign and malignant cells against photochemical stress by a naturally occurring compound, Yuan-Hao Lee, Neeru Kumar, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Randolph D. Glickman, The Univ. of Texas Health Science Ctr. at San Antonio (USA) and The Univ. of Texas at San Antonio (USA) . . . . . [8221-60]

Terahertz spectroscopy of dry, hydrated, and thermally-denatured biological macromolecules, Dawn Lipsomb, Air Force Research Lab.; Jessica E. Grundt, Air Force Research Lab. (USA); Ibtissam Echchgadda, National Academy of Sciences; Bennett L. Ibey, Air Force Research Lab. (USA); Marjorie A. Kuipers, Air Force Research Lab.; Hope T. Beier, Robert J. Thomas, Gerald J. Wilmink, Air Force Research Lab. (USA) . . . . . [8221-61]

MicroRNA-mediated stress reponses in human cells exposed to terahertz radiation, Cesario Z. Cerna, General Dynamics Advanced Information Systems (USA); Jessica E. Grundt, Air Force Research Lab. (USA); Ibtissam Echchgadda, National Academy of Sciences; Bennett L. Ibey, Gerald J. Wilmink, Air Force Research Lab. (USA) . . . . . [8221-62]

Tuesday 24 January

SESSION 5 . . . . . Tues. 8:00 to 10:00 am

Terahertz Biomedical Imaging Applications

Session Chair: **Gerald J. Wilmink,** Air Force Research Lab. (USA)

Cutting-edge terahertz technology and prospect of its application *(Invited Paper)*, Masayoshi Tonouchi, Osaka Univ. (Japan) . . . . . [8221-21]

Breast cancer tissue diagnosis at terahertz frequencies *(Invited Paper)*, Emma Pickwell-MacPherson, Hong Kong Univ. of Science and Technology (Hong Kong, China); Anthony Fitzgerald, Vincent Wallace, The Univ. of Western Australia (Australia) . . . . . [8221-22]

Feasibility demonstration of frequency domain terahertz imaging in breast cancer margin determination *(Invited Paper)*, Sigfrid K. Yngvesson, Univ. of Massachusetts Amherst (USA) . . . . . [8221-23]

Terahertz molecular imaging using nanoparticles *(Invited Paper)*, Joo-Hiuk Son, The Univ. of Seoul (Korea, Republic of) . . . . . [8221-24]

A new chirped-pulse THz method for rapid detection of gas and condensed phase material properties, David F. Plusquellic, Eyal Gerecht, Kevin O. Douglass, Julia Scherschligt, Zeeshan Ahmed, Shin G. Chou, National Institute of Standards and Technology (USA) . . . . . [8221-25]

SESSION 6 . . . . . Tues. 10:20 to 11:00 am

Terahertz Skin Interactions

Session Chair: **Gerald J. Wilmink,** Air Force Research Lab. (USA)

The unexplored avenues of human skin: electromagnetic properties in the sub-THz band, Yuri Feldman, Alexander Puzenko, Paul Ben Ishai, The Hebrew Univ. of Jerusalem (Israel); Andreas Caduff, The Hebrew Univ. of Jerusalem (Israel) and Biovotion AG (Switzerland); Aharon J. Agranat, The Hebrew Univ. of Jerusalem (Israel) . . . . . [8221-26]

Terahertz techniques for human skin measurement, Kodo Kawase, Nagoya Univ. (Japan) and RIKEN (Japan); Shin'ichiro Hayashi, RIKEN (Japan) . [8221-27]

SESSION 7 . . . . . Tues. 11:00 am to 12:00 pm

Terahertz Spectroscopy and Interactions with Biological Macromolecules

Session Chair: **Gerald J. Wilmink,** Air Force Research Lab. (USA)

Long-range hydration effect of lipid membrane studied by terahertz time-domain spectroscopy, Mafumi Hishida, Koichiro Tanaka, Kyoto Univ. (Japan) . . . . . [8221-28]

High-resolution THz spectroscopy of nucleic-acid biomolecules and crystals, Elliott Brown, Wright State Univ. (USA) . . . . . [8221-29]

TBA - Wilmink, Gerald J. Wilmink, Air Force Research Lab. (USA) . . . . [8221-30]

Lunch/Exhibition Break . . . . . 12:00 to 1:20 pm

SESSION 8 . . . . . Tues. 1:20 to 3:10 pm

Spectroscopy, Transport, and Imaging I

Session Chair: **Jessica C. Ramella-Roman,** The Catholic Univ. of America (USA)

Influence of optical properties on sampling depth of laser speckle contrast imaging *(Invited Paper)*, Andrew K. Dunn, The Univ. of Texas at Austin (USA) . . . . . [8221-31]

Depolarization of light in biological tissues: affect the polarization state by flow and estimation of flow rates, Dror Fixler, Zeev Zalevsky, Bar-Ilan Univ. (Israel) . . . . . [8221-32]

Parametric imaging of tissue pathology based on optical properties measured with optical coherence tomography, Blake R. Klyen, Loretta Scolaro, David D. Sampson, The Univ. of Western Australia (Australia) . [8221-33]

Fast computation of optical coherence tomography signal using an importance sampling-based Monte Carlo method, Ivan Lima, Jr., Anshul Kalra, North Dakota State Univ. (USA); Hugo E. Hernández-Figueroa, Univ. Estadual de Campinas (Brazil); Sherif S. Sherif, Univ. of Manitoba (Canada) . . . . . [8221-34]

A hybrid method for fast Monte Carlo simulation of diffuse reflectance from a multi-layered tissue model with tumor-like heterogeneities, Caigang Zhu, Quan Liu, Nanyang Technological Univ. (Singapore) . . . . . [8221-35]

SESSION 9 . . . . . Tues. 3:40 to 5:20 pm

Spectroscopy and Optical Properties

Session Chair: **Marissa Nicole Rylander,**
Virginia Polytechnic Institute and State Univ. (USA)

Coherent Raman scattering for localized thermal mapping, Hope T. Beier, Air Force Research Lab. (USA); Gary D. Noojin, TASC, Inc. (USA); Benjamin A. Rockwell, Air Force Research Lab. (USA) . . . . . [8221-36]

Extracting scattering coefficient and anisotropy factor of tissue using optical coherence tomography, Niloy Choudhury, Michigan Technological Univ. (USA); Steven L. Jacques, Oregon Health and Science Univ. (USA) . . . . . [8221-37]

Study of Fourier transform infrared spectra of cockroach nervous tissue and chitin, Vijay Hanumant Ghadage, Baburaoji Gholap College (India); Gauri Rajendra Kulkarni, Sudha Vasant Bhoraskar, Univ. of Pune (India) . . . . . [8221-38]

Optical parameters of embedded abnormalities in tissues as determined by Monte Carlo simulation, J. B. Jeeva, Megha Singh, VIT Univ. (India). . [8221-39]

Analysis of the influences of biological variance, measurement error, and uncertainty on retinal photothermal damage threshold studies, David Wooddell, Air Force Research Lab. (USA); C. Schubert-Kabban, R. Hill, Air Force Research Lab. . . . . [8221-40]

Wednesday 25 January

SESSION 10 . . . . . Wed. 8:20 to 10:00 am

Spectroscopy, Transport, and Imaging II

Session Chair: **William P. Roach,** U.S. Air Force (USA)

Optical property change of blood on an optical window boundary by 660-nm band laser irradiation, Mei Takahashi, Arisa Ito, Tsunenori Arai, Keio Univ. (Japan) . . . . . [8221-41]

Determining light distribution in human head using 3D Monte Carlo simulations, Christoph Böcklin, Dirk Baumann, Jürg Fröhlich, ETH Zurich (Switzerland) . . . . . [8221-42]

Monte Carlo simulation of fluorescence imaging of microvasculature, Mitchell A. Davis, Arnold D. Estrada, Adrien Ponticorvo, Andrew K. Dunn, The Univ. of Texas at Austin (USA) . . . . . [8221-43]

Fluorescence angular domain imaging of skin tissue phantoms using intralipid-infused solids, Rongen Cheng, Michael Phang, Rahul Thomas, Nick Pfeiffer, Glenn Chapman, Bozena Kaminska, Simon Fraser Univ. (Canada) . . . . . [8221-44]

Evaluation of fast avalanche photodiode detectors for early photon diffuse fluorescence tomography, Mark J. Niedre, Ryan Duross, Northeastern Univ. (USA) . . . . . [8221-45]

SESSION 11 . . . . . Wed. 10:30 to 11:50 am

Spectroscopy, Transport, and Imaging III

Session Chair: **Robert J. Thomas,** Air Force Research Lab. (USA)

Angle-resolved spectroscopy: a tissue-mimicking phantom study, Yan Zhang, Simon Fraser Univ. (Canada); Fartash Vasefi, Astrid Chamson-Reig, Lawson Health Research Institute (Canada); Mohamadreza Najiminaini, Bozena Kaminska, Simon Fraser Univ. (Canada); Jeffrey Carson, Lawson Health Research Institute (Canada) . . . . . [8221-46]

Silica hollow-core photonic crystal fibres for mid-infrared applications, Artur Urich, Jonathan D. Shephard, Robert R. J. Maier, Duncan P. Hand, Heriot-Watt Univ. (United Kingdom); Jonathan C. Knight, Univ. of Bath (United Kingdom) . . . . . [8221-47]

Efficient, non-invasive determination of skin optical properties in the near-infrared wavelength range, Nan Yu Cheng, Shih Yu Tseng, Sheng-Hao Tseng, National Cheng Kung Univ. (Taiwan) . . . . . [8221-48]

Evaluation of skin roughness using diffuse reflectance spectroscopy, Shih-Yu Tzeng, Nan-Yu Cheng, Sheng-Hao Tseng, National Cheng Kung Univ. (Taiwan) . . . . . [8221-49]

Courses of Related Interest

SC029 Tissue Optics (Jacques) Sunday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8222

Saturday-Monday 21-23 January 2012 • Proceedings of SPIE Vol. 8222

Dynamics and Fluctuations in Biomedical Photonics VII

Conference Chairs: **Valery V. Tuchin,** N.G. Chernyshevsky Saratov State Univ. (Russian Federation) and Univ. of Oulu (Russian Federation); **Donald D. Duncan,** Portland State Univ. (USA); **Kirill V. Larin,** Univ. of Houston (USA); **Martin J. Leahy,** National Univ. of Ireland, Galway (Ireland) and National Biophotonics and Imaging Platform Ireland (Ireland) and Royal College of Surgeons (Ireland); **Ruikang K. Wang,** Univ. of Washington (USA)

Program Committee: **Pierre O. Bagnaninchi,** The Univ. of Edinburgh (United Kingdom); **Wei R. Chen,** Univ. of Central Oklahoma (USA); **Joseph P. Culver,** Washington Univ. in St. Louis (USA); **Ekaterina I. Galanzha,** Univ. of Arkansas for Medical Sciences (USA); **Miya Ishihara,** National Defense Medical College (Japan); **Jingying Jiang,** Tianjin Univ. (China); **Sean J. Kirkpatrick,** Michigan Technological Univ. (USA); **Jürgen M. Lademann,** Charité Universitätsmedizin Berlin (Germany); **Hong Liu,** The Univ. of Oklahoma (USA); **Qingming Luo,** Britton Chance Ctr. for Biomedical Photonics (China); **Igor Meglinski,** Univ. of Otago (New Zealand); **Brian S. Sorg,** Univ. of Florida (USA); **Vladislav Y. Toronov,** Ryerson Univ. (Canada); **Lihong V. Wang,** Washington Univ. in St. Louis (USA); **Ying Yang,** Keele Univ. (United Kingdom); **Anna N. Yaroslavsky,** Univ. of Massachusetts Lowell (USA); **Vladimir P. Zharov,** Univ. of Arkansas for Medical Sciences (USA)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:30 to 11:30 am

Speckle Technologies

Session Chair: **Donald D. Duncan,** Portland State Univ. (USA)

Phase singularities in speckle patterns for investigating tissue dynamics and flow *(Invited Paper)*, Sean J. Kirkpatrick, Kosar Khaksari, Dennis Thomas, Michigan Technological Univ. (USA); Donald D. Duncan, Portland State Univ. (USA) . . . . . [8222-01]

Experimental comparison of perfusion imaging systems using multi-exposure laser speckle, single-exposure laser speckle, and full-field laser Doppler, Oliver B. Thompson, Evan Hirst, Industrial Research Ltd. (New Zealand); Jimmy Bakker, Fredrik Salomonsson, Perimed AB (Sweden); Carla Kloeze, Erwin Hondebrink, Wiendelt Steenbergen, Univ. Twente (Netherlands) . . . . . [8222-02]

Multi-exposure laser speckle perfusion imaging for retinal blood flow, Evan R. Hirst, Michael K. Andrews, Oliver B. Thompson, Industrial Research Ltd. (New Zealand) . . . . . [8222-03]

Optical viscometry of biological fluids using laser speckle rheology, Zeinab Hajjarian Kashany, Seemantini Nadkarni, Harvard Medical School (USA) . . . . . [8222-04]

Optical speckles of blood proteins embedded in porous glassy substrate, Todd Holden, Pat Schneider, Sumudu Dehipawala, Nidhi Gadura, Sunil Dehipawala, Dimitrios Kokkinos, George Tremberger, Jr., David Lieberman, Tak D. Cheung, Queensborough Community College (USA). . . . . [8222-05]

Evaluation of algorithms used in tissue perfusion assessment using fast analytical calculation of laser Doppler signals, Stanislaw Wojtkiewicz, Adam Liebert, Institute of Biocybernetics and Biomedical Engineering (Poland); Herve Rix, Univ. de Nice Sophia Antipolis (France); Roman Maniewski, Institute of Biocybernetics and Biomedical Engineering (Poland). . . . . [8222-06]

Dual-wavelength endoscopic laser speckle contrast imaging system for indicating tissue blood flow and oxygenation, Lipei Song, Daniel Elson, Imperial College London (United Kingdom) . . . . . [8222-07]

Keynote Presentation . . . . . .Sat. 11:30 am to 12:00 pm

Session Chair: **Valery V. Tuchin,** Univ. of Oulu (Finland) and N.G. Chernyshevsky Saratov State Univ. (Russian Federation)

The many facets of Raman spectroscopy for innovative biomedical diagnostics, Jürgen Popp, Institut für Photonische Technologien e.V. (Germany). . . . . [8222-08]

Lunch. . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Sat. 1:30 to 4:40 pm

Tissue and Cell Dynamics

Session Chair: **Martin J. Leahy,** Royal College of Surgeons (Ireland) and National Biophotonics and Imaging Platform (Ireland) and National Univ. of Ireland, Galway (Ireland)

Illuminating tissue dynamics with real-time optoacoustic tomography *(Invited Paper)*, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) . . . . . [8222-09]

In vivo label-free photoacoustic flow cytometry of circulating clots *(Invited Paper)*, Ekaterina I. Galanzha, Mustafa Sarimollaoglu, Dmitry A. Nedosekin, Vladimir P. Zharov, Univ. of Arkansas for Medical Sciences (USA) . . . . [8222-10]

Absolute flow velocity measurement using spectral-domain optical coherence tomography, Zhongwei Zhi, Ruikang K. Wang, Univ. of Washington (USA) . . . . . [8222-11]

Dual-mode label-free methodology for non-invasive imaging of blood and lymphatic vessels, Vyacheslav Kalchenko, Weizmann Institute of Science (Israel); Igor Meglinski, Univ. of Otago (New Zealand); Yuri Kuznetsov, Alon Harmelin, Weizmann Institute of Science (Israel) . . . . . [8222-12]

Optical coherence tomography in quantifying the permeation of human plasma lipoproteins in vascular tissues, Mohamad G. Ghosn, Baylor College of Medicine (USA); Maleeha Mashiatulla, Univ. of Houston (USA); Valery Tuchin, N.G. Chernyshevsky Saratov State Univ. (Russian Federation) and Univ.of Oulu (Finland); Joel D. Morrisett, Baylor College of Medicine (USA); Kirill V. Larin, Univ. of Houston (USA) . . . . . [8222-13]

Wavelet-based multifractal analysis of laser biopsy imagery, Jaidip Jagtap, Indian Institute of Technology Kanpur (India); Sayantan Ghosh, Univ. of KwaZulu-Natal (South Africa); Prasanta K. Panigrahi, Indian Institute of Science Education and Research Kolkata (India); Asima Pradhan, Indian Institute of Technology Kanpur (India). . . . . [8222-14]

Mitosis detection in 3D tissue culture using tissue dynamics spectroscopy, Ran An, Kwan Jeong, John Turek, David D. Nolte, Purdue Univ. (USA) . . . . . [8222-15]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 4 . . . . . Sun. 8:30 to 11:40 am

Clinical Imaging and Evaluation

Session Chair: **Ruikang K. Wang,** Univ. of Washington (USA)

Intraoperative functional mapping of eloquent brain cortex for minimizing post-operative neurological deficit *(Invited Paper)*, Sameer A. Sheth, Churl-su Kwon, Sarah Bourne, Emad N. Eskandar, Massachusetts General Hospital (USA); Anna N. Yaroslavsky, Univ. of Massachusetts Lowell (USA) . . . . [8222-16]

Real-time, non-invasive assessment of human hematocrit, Donald D. Duncan, Portland State Univ. (USA); David Fischer, Jerry Myers, NASA Glenn Research Ctr. (USA) . . . . . [8222-17]

Ultrahigh-resolution image of human skin using optical coherence tomography/optical microangiography, Zhongwei Zhi, Ruikang K. Wang, Univ. of Washington (USA) . . . . . [8222-18]

In vivo 3D multifunctional imaging of human corneal-scleral limbus with spectral-domain optical coherence tomography, Peng Li, Tueng Shen, Murray Johnstone, Ruikang K. Wang, Univ. of Washington (USA) . . . . . [8222-19]

In vivo spectral and fluorescence imaging microscopy of tumor microvessel blood supply and oxygenation changes following vascular targeting agent treatment, Jennifer A. Lee, Dietmar W. Siemann, Raymond T. Kozikowski, Brian S. Sorg, Univ. of Florida (USA). . . . . [8222-20]

Clinical Evaluation of Psoriasis using Optical Coherence Tomography and Raman Spectroscopy, Marie-Louise O'Connell, Univ. of Limerick (Ireland) . . . . . [8222-21]

OCT and 4D microcirculation imaging *(Invited Paper)*, Martin J. Leahy, National Univ. of Ireland, Galway (Ireland) and National Biophotonics and Imaging Platform (Ireland) and Royal College of Surgeons (Ireland). . . . [8222-22]

Roundtable/Panel Discussion Sun. 11:40 am to 12:20 pm

Session Chair: **Martin J. Leahy,** Royal College of Surgeons (Ireland) and National Biophotonics and Imaging Platform (Ireland) and National Univ. of Ireland, Galway (Ireland)

Panelists: **Vasilis Ntziachristos,** Technical Univ. of Munich (Germany); **Vladimir P. Zharov,** Univ. of Arkansas for Medical Sciences; **Jessica Ramella-Roman,** The Catholic Univ. of America

Lunch. . . . . 12:20 to 1:30 pm

SESSION 6 . . . . . Sun. 1:30 to 3:20 pm

Functional Imaging and Spectroscopy

Session Chair: **Sean J. Kirkpatrick,** Michigan Technological Univ. (USA)

Functional imaging of freshly isolated pancreatic islets using glucose-evoked intrinsic optical signal response *(Invited Paper)*, Xincheng Yao, Wanxing Cui, Xujing Wang, Yichao Li, Wei Zhang, Rongwen Lu, The Univ. of Alabama at Birmingham (USA) . . . . . [8222-23]

3-Dimensional Absorption-based Chromophore Mapping, Paul M. McNamara, Enock Jonathan, Univ. of Limerick (Ireland); Martin J. Leahy, National Univ. of Ireland, Galway (Ireland) and National Biophotonics and Imaging Platform (Ireland) and Royal College of Surgeons (Ireland). . . . [8222-24]

Signal processing in broadband functional near-infrared spectroscopy, Irina Schelkanova, Vladislav Toronov, Ryerson Univ. (Canada) . . . . . [8222-25]

Use of circular polarized light for tissue diagnostics: from optical clearing to cancer diagnostics, Igor Meglinski, Callum Macdonald, Ersin Avci, Han-Seung Yoon, Michael Eccles, Univ. of Otago (New Zealand) . . . . . [8222-26]

Single-wavelength imaging polarimeter based on liquid crystal technology, James C. Gladish, Donald D. Duncan, Portland State Univ. (USA) . . . . [8222-27]

SESSION 7 . . . . . Sun. 3:50 to 5:00 pm

Tissue and Cell Mechanical Properties

Session Chair: **Kirill V. Larin,** Univ. of Houston (USA)

Using tissue mechanical properties to improve contrast and image quality in optical coherence tomography *(Invited Paper)*, Brendan F. Kennedy, Kelsey M. Kennedy, Robert A. McLaughlin, David D. Sampson, The Univ. of Western Australia (Australia) . . . . . [8222-28]

Measurement of mechanical properties of individual red blood cells from a sickle cell patient using quantitative phase microscopy, YongKeun Park, HeeSu Byun, KAIST (Korea, Republic of); John Higgins, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Timothy R. Hillman, Monica Diez-Silva, Ming Dao, Massachusetts Institute of Technology (USA). . . [8222-29]

The study of collagen properties on cellular behavior and the mechanical strength of the formed hydrogel, Ying Yang, Samantha Wilson, Keele Univ. (United Kingdom); Marie Guilbert, Emilie Millerot-Serrurot, Pierre Jeannesson, Univ. de Reims Champagne-Ardenne (France); Josep Sule-Suso, Keele Univ. (United Kingdom); Ganesh D. Sockalingum, Univ. de Reims Champagne-Ardenne (France) . . . . . [8222-30]

SESSION 8 . . . . . Sun. 5:00 to 6:10 pm

Terahertz Imaging and Impact

Session Chair: **Valery V. Tuchin,** Univ.of Oulu (Finland) and N.G. Chernyshevsky Saratov State Univ. (Russian Federation)

The influence of the hydrogen bonding on THz and Raman spectra of biological molecules *(Invited Paper)*, Alexander P. Shkurinov, Maxim Naarov, Lomonosov Moscow State Univ. (Russian Federation); Olga P. Cherkasova, Institute of Laser Physics (Russian Federation) . . . . . [8222-31]

Characterization of nonmelanoma skin cancers using imaging in the optical and terahertz spectral ranges, Cecil S. Joseph, Univ. of Massachusetts Lowell (USA); Victor A. Neel, Massachusetts General Hospital (USA); Thomas M. Goyette, Robert H. Giles, Anna N. Yaroslavsky, Univ. of Massachusetts Lowell (USA). . . . . [8222-32]

Investigating the effects of terahertz radiation on Bacillus subtilis, Jillian P. Giles, Brittany J. Carney, Cecil S. Joseph, Mark E. Hines, Robert H. Giles, Univ. of Massachusetts Lowell (USA). . . . . [8222-33]

Monday 23 January

POSTERS-MONDAY . . . . . Mon. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Influence of uric acid on non-invasive blood glucose sensing studied with NIR spectroscopy, Jingying Jiang, Lingling Zhang, Tianjin Univ. (China); Kai Zhang, Tianjin Chang Zheng Hospital (China); Kexin Xu, Tianjin Univ. (China) . . . . . [8222-34]

Mathematical modeling on experimental protocol of glucose adjustment for non-invasive blood glucose sensing, Jingying Jiang, Xiaolin Min, Kexin Xu, Tianjin Univ. (China). . . . . [8222-35]

Investigation on how to choose measurement sites for non-invasive near-infrared blood glucose sensing, Jingying Jiang, Da Zou, Kexin Xu, Tianjin Univ. (China) . . . . . [8222-36]

Monte Carlo simulation on how cholesterol influences measurement of non-invasive blood glucose sensing with NIR spectroscopy, Jingying Jiang, Lingling Zhang, Kexin Xu, Tianjin Univ. (China). . . . . [8222-37]

Influence of hemoglobin on non-invasive Bilirubin measurement, Jingying Jiang, Qiliang Gong, Kexin Xu, Tianjin Univ. (China). . . . . [8222-38]

Characterization of liquid crystal variable retarder scatter, James C. Gladish, Donald D. Duncan, Portland State Univ. (USA). . . . . [8222-39]

Wavelet-based analysis of gastric microcirculation in rats with ulcer bleedings, Alexey N. Pavlov, Mikhail A. Rodionov, Oxana V. Semyachkina-Glushkovskaya, Veronika A. Berdnikova, Yana V. Kuznetsova, Igor A. Semyachkin-Glushkovskij, N.G. Chernyshevsky Saratov State Univ. (Russian Federation) . . . . . [8222-40]

Conference 8223

Sunday-Tuesday 22-24 January 2012 • Proceedings of SPIE Vol. 8223

Photons Plus Ultrasound: Imaging and Sensing 2012

Conference Chairs: **Alexander A. Oraevsky,** TomoWave Labs., Inc. (USA); **Lihong V. Wang,** Washington Univ. in St. Louis (USA)

Program Committee: **Mark A. Anastasio,** Washington Univ. in St. Louis (USA); **Paul C. Beard,** Univ. College London (United Kingdom); **Albert Claude Boccara,** Ecole Supérieure de Physique et de Chimie Industrielles (France); **Gerald J. Diebold,** Brown Univ. (USA); **Charles A. DiMarzio,** Northeastern Univ. (USA); **Stanislav Y. Emelianov,** The Univ. of Texas at Austin (USA); **Rinat O. Esenaliev,** The Univ. of Texas Medical Branch (USA); **Martin Frenz,** Univ. Bern (Switzerland); **Steven L. Jacques,** Oregon Health & Science Univ. (USA); **Robert A. Kruger,** OptoSonics, Inc. (USA); **Pai-Chi Li,** National Taiwan Univ. (Taiwan); **Andreas Mandelis,** Univ. of Toronto (Canada); **Vasilis Ntziachristos,** Helmholtz Zentrum München GmbH (Germany); **Matthew O'Donnell,** Univ. of Washington (USA); **Günther Paltauf,** Karl-Franzens-Univ. Graz (Austria); **Wiendelt Steenbergen,** Univ. Twente (Netherlands); **William M. Whelan,** Univ. of Prince Edward Island (Canada); **Vladimir P. Zharov,** Univ. of Arkansas for Medical Sciences (USA); **Qifa Zhou,** The Univ. of Southern California (USA); **Quing Zhu,** Univ. of Connecticut (USA)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:00 to 10:00 am

Toward Clinical Use I

Session Chairs: **Robert A. Kruger,** OptoSonics, Inc. (USA); **Wiendelt Steenbergen,** Univ. Twente (Netherlands)

Fast deep-tissue multispectral optoacoustic tomography (MSOT) for preclinical imaging of cancer and cardiovascular disease, Adrian Taruttis, Daniel Razansky, Vasilis Ntziachristos, Technische Univ. München (Germany) and Helmholtz Zentrum München GmbH (Germany) . . . . . [8223-01]

In vivo imaging of stents using an integrated intravascular ultrasound and photoacoustic imaging catheter, Andrei B. Karpiouk, Bo Wang, Jimmy L. Su, Douglas E. Yeager, The Univ. of Texas at Austin (USA); James H. Amirian, Richard W. Smalling, The Univ. of Texas Health Science Ctr. at Houston (USA); Stanislav Y. Emelianov, The Univ. of Texas at Austin (USA). . . . . [8223-02]

Spectroscopic molecular photoacoustic imaging of sentinel lymph node metastases, Geoffrey P. Luke, The Univ. of Texas at Austin (USA); Aristarchos Papagiannaros, M.D. Anderson Cancer Ctr. (USA) and University of Texas at Austin (USA); Justina Tam, The Univ. of Texas at Austin (USA); Konstantin Sokolov, M.D. Anderson Cancer Ctr. (USA) and The Univ. of Texas at Austin (USA); Stanislav Emelianov, The Univ. of Texas at Austin (USA) and M.D. Anderson Cancer Ctr. (USA) . . . . . [8223-03]

Simultaneous in vivo imaging of melanin and lipofuscin in the retina with multimodal photoacoustic ophthalmoscopy, Xiangyang Zhang, The Univ. of Southern California (USA); Hao F. Zhang, Northwestern Univ. (USA); Shuliang Jiao, The Univ. of Southern California (USA). . . . . [8223-04]

Photoacoustic imaging of chemotherapy-induced apoptosis in squamous cell carcinoma, Quihong Yang, Huizhong Cui, Shuang Cai, M. Laird Forrest, Xinmai Yang, The Univ. of Kansas (USA) . . . . . [8223-05]

In vivo photoacoustic imaging of breast cancer cellular receptors using multiplex contrast agents, Carolyn Bayer, Yun-Sheng Chen, Iulia Graf, Geoffrey P. Luke, The Univ. of Texas at Austin (USA); Konstantin Sokolov, The Univ. of Texas M.D. Anderson Cancer Center (USA); Stanislav Y. Emelianov, The Univ. of Texas at Austin (USA) . . . . . [8223-06]

Photoacoustic imaging of functional domains in primary motor cortex in Rhesus Macaques, Janggun Jo, The Univ. of Kansas (USA); Hongyu Zhang, Paul Cheney, The Univ. of Kansas Medical Ctr. (USA); Xinmai Yang, The Univ. of Kansas (USA). . . . . [8223-07]

Photoacoustic and thermoacoustic imaging with a multichannel breast scanner, Bin Huang, Konstantin Maslov, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-08]

SESSION 2 . . . . . Sun. 10:30 am to 12:00 pm

Toward Clinical Use II

Session Chairs: **Alexander A. Oraevsky,** TomoWave Labs., Inc. (USA); **Quing Zhu,** Univ. of Connecticut (USA)

Two-dimensional optoacoustic imaging combined with B-mode ultrasound: system evaluation for application in breast cancer detection and diagnostics, Jason Zalev, Bryan Clingman, Don Herzog, Tom Miller, Seno Medical Instruments, Inc. (USA); Pamela Otto, The Univ. of Texas Health Science Ctr. at Houston (USA); Kenneth Kist, N. Carol Dornbluth, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Sergey Ermiliov, Richard Su, Vyacheslav Nadvoretsky, Alexander Oraevsky, TomoWave Labs., Inc. (USA) . . . . . [8223-09]

PAT of the breast using a hemispherical array and rectilinear scanning, Robert A. Kruger, Richard B. Lam, Daniel Reinecke, Stephen P. DelRio, OptoSonics, Inc. (USA) . . . . . [8223-10]

Imaging breast lesions using the Twente Photoacoustic Mammoscope: ongoing clinical experience, Michelle Heijblom, Univ. Twente (Netherlands) and Medisch Spectrum Twente (Netherlands); Daniele Piras, Wenfeng Xia, Johan van Hespen, Univ. Twente (Netherlands); Frank van den Engh, Joost Klaase, Medisch Spectrum Twente (Netherlands); A. G. J. M. Ton van Leeuwen, Univ. Amsterdam (Netherlands) and Univ. Twente (Netherlands); Wiendelt Steenbergen, Srirang Manohar, Univ. Twente (Netherlands) . . . . . [8223-11]

Optoacoustic angiography of peripheral vasculature for disease detection and staging, Mario P. Zamora, Sergey Ermilov, Alexander A. Oraevsky, TomoWave Labs., Inc. (USA) . . . . . [8223-12]

Real-time detection of exhaled human breath using quantum cascade laser based sensor technology, Frank K. Tittel, Rafal Lewicki, Lei Dong, Rice Univ. (USA); Terence H. Risby, The Johns Hopkins Bloomberg School of Public Health (USA); Steven Solga, St Luke's Hospital (USA); Tim Schwartz, St. Luke's Hospital (USA) . . . . . [8223-13]

Noninvasive optoacoustic system for rapid diagnostics and management of circulatory shock, Rinat O. Esenaliev, Irene Y. Petrov, Yuriy Y. Petrov, Michael Kinsky, Donald S. Prough, The Univ. of Texas Medical Branch (USA) . . . . . [8223-14]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Sun. 1:30 to 3:00 pm

In Vivo Preclinical Imaging

Session Chairs: **Vasilis Ntziachristos,** Helmholtz Zentrum München GmbH (Germany); **William M. Whelan,** Univ. of Prince Edward Island (Canada)

Small-animal whole-body imaging using a photoacoustic full-ring array system, Jun Xia, Muhammad R. Chatni, Rebecca Sohn, Jeffrey M. Arbeit, Mark A. Anastasio, Washington Univ. in St. Louis (USA); Quing Zhu, Univ. of Connecticut (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-15]

High-resolution imaging of mouse anatomy and molecular probes by means of multispectral optoacoustic tomography (MSOT), Andreas Buehler, Technische Univ. München (Germany) and Helmholtz Zentrum München GmbH (Germany); Daniel Razansky, Helmholtz Zentrum München GmbH (Germany); Vasilis Ntziachristos, Technische Univ. München (Germany) and Helmholtz Zentrum München GmbH (Germany) . . . . . [8223-16]

In vivo imaging with GRIN-lens optical resolution photoacoustic micro-endoscopy, Parsin Haji Reza, Wei Shi, Peng Shao, Alexander Forbrich, Roger J. Zemp, Univ. of Alberta (Canada) . . . . . [8223-17]

Photoacoustic ophthalmology in mouse eyes, Wei Song, Northwestern Univ. (USA); Shuliang Jiao, The Univ. of Southern California (USA); Hao F. Zhang, Northwestern Univ. (USA) . . . . . [8223-18]

Optoacoustic 3D visualization of changes in physiological properties of mouse tissues from live to postmortem, Richard Su, Sergey Ermiliov, Anton Liopo, Vyacheslav Nadvoretsky, Travis Hernandez, Alexander Oraevsky, TomoWave Labs., Inc. (USA) . . . . . [8223-19]

Photoacoustic tomography of the monkey brain using virtual point detectors: experiment, Liming Nie, Chao Huang, Zijian Guo, Mark Anastasio, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-20]

SESSION 4 . . . . . Sun. 3:30 to 5:45 pm

Quantitative Imaging and Measurements

Session Chairs: **Paul C. Beard,** Univ. College London (United Kingdom); **Rinat O. Esenaliev,** The Univ. of Texas Medical Branch (USA)

In vivo functional and molecular photoacoustic imaging of endogenous and exogenous chromophores using quantitative spectroscopic techniques, Jan G. Laufer, Benjamin T. Cox, Univ. College London (United Kingdom); Bradley E. Treeby, The Australian National Univ. (Australia); Edward Zhang, Paul Beard, Univ. College London (United Kingdom) . . . . . [8223-21]

Functional photoacoustic microscopy of pH, Muhammad R. Chatni, Junjie Yao, Amos Danielli, Christopher P. Favazza, Konstantin I. Maslov, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-22]

Photoacoustic correlation spectroscopy for in vivo blood flow speed measurement, Sung-Liang Chen, Univ. of Michigan (USA); Zhixing Xie, Paul L. Carson, Xueding Wang, Univ. of Michigan Medical School (USA); L. Jay Guo, Univ. of Michigan (USA) . . . . . [8223-23]

Blood flow measurements using a pulsed time correlation photoacoustic Doppler technique: accuracy, resolution, and velocity range, Joanna Brunker, Paul Beard, Univ. College London (United Kingdom). . . . . [8223-24]

Investigations into soft tissue discrimination obtainable in thermoacoustic imaging, Olumide Ogunlade, Paul Brennan, Paul C. Beard, Univ. College London (United Kingdom) . . . . . [8223-25]

In vivo imaging of inducible tyrosinase gene expression with an ultrasound array-based photoacoustic system, Tyler Harrison, Robert Paproski, Roger J. Zemp, Univ. of Alberta (Canada) . . . . . [8223-26]

Temperature mapping using photoacoustic and thermoacoustic tomography, Haixin Ke, Washington Univ. in St. Louis (USA); Todd N. Erpelding, Ladislav Jankovic, Philips Research North America (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-27]

In vivo photoacoustic tomography of total blood flow and Doppler angle, Junjie Yao, Konstantin I. Maslov, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-28]

Hemoglobin oxygen saturation measurement in rat retinal vessels by multiwavelength laser-scanning photoacoustic ophthalmoscopy, Qing Wei, Northwestern Univ. (USA); Shuliang Jiao, The Univ. of Southern California (USA); Hao F. Zhang, Northwestern Univ. (USA) . . . . . [8223-29]

POSTERS - SUNDAY . . . . . Sun. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Compact fiber-Bragg-grating detector for high-sensitivity ultrasound measurements, Amir Rosenthal, Daniel Razansky, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) . . . . . [8223-81]

The study of quantitative optical absorption imaging by using Monte Carlo simulation of combined photoacoustic tomography and ultrasound-modulated optical tomography, Chulhong Kim, Yang Li, Univ. at Buffalo (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA). . . . . [8223-82]

A method for simultaneously estimating acoustic and optical properties of heterogeneous absorber using focused photoacoustic imaging based on Hilbert transform, Zhifang Li, Zhiping Zeng, Hui Li, Fujian Normal Univ. (China) . . . . . [8223-83]

3D digital acousto-optical coherence tomography, Emilie Benoit, Salma Farahi, Emmanuel Bossy, Francois Ramaz, Ecole Supérieure de Physique et de Chimie Industrielles (France) . . . . . [8223-84]

Photoacoustic spectral characterization of liquid perfluorocarbon droplets, Eric Strohm, Min Rui, Ryerson Univ. (Canada); Ivan Gorelikov, Naomi Matsuura, Sunnybrook Health Sciences Ctr. (Canada); Michael C. Kolios, Ryerson Univ. (Canada) . . . . . [8223-85]

Photoacoustic microscopy of myocardial sheet architecture in unfixed and unstained mammalian hearts, Chi Zhang, Ya-Jian Cheng, Da-Kang Yao, Washington Univ. in St. Louis (USA); Samuel A. Wickline M.D., Washington Univ. School of Medicine in St. Louis (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA). . . . . [8223-86]

Photoacoustic sensing of exogeneously delivered contrast agents using high-frequency ultrasonic transducers, Pavel V. Subochev, Roman V. Belyaev, Aleksey R. Katichev, Andrey N. Morozov, Anna G. Orlova, Ilya V. Turchin, Institute of Applied Physics (Russian Federation) . . . . . [8223-87]

Developing a stochastic model for acousto-optic tissue imaging, Steffen G. Resink, Wiendelt Steenbergen, MIRA Institute for Biomedical Technology and Technical Medicine (Netherlands) . . . . . [8223-88]

Measuring tissue blood flow using ultrasound modulated diffused light: a preclinical study, Ilan Breskin, Avihai Ron, Noam Racheli, Coby Metzger M.D., Zmira Silman, Moshe Kamar M.D., Asaph Nini M.D., Michal Balberg, Revital Shechter, Ornim Medical Ltd. (Israel) . . . . . [8223-89]

Drug delivery monitoring by photoacoustic tomography with an ICG encapsulated double emulsion, Xueding Wang, Justin Rajian, Mario Fabiilli, J. Brian Fowlkes, Paul Carson, Univ. of Michigan Medical School (USA) . . . . . [8223-90]

An optical resolution photoacoustic dermoscope for port-wine stain imaging, Bin Rao, Washington Univ. in St. Louis (USA); Wangcun Jia, J. Stuart Nelson, Beckman Laser Institute and Medical Clinic (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-91]

Photoacoustic speckles: boundary dependence and experimental validation, Zijian Guo, Zhun Xu, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-92]

Photoacoustic molecular imaging on ferritin as a reporter gene, Seunghan Ha, Andrew Carson, Univ. of Pittsburgh Medical Ctr. (USA); Kang Kim, Univ. of Pittsburgh Medical Ctr. (USA) and Univ. of Pittsburgh (USA) . . . . . [8223-93]

Photoacoustic tomography of the monkey brain using virtual point detectors: theory, Chao Huang, Robert Schoonover, Liming Nie, Zijian Guo, Lihong V. Wang, Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [8223-94]

Compensation of shear waves in photoacoustic tomography with layered acoustic media, Robert W. Schoonover, Mark A. Anastasio, Washington Univ. in St. Louis (USA). . . . . [8223-95]

Ultrasound-modulated optical tomography using slow light in spectral-hole burning materials, Huiliang Zhang, Harvard Univ. (USA); Mahmood Sabooni, Lars Rippe, Stefan Kröll, Lund Univ. (Sweden); Lihong V. Wang, Washington Univ. in St Louis (USA); Philip Hemmer, Texas A&M Univ. (USA) . . . . . [8223-96]

Imaging the ultrasound field and shear-wave propagation using acousto-optic laser speckle contrast analysis (AO-LASCA), Lipei Song, Yi Cheng, Rui Li, Mengxing Tang, Daniel Elson, Imperial College London (United Kingdom) . . . . . [8223-97]

Passive acoustic radiometer for non-invasive monitoring of internal temperature during local laser hyperthermia, Pavel V. Subochev, Institute of Applied Physics (Russian Federation); Marina A. Sirotkina, Nizhny Novgorod State Medical Academy (Russian Federation); Vladimir V. Klin'shov, Anatoly D. Mansfel'd, Institute of Applied Physics (Russian Federation) . . . . . [8223-98]

Conjugate gradient preconditioning methods with symmetric algebraic reconstruction technique in photoacoustic imaging, Xueyan Liu, Northeastern Univ. (China); Jie Tian, Dong Han, Guodong Li, Institute of Automation (China); Wei Guo, Beijing Univ. of Technology (China); Chenghu Qin, Xibo Ma, Xin Yang, Institute of Automation (China) . . . . . [8223-99]

Ultrafast ultrasound and photoacoustic co-registered imaging system based on FPGA parallel processing, Umar S. Alqasemi, Hai Li, Andres Aguirre, Quing Zhu, Univ. of Connecticut (USA). . . . . [8223-100]

DVD pickup head based optical resolution photoacoustic microscopy, Po-Hsun Wang, Meng-Lin Li, National Tsing Hua Univ. (Taiwan). . . . . [8223-101]

Influence of laser pulse width to the photoacoustic temporal waveform and the image resolution with a solid state excitation laser, Kaku Irisawa, Kazuhiro Hirota, Kazuhiro Tsujita, FUJIFILM Corp. (Japan); Takeshi Hirasawa, Miya Ishihara, National Defense Medical College (Japan) . . . . . [8223-102]

New adaptive beamforming with spatially smoothed coherence factor for photoacoustic imaging, Jeeun Kang, Jin Ho Chang, Yangmo Yoo, Tai-Kyong Song, Sogang Univ. (Korea, Republic of) . . . . . [8223-103]

Model-based image enhancement in optoacoustic tomography of the mouse brain, Amir Rosenthal, Thomas Jetzfellner, Xosé Luís Deán Ben, Daniel Razansky, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) . . . . . [8223-104]

An algorithm for sensing venous oxygenation using ultrasound-modulated light enhanced by microbubbles, Jack E. P. Honeysett, Eleanor Stride, Terence S. Leung, Univ. College London (United Kingdom). . . . . [8223-105]

Real-time imaging of renal clearance using multispectral optoacoustic tomography, Stefan Morscher, Neal C. Burton, Adrian Taruttis, Nikolaos C. Deliolanis, Daniel Razansky, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) and Technische Univ. München (Germany) . . . . . [8223-106]

Elasticity characterisation in turbid tissue mimicking phantoms by optical tracking of shear waves, Yi Cheng, Rui Li, Daniel S. Elson, Mengxing Tang, Imperial College London (United Kingdom) . . . . . [8223-107]

On laser-induced ultrasound generated in a thin semi-transparent layered polymer structure, Erika T. Svanström, Torbjörn Löfqvist, Jerker Delsing, Luleå Univ. of Technology (Sweden). . . . . [8223-108]

Continuous wavelet-transform analysis of photoacoustic signal waveform to determine optical absorption coefficient, Takeshi Hirasawa, Miya Ishihara, National Defense Medical College (Japan); Kazuhiro Tsujita, Kazuhiro Hirota, Kaku Irisawa, FUJIFILM Corp. (Japan); Manabu Kitagaki M.D., Masanori Fujita M.D., Makoto Kikuchi, National Defense Medical College (Japan). . . . [8223-109]

Functional photoacoustic micro-imaging of rat cerebral hemodynamic response function in single vessels during forepaw electrical stimulation, Lun-De Liao, National Chiao Tung Univ. (Taiwan); You-Yin Chen, National Yang Ming Univ. (Taiwan); Chin-Teng Lin, Jyh-Yeong Chang, National Chiao Tung Univ. (Taiwan); Meng-Lin Li, National Tsing Hua Univ. (Taiwan). . . . . [8223-110]

Photoacoustic array imaging of calcifications: phantom study, Yao-You Cheng, Tsai-Chu Hsiao, National Tsing Hua Univ. (Taiwan); Wan-Ting Tien, Shih-Bin Luo, De-Yi Chiou, Industrial Technology Research Institute (Taiwan); Meng-Lin Li, National Tsing Hua Univ. (Taiwan) . . . . . [8223-111]

Signal recovered from a photoacoustic imaging based on a long-focal-zone transducer, Wenming Xie, Zhiping Zeng, Li Li, Zhifang Li, Hui Li, Fujian Normal Univ. (China) . . . . . [8223-112]

Single-mode polymer fiber line detector for photoacoustic tomography, Hubert Grün, Thomas Berer, Karoline Felbermayer, RECENDT GmbH (Austria); Günther Paltauf, Karl-Franzens-Univ. Graz (Austria); Peter Burgholzer, RECENDT GmbH (Austria) . . . . . [8223-113]

Optical detection of photoacoustic waves using phase sensitive low-coherence interferometry, Boris Hermann, Michelle Gabriele Sandrian, Boris Považay, Bernd Hofer, Wolfgang Drexler, Medizinische Univ. Wien (Austria) . . . . . [8223-114]

Ultrasound-guided photoacoustic image reconstruction, Pieter Kruizinga, Frits Mastik, Erasmus MC (Netherlands); Nico de Jong, Antonius FW van der Steen, Erasmus MC (Netherlands) and Interuniversity Cardiology Institute of The Netherlands (Netherlands); Gijs van Soest, Erasmus MC (Netherlands) . . . . . [8223-115]

Photoacoustic imaging of the near-infrared fluorescent protein iRFP in vivo, Arie Krumholz, Washington Univ. in St. Louis (USA); Grigory S. Filonov, Albert Einstein College of Medicine (USA); Jun Xia, Junjie Yao, Washington Univ. in St. Louis (USA); Vladislav V. Verkhusha, Albert Einstein College of Medicine (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA). . . . . [8223-116]

Monday 23 January

SESSION 5 . . . . . Mon. 8:00 to 9:45 am

Microscopy

Session Chairs: **Lihong V. Wang,** Washington Univ. in St. Louis (USA); **Qifa Zhou,** The Univ. of Southern California (USA)

3D high-resolution pure optical photoacoustic microscopy, Zhixing Xie, Univ. of Michigan Medical School (USA); Sung-Liang Chen, Tao Ling, L. Jay Guo, Univ. of Michigan (USA); Paul L. Carson, Xueding Wang, Univ. of Michigan Medical School (USA) . . . . . [8223-30]

In vivo imaging of larvae by photoacoustic microscopy, Shuoqi Ye, Ran Yang, Jingwei Xiong, Peking Univ. (China); K. Kirk Shung, Qifa Zhou, Univ. of Southern California (USA); Changhui Li, Peking Univ. (China); Qiushi Ren, Peking Univ. (China) and Shanghai JiaoTong Univ. (China) . . . . . [8223-31]

Imaging dynamic processes using fiber laser optical-resolution photoacoustic microscopy, Wei Shi, Parsin Hajireza, Alexander Forbrich, Roger J. Zemp, Univ. of Alberta (Canada) . . . . . [8223-32]

Optoacoustic microscopy system based on an off-axis parabolic reflector, Dmitri Tsyboulski, André Conjusteau, Alexander A. Oraevsky, TomoWave Labs., Inc. (USA). . . . . [8223-33]

Multiparameter photoacoustic microscopy of tumor micro-environment, Song Hu, Washington Univ. in St. Louis (USA); Rebecca Sohn, Zhi-Hong Lu, Washington Univ. in St. Louis School of Medicine (USA); Brian T. Soetikno, Qiaonan Zhong, Junjie Yao, Konstantin Maslov, Washington Univ. in St. Louis (USA); Jeffrey M. Arbeit, Washington Univ. in St. Louis School of Medicine (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA). . . . . [8223-34]

Mosaicing for fast wide-field-of-view optical-resolution photoacoustic microscopy, Peng Shao, Ryan Chee, Alexander Forbrich, Roger J. Zemp, Univ. of Alberta (Canada) . . . . . [8223-35]

A fast multiwavelength-scanning photoacoustic microscope based on a digital mirror device, Yu Wang, Konstantin Maslov, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-36]

SESSION 6 . . . . . Mon. 10:15 am to 12:00 pm

Dual Modality Imaging and Monitoring

Session Chairs: **Martin Frenz,** Univ. Bern (Switzerland); **Stanislav Y. Emelianov,** The Univ. of Texas at Austin (USA)

Optoacoustic temperature monitoring during HIFU impact on biological tissues: ex-vivo study and numerical simulation of 2D temperature reconstruction, Ivan M. Pelivanov, Sergey M. Nikitin, Lomonosov Moscow State Univ. (Russian Federation); Tatiana Khokhlova, Univ. of Washington (USA) . . . . . [8223-37]

Combined optoacoustic and high-frequency ultrasound imaging of live mouse embryos, Parag V. Chitnis, Riverside Research Institute (USA); Orlando Aristizábal, New York Univ. School of Medicine (USA); Erwan Filoux, Ashwinkumar Sampathkumar, Jonathan Mamou, Riverside Research Institute (USA); Daniel H. Turnbull, New York Univ. School of Medicine (USA); Jeffrey A. Ketterling, Riverside Research Institute (USA) . . . . . [8223-38]

In vivo combined photoacoustic and Doppler ultrasound imaging, Yan Jiang, Tyler Harrison, Alex Forbrich, Roger J. Zemp, Univ. of Alberta (Canada) . . . . . [8223-39]

Functional dual-modality photoacoustic and ultrasonic endoscopy in vivo, Joon-Mo Yang, Christopher P. Favazza, Washington Univ. in St. Louis (USA); Ruimin Chen, The Univ. of Southern California (USA); Junjie Yao, Xin Cai, Konstantin I. Maslov, Washington Univ. in St. Louis (USA); Qifa Zhou, K. Kirk Shung, The Univ. of Southern California (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-40]

Optoacoustic generation of high-intensity focused ultrasound by using carbon-nanotube polymer composite films, Hyoung Won Baac, Adam Maxwell, Jong G. Ok, Kuang-Wei Lin, Zhen Xu, L. Jay Guo, Univ. of Michigan (USA) . . . . . [8223-41]

Combined optical-resolution photoacoustic and fluorescence micro-endoscopy, Peng Shao, Parsin Hajireza, Wei Shi, Roger J. Zemp, Univ. of Alberta (Canada) . . . . . [8223-42]

Real-time intravascular ultrasound/photoacoustic imaging system with omni-directional light excitation, Bao-Yu Hsieh, Pai-Chi Li, National Taiwan Univ. (Taiwan) . . . . . [8223-43]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 7 . . . . . Mon. 1:30 to 5:45 pm

New Methods and Novel Techniques

Session Chairs: **Günther Paltauf,** Karl-Franzens-Univ. Graz (Austria); **Claude Boccara,** Ecole Supérieure de Physique et de Chimie Industrielles (France)

New photoacoustic cell with diamond window cover for mid-infrared investigations on biological samples, Jonas Kottmann, Julien M. Rey, Markus W. Sigrist, ETH Zurich (Switzerland) . . . . . [8223-44]

Time-reversed ultrasonically encoded (TRUE) optical focusing in reflection mode: demonstrations in tissue mimicking phantoms and ex vivo tissue, Puxiang Lai, Xiao Xu, Honglin Liu, Yuta Suzuki, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-45]

Non-contact photoacoustic tomography and ultrasonography for biomedical imaging, Guy Rousseau, Alain Blouin, Jean-Pierre Monchalin, National Research Council Canada (Canada) . . . . . [8223-46]

Flow-dependant photothermal modulation of the photoacoustic response, Adi Sheinfeld, Avishay Eyal, Tel Aviv Univ. (Israel) . . . . . [8223-47]

Multispectral photoacoustic coded excitation using pseudorandom codes, Martin F. Beckmann, Claus-Stefan Friedrich, Ruhr-Univ. Bochum (Germany); Martin P. Mienkina, Nils C. Gerhardt, Ruhr-Universität Bochum (Germany); Martin R. Hofmann, Georg Schmitz, Ruhr-Univ. Bochum (Germany) . . . [8223-48]

Acoustic reflector combined with optical detection for photoacoustic section imaging, Robert Nuster, Sibylle Gratt, Klaus Passler, Guenther Paltauf, Karl-Franzens-Univ. Graz (Austria) . . . . . [8223-49]

Contactless photoacoustic imaging of biological samples, Thomas Berer, Armin Hochreiner, Hubert Grün, Peter Burgholzer, RECENDT GmbH (Austria) . . . . . [8223-50]

Miniature fiber optic photoacoustic imaging probes for micro-endoscopic applications, Edward Z. Zhang, Paul Beard, Univ. College London (United Kingdom) . . . . . [8223-51]

Vibrational photoacoustic microscopy for deep tissue bond-selective imaging, Ji-Xin Cheng, Purdue Univ. (USA) . . . . . [8223-52]

Photoacoustic and ultrasonic image co-registration using a phased array probe and frequency domain correlation processing, Sergey A. Telenkov, Rudolf Alwi, Univ. of Toronto (Canada); Willa Shi, Emily Chen, Alex I. Vitkin, Ontario Cancer Institute (Canada); Andreas Mandelis, Univ. of Toronto (Canada) . . . . . [8223-53]

Real-time photoacoustic imaging with optical ultrasound detection, Robert Nuster, Guenther Paltauf, Karl-Franzens-Univ. Graz (Austria) . . . . . [8223-54]

Novel optoacoustic system for noninvasive, continuous monitoring of cerebral venous blood oxygenation, Yuriy Y. Petrov, Irene Y. Petrov, Donald S. Prough, Rinat O. Esenaliev, The Univ. of Texas Medical Branch (USA) . . . . . [8223-55]

Noninvasive, optoacoustic monitoring of cerebral venous blood oxygenation in newborns, Irene Y. Petrov, Karon E. Wynne, Yuriy Y. Petrov, Rinat O. Esenaliev, C. J. Richardson, Donald S. Prough, The Univ. of Texas Medical Branch (USA) . . . . . [8223-56]

Impulse-based near-field thermoacoustic tomography of small animals, Stephan Kellnberger, Daniel Razansky, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany) . . . . . [8223-57]

Near-field radio-frequency thermo-acoustic imaging based on transmission lines for optimized performance, Murad Omar, Stephan Kellnberger, Technische Univ. München (Germany) and Helmholtz Zentrum München GmbH (Germany); George Sergiadis, Aristotle Univ. of Thessaloniki (Greece); Daniel Razansky, Vasilis Ntziachristos, Technische Univ. München (Germany) and Helmholtz Zentrum München GmbH (Germany) . . . . . [8223-58]

POSTERS-MONDAY . . . . . Mon. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Photoacoustic tomography of breast phantoms based on a custom-made linear array transducer, Wenfeng Xia, Daniele Piras, Johan Van Hespen, Wiendelt Steenbergen, A. G. J. M. Ton Van Leeuwen, Srirang Manohar, Univ. Twente (Netherlands) . . . . . [8223-117]

Detection and characterization of red blood cell (RBC) aggregation with photoacoustics, Eno Hysi, Ratan K. Saha, Min Rui, Michael C. Kolios, Ryerson Univ. (Canada) . . . . . [8223-118]

Optimising the excitation and detection parameters for deep-tissue photoacoustic imaging applications, Thomas J. Allen, Edward Zhang, Paul C. Beard, Univ. College London (United Kingdom) . . . . . [8223-119]

3D photoacoustic imaging via staring, sparse approach at 0.7 FPS, Michael B. Roumeliotis, Jeffrey J. L. Carson, Lawson Health Research Institute (Canada) . . . . . [8223-120]

Laser-diode based 10MHz photoacoustic Doppler flowmetry at 830 nm, Adi Sheinfeld, Avishay Eyal, Tel-Aviv Univ. (Israel) . . . . . [8223-121]

Wide-spectral range quantitative photoacoustic spectroscopy to measure non-linear optical absorption of hemoglobin, Amos Danielli, Konstantin Maslov, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-122]

Monitoring of streptozotocin-induced diabetes in a mouse model by photoacoustic microscopy, Arie Krumholz, Junjie Yao, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-123]

Image quality improvement for photoacoustic imaging systems employing linear transducer arrays, Adam Petschke, Patrick J. La Rivière, The Univ. of Chicago Medical Ctr. (USA) . . . . . [8223-124]

Photoacoustic imaging of RF ablations in cardiac tissue, Richard Bouchard, The Univ. of Texas (USA) and M.D. Anderson Cancer Ctr. (USA); Luigi Di Base, Andrea Natale, St. David's Medical Ctr. (USA); Stanislav Emelianov, The Univ. of Texas at Austin (USA) and M.D. Anderson Cancer Ctr. (USA) . . . . . [8223-125]

Photoacoustic microscopy imaging of spheroids with endogenous and exogenous contrast, Min Rui, Michael C. Kolios, Ryerson Univ. (Canada) . . . . . [8223-126]

2.5-mm outer diameter photoacoustic endoscopic mini-probe based on highly sensitive PMN-PT ultrasonic transducer, Joon-Mo Yang, Washington Univ. in St. Louis (USA); Ruimin Chen, The Univ. of Southern California (USA); Christopher P. Favazza, Junjie Yao, Washington Univ. in St. Louis (USA); Qifa Zhou, K. Kirk Shung, The Univ. of Southern California (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-127]

A hand-held, low-cost photoacoustic microscopic probe, Bin Huang, Konstantin Maslov, William D. Richard, Lihong V. Wang, David M. Zar, Washington Univ. in St. Louis (USA) . . . . . [8223-128]

Tissue-mimicking phantoms for photoacoustic and ultrasonic imaging, Richard R. Bouchard, M.D. Anderson Cancer Ctr. (USA) and The Univ. of Texas at Austin (USA); Jason Cook, The Univ. of Texas at Austin (USA); Stanislav Emelianov, The Univ. of Texas at Austin (USA) and M.D. Anderson Cancer Ctr. (USA) . . . . . [8223-129]

In vivo quantitative evaluation of gold nanocages' kinetics in sentinel lymph nodes by photoacoustic imaging, Xin Cai, Weiyang Li, Washington Univ. in St. Louis (USA); Chulhong Kim, Univ. at Buffalo (USA); Yuchen Yuan, Younan Xia, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-130]

Multiphoton photoacoustic microscopic imaging of fluorescently labeled neuron populations, Gali Sela, Hod Dana, Inbar Brosh, Technion-Israel Institute of Technology (Israel); Daniel Razansky, Helmholtz Zentrum München GmbH (Germany); Shy Shoham, Technion-Israel Institute of Technology (Israel) . . . . . [8223-131]

Design of an optimum ultrasound pattern to minimize multiple-scattered light reflected from inhomogeneous tissue, Pedro Pereira, Sherif S. Sherif, Univ. of Manitoba (Canada) . . . . . [8223-132]

Modeling comparison of optical-resolution photoacoustic microscopy and optical coherence tomography, Yan Liu, Chi Zhang, Song Hu, Yuta Suzuki, Zhun Xu, Silvina L. Ferradal, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-133]

Dichroic photoacoustic microscopy of amyloid plaques in a transgenic mouse model, Konstantin I. Maslov, Song Hu, Ping Yan, Jin-Moo Lee, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-134]

Time-resolved transient absorption ultrasonic microscopy measurements of the ground state recovery time, Ryan L. Shelton, Brian E. Applegate, Texas A&M Univ. (USA) . . . . . [8223-135]

Photoacoustic microscopy of intestinal hemodynamics following massive small bowel resection, Junjie Yao, Washington Univ. in St. Louis (USA); Kathryn J. Rowland, Washington Univ. in St. Louis School of Medicine (USA); Lidai Wang, Konstantin I. Maslov, Washington Univ. in St. Louis (USA); Brad W. Warner, Washington Univ. in St. Louis School of Medicine (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-136]

Molecular probes for imaging of enzyme activity by photoacoustic lifetime imaging (PALI), Ekaterina Morgounova, Qi Shao, Sajeda Abdo, Mickael Wilson, George Barany, Shai Ashkenazi, Univ. of Minnesota, Twin Cities (USA) . . . . . [8223-137]

Modeling optical phase conjugation of ultrasonically encoded signal utilizing finite-difference time-domain simulations, Joseph L. Hollmann, Charles A. DiMarzio, Northeastern Univ. (USA). . . . . [8223-138]

Inducible expression of photoacoustic reporter gene tyrosinase in cells using a single plasmid, Robert J. Paproski, Roger J. Zemp, Univ. of Alberta (Canada) . . . . . [8223-139]

Characterization of dual-contrast microbubbles for photoacoustic and ultrasound imaging, Robin F. Castelino, Univ. of Toronto (Canada) and Sunnybrook Health Sciences Ctr. (Canada); Amanda L. Martin, Sunnybrook Health Sciences Ctr. (Canada); F. Stuart Foster, Univ. of Toronto (Canada) and Sunnybrook Health Sciences Ctr. (Canada) . . . . . [8223-140]

Signal-to-noise-ratio scaled coherence weighting for photoacoustic array imaging, Yu-Hsin Wang, Pai-Chi Li, National Taiwan Univ. (Taiwan). . [8223-141]

Frequency domain photoacoustic correlation imaging: novel methodology for non-invasive imaging of biological tissues, Sergey A. Telenkov, Rudolf Alwi, Univ. of Toronto (Canada); Willa Shi, Emily Chen, Alex I. Vitkin, Ontario Cancer Institute (Canada); Andreas Mandelis, Univ. of Toronto (Canada) . . . . . [8223-142]

Optoacoustic signal characterization of laser heated tissues, Annie Ladéroute, Univ. of Prince Edward Island (Canada); Michelle P. Patterson, Univ. of Prince Edward Island (Canada) and Atlantic Veterinary College (Canada); Michael C. Kolios, Ryerson Univ, (Canada); William M. Whelan, Univ. of Prince Edward Island (Canada) and Atlantic Veterinary College (Canada) . . . [8223-143]

Measuring metabolic rate of oxygen with combined photoacoustic microscopy and optical coherent tomography in small animals, Tan Liu, Northwestern Univ. (USA); Shuliang Jiao, The Univ. of Southern California (USA); Hao F. Zhang, Northwestern Univ. (USA) . . . . . [8223-144]

High-sensitivity polymer inverted-rib optical waveguide interferometric sensor for optoacoustic imaging, Daniel C. Gallego, Horacio Lamela, Univ. Carlos III de Madrid (Spain); Meng Wang, Univ. of Oulu (Finland); Jussi Hiltunen, VTT Technical Research Ctr. of Finland (Finland); Risto Myllylä, Univ. of Oulu (Finland). . . . . [8223-145]

PEG-coated gold nanorods conjugated with monoclonal antibodies for preclinical research in optoacoustic imaging and sensing, Anton Liopo, André Conjusteau, Alexander Oraevsky, TomoWave Labs., Inc. (USA) [8223-146]

Vessel segmentation analysis of ischemic stroke images acquired with photoacoustic microscopy, Brian T. Soetikno, Song Hu, Washington Univ. in St. Louis (USA); Ernie Gonzales, Washington Univ. in St. Louis School of Medicine (USA); Qiaonan Zhong, Konstantin Maslov, Washington Univ. in St. Louis (USA); Jin-Moo Lee M.D., Washington Univ. in St. Louis School of Medicine (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA)[8223-147]

Numerical simulation based photoacoustic design parameter optimization for deep tissue imaging, Zhaohui Wang, Seung-Han Ha, Univ. of Pittsburgh Medical Ctr. (USA); Kang Kim, Univ. of Pittsburgh Medical Ctr. (USA) and Univ. of Pittsburgh (USA) . . . . . [8223-148]

Application of laser pulse stretching scheme for efficiently delivering laser energy in photoacoustic imaging, Tianheng Wang, Patrick D. Kumavor, Quing Zhu, Univ. of Connecticut (USA) . . . . . [8223-149]

Photoacoustic imaging using Porphyrin derivatives as exogeneous contrast agents, Akram Abuteen, Saeid Zanganeh, Joshua Akhigbe, Nrusingh C. Biswal, Andres Aguirre, Christian Brückner, Quing Zhu, Univ. of Connecticut (USA) . . . . . [8223-150]

Investigation of a quantitative photoacoustic tomography fitting procedure on multiple targets in reflection geometry with diffuse optical measurement assistance, Chen Xu, Patrick D. Kumavor, Quing Zhu, Univ. of Connecticut (USA) . . . . . [8223-151]

Optoacoustic monitoring of cerebral venous blood oxygenation in rats with traumatic brain injury, Karon E. Wynne, Douglas S. Dewitt, Yuriy Y. Petrov, Irene Y. Petrov, Margaret A. Parsley, Rinat O. Esenaliev, Donald S. Prough, The Univ. of Texas Medical Branch (USA) . . . . . [8223-152]

Integrated scanning confocal photothermal-lens and photoacoustic microscopy, Dmitry A. Nedosekin, Ekaterina I. Galanzha, Robert J. S. Reis, Vladimir P. Zharov, Univ. of Arkansas for Medical Sciences (USA) . . . [8223-153]

Quantification of optical absorption coefficient from acoustic spectra in the optical diffusive regime using photoacoustic microscopy, Zijian Guo, Christopher P. Favazza, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-154]

Tuesday 24 January

SESSION 8 . . . . . Tues. 8:00 to 9:15 am

Imaging Nanoparticles and Contrast Agents

Session Chairs: **Pai-Chi Li,** National Taiwan Univ. (Taiwan); **Matthew O'Donnell,** Univ. of Washington (USA)

Ultrasound guided spectroscopic photoacoustic imaging for in vivo monitoring of mesenchymal stem cells labeled with nanotracers, Seung Yun Nam, Laura M. Ricles, Laura J. Suggs, Stanislav Y. Emelianov, The Univ. of Texas at Austin (USA) . . . . . [8223-59]

Intravascular photoacoustic imaging of gold nanorod-labeled atherosclerotic plaques, Douglas E. Yeager, Bo Wang, Andrei B. Karpiouk, The Univ. of Texas at Austin (USA); James Amirian, The Univ. of Texas Health Science Ctr. at Houston (USA); Konstantin V. Sokolov, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA) and The Univ. of Texas at Austin (USA); Stanislav Y. Emelianov, The Univ. of Texas at Austin (USA) and The Univ. of Texas M.D. Anderson Cancer Ctr. (USA) . . . . . [8223-60]

Trapping and dynamic manipulation with magnetomotive photoacoustic imaging of targeted microspheres mimicking metastatic cancer cells trafficking in the vasculature, Chen-Wei Wei, Jinjun Xia, Univ. of Washington (USA); Ivan M. Pelivanov, Univ. of Washington (Russian Federation); Xiaoge Hu, Xiaohu Gao, Matthew O'Donnell, Univ. of Washington (USA) . . . . . [8223-61]

Dual-contrast photoacoustic nanodroplets: in vivo imaging results, Katheryne E. Wilson, Alexander Hannah, Kimberly Homan, Stanislav Emelianov, The Univ. of Texas at Austin (USA) . . . . . [8223-62]

In vivo photoacoustic flow cytometry in plants: direct study of nanomaterials uptake and accumulation, Dmitry A. Nedosekin, Univ. of Arkansas for Medical Sciences (USA); Mariya V. Khodakovskaya, Alexandru S. Biris, Univ. of Arkansas at Little Rock (USA); Ekaterina I. Galanzha, Vladimir P. Zharov, Univ. of Arkansas for Medical Sciences (USA) . . . . . [8223-63]

SESSION 9 . . . . . Tues. 9:15 to 10:15 am

Imaging and Sensing at Cellular Level

Session Chairs: **Steven L. Jacques,** Oregon Health & Science Univ. (USA); **Vladimir P. Zharov,** Univ. of Arkansas for Medical Sciences (USA)

Photoacoustic cystography, Chulhong Kim, Mansik Jeon, Univ. at Buffalo (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA). . . . . [8223-64]

Photoacoustic imaging of oxygen release from hemoglobin in single red blood cells in vivo, Lidai Wang, Lihong V. Wang, Washington Univ. School of Medicine in St. Louis (USA). . . . . [8223-65]

Label-free photoacoustic microscopy of cytochrome C in mitochondria, Chi Zhang, Konstantin I. Maslov, Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-66]

In vivo imaging of cell nuclei by photoacoustic microscopy without staining, Da-Kang Yao, Washington Univ. in St. Louis (USA); Ruimin Chen, The Univ. of Southern California (USA); Konstantin I. Maslov, Washington Univ. in St. Louis (USA); Qifa Zhou, The Univ. of Southern California (USA); Lihong V. Wang, Washington Univ. in St. Louis (USA) . . . . . [8223-67]

SESSION 10 . . . . . Tues. 10:45 am to 12:00 pm

Signal and Image Processing

Session Chairs: **Mark A. Anastasio,** Washington Univ. in St. Louis (USA); **Andreas Mandelis,** Univ. of Toronto (Canada)

Application of iterative image reconstruction algorithms to three-dimensional optoacoustic tomography, Kun Wang, Washington Univ. in St. Louis (USA); Alexander Oraevsky, TomoWave Labs., Inc. (USA); Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [8223-68]

Adapted directivity approach for photoacoustic imaging reconstruction, Daniele Piras, Wenfeng Xia, Michelle Heijblom, Wiendelt Steenbergen, Univ. Twente (Netherlands); A. G. J. M. Ton van Leeuwen, Univ. Amsterdam (Netherlands) and Univ. Twente (Netherlands); Srirang Manohar, Univ. Twente (Netherlands) . . . . . [8223-69]

Analysis of the role of shear waves in transcranial photoacoustic tomography, Robert W. Schoonover, Lihong V. Wang, Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [8223-70]

Spatial resolution and sensitivity in photoacoustic tomography taking noise into account: from point-like detectors to large integrating detectors, Peter Burgholzer, RECENDT GmbH (Austria); Thomas Berer, RECENDT GmbH (Germany); Hubert Grün, RECENDT GmbH (Austria); Robert Nuster, Günther Paltauf, Karl-Franzens-Univ. Graz (Austria). . . . . [8223-71]

Sparsity regularized data-space restoration in optoacoustic tomography, Kun Wang, Washington Univ. in St. Louis (USA); Alexander Oraevsky, TomoWave Labs., Inc. (USA); Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [8223-72]

SESSION 11 . . . . . Tues. 1:30 to 3:00 pm

Ultrasound Modulated Optical Tomography I: Joint Session with Conference 8272

Session Chairs: **Lihong V. Wang,** Washington Univ. in St. Louis (USA); **Philip R. Hemmer,** Texas A&M Univ. (USA)

Signals, noises, and detection schemes in ultrasonically modulated optical imaging *(Invited Paper)*, François Ramaz, Ecole Supérieure de Physique et de Chimie Industrielles (France); Michel Gross, Univ. Montpellier 2 (France); Claude Boccara, Ecole Supérieure de Physique et de Chimie Industrielles (France) . . . . . [8223-73]

Ultrasound-modulated optical tomography of biological tissue using spectral-hole burning *(Invited Paper)*, Xiao Xu, Honglin Liu, Washington Univ. in St. Louis (USA); Sri-Rajasekhar Kothapalli, Stanford Univ. (USA); Puxiang Lai, Yuta Suzuki, Lihong V. Wang, Washington Univ. in St. Louis (USA). . . . [8223-74]

Creating filters for shot-noise-limited Ultrasound Optical Tomography (UOT) *(Invited Paper)*, Mahmood Sabooni, Lund Univ. (Sweden); Huiliang Zhang, Texas A&M Univ. (USA); Lars Rippe, Lund Univ. (Sweden); Chulhong Kim, Washington Univ. in St. Louis (USA); Stefan Kroll, Lund Univ. (Sweden); Philip Hemmer, Texas A&M Univ. (USA) . . . . . [8272-12]

Rare-earth-doped materials with application to optical signal processing, quantum information science, and medical imaging technology *(Invited Paper)*, Rufus L. Cone, Charles W. Thiel, Montana State Univ. (USA); Yongchen Sun, The Univ. of South Dakota (USA); Thomas Böttger, Univ. of California, San Francisco (USA); Roger M. Macfarlane, Montana State Univ. (USA) . . . . . [8272-13]

Recent progress in ultrasound-mediated fluorescence *(Invited Paper)*, Baohong Yuan, Yuan Liu, The Univ. of Texas at Arlington (USA) . . . . . [8223-75]

The potential of ultrasound-modulated optical sensing in clinical monitoring *(Invited Paper)*, Terence S. Leung, Univ. College London (United Kingdom) . . . . . [8223-76]

SESSION 12 . . . . . Tues. 3:30 to 5:30 pm

Ultrasound Modulated Optical Tomography II

Joint Session with Conference 8272

Session Chairs: **Lihong V. Wang,** Washington Univ. in St. Louis (USA); **Philip R. Hemmer,** Texas A&M Univ. (USA)

Atom like centers in solids for nanophotonic and quantum devices, Zameer U. Hasan, Temple Univ. (USA) . . . . . [8272-14]

Acoustic radiation force assisted ultrasound modulated optical tomography *(Invited Paper)*, Mengxing Tang, Rui Li, Yi Cheng, Christopher W. Dunsby, Robert J. Eckersley, Daniel Elson, Imperial College London (United Kingdom) . . . . . [8223-77]

Improving signal-to-noise ratio and spatial resolution in ultrasound modulated optical tomography *(Invited Paper)*, Stephen P. Morgan, Haowen Ruan, Nam Trung Huynh, Melissa L. Mather, Diwei He, John Crowe, Felicity R. Rose, Barrie R. Hayes-Gill, The Univ. of Nottingham (United Kingdom). [8223-78]

Creating filters for shot-noise-limited Ultrasound Optical Tomography (UOT) *(Invited Paper)*, Huiliang Zhang, Texas A&M Univ. (USA); Mahmood Sabooni, Lars Rippe, Lund Univ. (Sweden); Chulhong Kim, Washington Univ. in St. Louis (USA); Stefan Kroll, Lund Univ. (Sweden); Lihong V. Wang, Washington Univ. in St. Louis (USA); Philip R. Hemmer, Texas A&M Univ. (USA) . . . [8272-15]

Organic materials for spectral hole burning and non-hole burning narrowband optical filters *(Invited Paper)*, Anshel Gorokhovsky, College of Staten Island (USA) . . . . . [8272-16]

Sound light: rendering photoacoustics fluence-independent by adding acousto-optic modulation, Wiendelt Steenbergen, Altaf Hussain, Khalid Daoudi, Univ. Twente (Netherlands) . . . . . [8223-79]

Efficient high-etendue four-wave mixing in a spectral hole-burning medium *(Invited Paper)*, Byoung S. Ham, Inha Univ. (Korea, Republic of); Philip R. Hemmer, Texas A&M Univ. (USA) . . . . . [8272-17]

Non-invasive blood flow measurements using ultrasound modulated diffused light, Noam Racheli, Avihai Ron, Coby Metzger, Ilan Breskin, Michal Balberg, Revital Shechter, Ornim Medical Ltd. (Israel) . . . . . [8223-80]

BEST PAPER AWARDS. . . . . .Tues. 5:15 pm

Seno Medical Best Paper Awards

Session Chairs: **Alexander A. Oraevsky,** TomoWave Labs., Inc. (USA); **Lihong V. Wang,** Washington Univ. in St. Louis (USA)

Courses of Related Interest

SC029 Tissue Optics (Jacques) Sunday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Biophotonics and Immune Responses VII

Conference Chair: **Wei R. Chen,** Univ. of Central Oklahoma (USA)

Program Committee: **Yuncheng Ge,** Beijing Glass Research Institute (China); **Sandra O. Gollnick,** Roswell Park Cancer Institute (USA); **Yueqing Gu,** China Pharmaceutical Univ. (China); **Michael R. Hamblin,** Massachusetts General Hospital (USA); **Tomas Hode,** Immunophotonics, Inc. (USA); **Zheng Huang,** Univ. of Colorado Denver (USA); **Mladen Korbelik,** The BC Cancer Agency Research Ctr. (Canada); **Mark F. Naylor,** The Univ. of Oklahoma (USA); **Karl-Goran Tranberg,** Lund Univ. (Sweden); **Xunbin Wei,** Fudan Univ. (China); **Da Xing,** South China Normal Univ. (China); **Vladimir P. Zharov,** Univ. of Arkansas for Medical Sciences (USA)

Monday 23 January

SESSION 1 . . . . . Mon. 8:30 to 9:50 am

PDT and Immune Responses

Session Chairs: **Mladen Korbelik,** The BC Cancer Agency Research Ctr. (Canada); **Michael R. Hamblin,** Massachusetts General Hospital (USA)

Expression of damage-associated molecular patterns in tumors treated by photodynamic therapy, Mladen Korbelik, The BC Cancer Agency Research Ctr. (Canada) . . . . . [8224-01]

Photodynamic therapy can induce non-specific protective immunity against a bacterial infection, Masamitsu Tanaka, National Defense Medical College (Japan); Pawel Mroz, Tianhong Dai, Massachusetts General Hospital (USA); Manabu Kinoshita, Yuji Morimoto, National Defense Medical College (Japan); Michael R. Hamblin, Massachusetts General Hospital (USA) . . [8224-02]

Study of post-PDT markers of topical photosan-mediated photodynamic therapy on DMBA-induced hamster buccal pouch precancerous and cancerous lesions, Yih-Chih Hsu, Chung Yuan Christian Univ. (Taiwan) . . . . . [8224-03]

Induction of immune responses and prevention of UV-induced skin carcinoma by topical photodynamic therapy, Xiuli Wang, Ting Lv, Hongwei Wang, Fei Miao, Jingjing Li, Shanghai Skin Diseases and STD Hospital (China); Zheng Huang, Univ. of Colorado Denver (USA) . . . . . [8224-04]

SESSION 2 . . . . . Mon. 10:30 to 11:30 am

In Situ Therapeutic Cancer Vaccine

Session Chairs: **Tomas Hode,** Immunophotonics, Inc. (USA); **Mark F. Naylor,** Dermatology Associates of San Antonio (USA)

Long-term effects of laser-imiquimod combination in the treatment of late-stage melanoma patients, Mark F. Naylor, Dermatology Associates of San Antonio (USA); Henry Le, Univ. of Central Oklahoma (USA); Hong Liu, The Univ. of Oklahoma (USA); Robert E. Nordquist, Wound Healing of Oklahoma, Inc. (USA); Tomas Hode, Immunophotonics, Inc. (USA); Wei R. Chen, Univ. of Central Oklahoma (USA) . . . . . [8224-05]

Laser immunotherapy for the treatment of human breast cancer: 2-year follow-up results, Tomas Hode, Immunophotonics, Inc. (USA); Orn Adalsteinsson, International Strategic Cancer Alliance (USA); Gabriela L. Ferrel, Hospital Nacional Edgardo Rebagliati Martins (Peru); John Lunn, John Lunn, MD (Bahamas); Maria Guerra, Immunophotonics, Inc. (USA); Xiaosong Li, Chinese PLA General Hospital (China); Robert E. Nordquist, Immunophotonics, Inc. (USA); Wei Chen, Univ. of Central Oklahoma (USA) . . . . . [8224-06]

Interstitial laser irradiation for the treatment of metastatic mammary tumors in combination of intratumoral injection of immunoadjuvant, Wei R. Chen, Chet Joshi, Daniel Figueroa, Kelvin Le, Hong Liu, Univ. of Central Oklahoma (USA); Robert E. Nordquist, Wound Healing of Oklahoma, Inc. (USA); Tomas Hode, Immunophotonics, Inc. (USA) . . . . . [8224-07]

SESSION 3 . . . . . Mon. 11:30 am to 12:10 pm

Monitoring of Phototherapy

Session Chairs: **Zheng Huang,** Univ. of Colorado Denver (USA); **Soumya Mitra,** Univ. of Rochester Medical Ctr. (USA)

Visualizing the mediators of innate and adaptive host response to photodynamic therapy, Soumya Mitra, Steven M. Hupcher, Thomas H. Foster, Univ. of Rochester Medical Ctr. (USA) . . . . . [8224-08]

Magnetic resonance thermometry using proton resonance frequency method to monitor photothermal effects of interstitial laser irradiation, Jessica Goddard, Jessnie Jose, Daniel Figueroa, Kelvin Le, Univ. of Central Oklahoma (USA); Hong Liu, The Univ. of Oklahoma (USA); Robert E. Nordquist, Wound Healing of Oklahoma, Inc. (USA); Tomas Hode, Immunophotonics, Inc. (USA); Wei R. Chen, Univ. of Central Oklahoma (USA) . . . . . [8224-09]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 4 . . . . . Mon. 1:30 to 2:50 pm

Novel Detection Techniques

Session Chairs: **Xunbin Wei,** Fudan Univ. (China); **Ekaterina I. Galanzha,** Univ. of Arkansas for Medical Sciences (USA)

Circulation times of cancer cells by in vivo flow cytometry, Xunbin Wei, Jin Guo, Fudan Univ. (China) . . . . . [8224-10]

In vivo high-speed photoacoustic flow cytometry of immune-related cells, Ekaterina I. Galanzha, Mustafa Sarimollaoglu, Dmitry A. Nedosekin, Vladimir P. Zharov, Univ. of Arkansas for Medical Sciences (USA) . . . . . [8224-11]

In-plane Spatial Resolution Measurements of X-ray Tomosynthesis Prototype, Di Wu, Hui Miao, Yuhua Li, The Univ. of Oklahoma (USA); Xizeng Wu, The Univ. of Alabama at Birmingham (USA); Hong Liu, The Univ. of Oklahoma (USA) . . . . . [8224-12]

An Automatic Scanning Method for High Throughput Microscopic System to Facilitate Medical Genetic Diagnosis: An Initial Study, Yuchen Qiu, The Univ. of Oklahoma (USA); Xiaodong Chen, Tianjin Univ. (China); Zheng Li, The Univ. of Oklahoma (USA); Wei R. Chen, Univ. of Central Oklahoma (USA); Bin Zheng, Univ. of Pittsburgh Medical Ctr. (USA); Shibo Li, The Univ. of Oklahoma Health Sciences Ctr. (USA); Hong Liu, The Univ. of Oklahoma (USA) . . [8224-13]

SESSION 5 . . . . . Mon. 2:50 to 3:30 pm

Low-Light Tissue Responses

Session Chairs: **Lars Hode,** Irradia AB (Sweden); **Melville B. Vaughan,** Univ. of Central Oklahoma (USA)

Effect of near-infrared lasers on myofibroblast differentiation and contraction, Melville B. Vaughan, Chelsea Spencer, Jessica Goddard, Wei R. Chen, Univ. of Central Oklahoma (USA) . . . . . [8224-14]

Penetration of light into living tissue, Lars Hode, Swedish Laser-Medical Society (Sweden); Peter Jenkins, Irradia USA (USA); Jan Tunér, Swedish Laser-Medical Society (Sweden); Tomas Hode, Immunophotonics, Inc. (USA) . . . . . [8224-15]

SESSION 6 . . . . . Mon. 4:00 to 5:20 pm

Laser-Nanotechnology

Session Chairs: **Darrell B. Tata,** U.S. Food and Drug Administration (USA); **Wei R. Chen,** Univ. of Central Oklahoma (USA)

Cellular internalization of a membrane binding two-photon probe by forming a nanostructure composed of anionic diblock copolymer and cationic surfactant, Okhil K. Nag, Wei R. Chen, Univ. of Central Oklahoma (USA) . . . . . [8224-16]

Applications of frequency up-converting "rare-earth" nanoparticles in activating photodynamic agents through near-infrared induced visible luminescence: An in-vitro study., Darrell B. Tata, U.S. Food and Drug Administration (USA) . . . . . [8224-17]

Imaging caveoale-mediated transport of nanoparticles using super-resolution microscopy, Zhenjia Wang, Chinnawamy Tiruppathi, Richard Minshall, Asrar B. Malik, Univ. of Illinois at Chicago (USA) . . . . . [8224-18]

Thermo responsive polyelectrolyte-gold nanorod composite for NIR-light-triggered controlled release of doxorubicin, Xuemei Chi, Jie Cao, Shunan Wan, Changli Du, Yueqing Gu, China Pharmaceutical Univ. (China) . . . [8224-19]

POSTERS-MONDAY . . . . . Mon. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Direct laser light enhancement of susceptibility of bacteria to gentamicin antibiotic, Yana Reznick, Ehud Banin, Anat Lipovsky, Rachel Lubart, Zeev Zalevsky, Bar-Ilan Univ. (Israel) . . . . . [8224-20]

SB203580 enhances the RV-induced loss of mitochondrial membrane potential and apoptosis in A549 cells, Haiyang Li, Xiao-Ping Wang, Jinan Univ. (China); Tong-Sheng Chen, South China Normal Univ. (China) . . . [8224-21]

Artesunate induces AIF-dependent apoptosis in A549 cells, Chenjuan Zhou, Tong-Sheng Chen, South China Normal Univ. (China) . . . . . [8224-22]

Low-power laser irradiation enhance macrophage phagocytic capacity through Src activation, Feifan Zhou, South China Normal Univ. (China) . . . . . [8224-23]

Nanoscopy of Protein-protein Interaction in Living Cells by Combination of Bimolecular Fluorescence Complementation, Lingsong Qin, Zhenli Huang, Shaoqun Zheng, Zhihong Zhang, Britton Chance Ctr. for Biomedical Photonics (China) . . . . . [8224-24]

Time-delayed mathematical model of nonlinear dynamics of interleukin-2 immunotherapy, Georgy S. Terentyuk, Tatiana S. Kondaurva, Nikita M. Ryskin, Irina L. Maksimova, N.G. Chernyshevsky Saratov State Univ. (Russian Federation) . . . . . [8224-25]

Neutrophils of the patient s with cervical cancer after femtosecond laser radiation in vitro, Tatyana Abakumova, Ulyanovsk State Univ. (Russian Federation); Alexei Sysolyatin, Russian Academy of Sciences (Russian Federation); Vyacheslav Svetukhin, Inna Antoneeva, Dinara Arslanova, Sneganna Gening, Ulyanovsk State Univ. (Russian Federation). . . . . [8224-26]

Comparsion of light dose on topical ALA-mediated photodynamic therapy for DMBA-induced hamster buccal pouch premaligant lesions, Yih-Chih Hsu, Deng Fu Yang, Meng-Kai Tseng, Chung Yuan Christian Univ. (Taiwan) . . . . . [8224-27]

Combination therapies in adjuvant with topical ALA-mediated photodynamic therapy for DMBA-induced hamster buccal pouch premaligant lesions, Yih-Chih Hsu, Deng-Fu Yang, Chung Yuan Christian Univ. (Taiwan) . . . . . [8224-28]

Synthesis of dimeric cyclic RGD based near-infrared probe for in vivo tumor diagnosis, Jie Cao, Shunan Wan, Junmei Tian, Xuemei Chi, Changli Du, Dawei Deng, Yueqing Gu, China Pharmaceutical Univ. (China) . . . . . [8224-29]

ERβ regulates miR-21 expression and inhibits invasion and metastasis in cancer cells, Junmei Tian, Yueqing Gu, Zhenzhen Tu, China Pharmaceutical Univ. (China) . . . . . [8224-30]

Surface modification of upconversion nanoparticles with amphiphilic chitosan for cancer cell imaging, Sisi Cui, Hongyan Zhu, Junmei Tian, Xuemei Chi, Haiyan Chen, Yueqing Gu, China Pharmaceutical Univ. (China) . . . [8224-31]

Preliminary study of PDT-1O2 dosimetry in vitro using Singlet Oxygen Sensor Green, Huiyun Lin, Huifen Zheng, Defu Chen, Buhong Li, Shusen Xie, Fujian Normal Univ. (China) . . . . . [8224-32]

Conference 8225

Saturday-Monday 21-23 January 2012 • Proceedings of SPIE Vol. 8225

Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues X

Conference Chairs: **Daniel L. Farkas,** Cedars-Sinai Medical Ctr. (USA); **Dan V. Nicolau,** Univ. of Liverpool (United Kingdom); **Robert C. Leif,** Newport Instruments (USA)

Conference Co-Chairs: **James F. Leary,** Purdue Univ. (USA); **J. Paul Robinson,** Purdue Univ. (USA); **Attila Tarnok,** Univ. Leipzig (Germany)

Program Committee: **Vincenza Andrisano,** Univ. degli Studi di Bologna (Italy); **Christopher H. Contag,** Stanford Univ. School of Medicine (USA); **Ewa M. Goldys,** Macquarie Univ. (Australia); **Dayong Jin,** Macquarie Univ. (Australia); **Charles P. Lin,** Massachusetts General Hospital (USA); **Andreas G. Nowatzyk,** Cedars-Sinai Medical Ctr. (USA); **Ramesh Raghavachari,** U.S. Food and Drug Administration (USA); **Markus Sauer,** Univ. Bielefeld (Germany); **Takahisa Taguchi,** National Institute of Advanced Industrial Science and Technology (Japan); **Robert M. Zucker,** U.S. Environmental Protection Agency (USA)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:20 am to 12:40 pm

Functional Imaging of Biomolecules, Live Cells and Tissues

Session Chair: **Dan V. Nicolau,** Univ. of Liverpool (United Kingdom)

Testing the behavior of microorganisms in combinatorial microfluidics *(Invited Paper)*, Dan V. Nicolau, Univ. of Liverpool (United Kingdom). . . [8225-01]

Light scattering of individual erythrocytes from a sickle cell anemia patient, Youngchan Kim, Korea Advanced Institute of Science and Technology (Korea, Republic of); John Higgins, Massachusetts General Hospital (USA); YongKeun Park, Korea Advanced Institute of Science and Technology (Korea, Republic of) . . . . . [8225-02]

Imaging caveolae-mediated transport of nanoparticles using superresolution microscopy, Zhenjia Wang, Chinnaswamy Tiruppathi, Richard Minshall, Asrar B. Malik, Univ. of Illinois at Chicago (USA) . . . . . [8225-03]

Heavy metal stress detection and monitoring via LED-induced chlorophyll fluorescence analysis of Zea mays L. seedlings aiming polluted soil phytoremediation, Artur S. Gouveia-Neto, Elias Arcanjo Arcanjo da Silva, Jr., Airon J. da Silva, Clístenes W.A. Nascimento, Univ. Federal Rural de Pernambuco (Brazil) . . . . . [8225-04]

Interferometric measurement of traveling waves in the mammalian cochlea in vivo combined with photo-deactivation of prestin: a cellular force-generating protein *(Invited Paper)*, Jonathan A. N. Fisher, Fumiaki Nin, Tobias Reichenbach, A. J. Hudpeth, The Rockefeller Univ. (USA) . . . . . [8225-05]

FTIR microspectroscopy highlights non-enzymatic glycation of type I collagen, Marie Guilbert, Univ. of Reims (France); Georges Said, Emilie Millerot-Serrurot, Valerie Untereiner, Teddy Hapillon, Cyril Gobinet, Roselyne Garnotel, Michel Manfait, Pierre Jeannesson, Ganesh D. Sockalingum, Univ. de Reims (France) . . . . . [8225-06]

Effects of cross-linkers on optical spectral properties and nano/microstructure of collagen hydrogels, Yu Jer Hwang, Joseph Granelli, Jillian Larsen, Julia G. Lyubovitsky, Univ. of California, Riverside (USA) . . . . . [8225-07]

A new diagnostic tool based on diffusion reflection measurements of gold nano particles, Rinat Ankri, Dror Fixler, Rachela Popovtzer, Bar-Ilan Univ. (Israel) . . . . . [8225-08]

In vivo imaging of microglia response to ionizing radiation, Clemens Alt, Judith Runnels, Charles P. Lin, Wellman Ctr. for Photomedicine (USA). [8225-09]

Evaluation of atherosclerotic plaque development by texture analysis of multimodal CARS images of rabbit arteries, Leila Mostaço-Guidolin, Alex C. T. Ko, Dan P. Popescu, Michael S. D. Smith, Elicia Kohlenberg, National Research Council Canada (Canada); Masashi Shiomi, Kobe Univ. School of Medicine (Japan); Arkady Major, Univ. of Manitoba (Canada); Michael Sowa, National Research Council Canada (Canada) . . . . . [8225-10]

Long-term measurement of spontaneous membrane fluctuations over a wide-dynamic range in the living cell by low-coherent quantitative phase microscopy, Toyohiko Yamauchi, Hidenao Iwai, Yutaka Yamashita, Hamamatsu Photonics K.K. (Japan) . . . . . [8225-11]

Lunch/BiOS Exhibition Break . . . . . 12:40 to 1:50 pm

SESSION 2 . . . . . Sat. 1:50 to 3:30 pm

Optical Manipulation of Cells and Tissues

Session Chair: **Dan V. Nicolau,** Univ. of Liverpool (United Kingdom)

Rotation of microscopic objects in fiber optic trap, Bryan Black, Samarendra K. Mohanty, The Univ. of Texas at Arlington (USA). . . . . [8225-12]

Multispectral optical tweezers for molecular diagnostics of single biological cells *(Invited Paper)*, Shima Fardad, Alex Sincore, Matthieu Baudelet, Martin Richardson, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8225-13]

Compact cell stretcher for RBC quantitative phase information, Mariana C. Potcoava, Dave W. M. Marr, Ralph Jimenez, JILA (USA) . . . . . [8225-14]

Fluorescence enhancement with glancing angle deposited nanostructured surfaces, Swathi Suran, Haobijam J. Singh, Venkanagouda S. Goudar, Arijith Ghosh, Manoj M. Varma, Ambarish Ghosh, Indian Institute of Science (India). . . . . [8225-15]

Amplification of the signal per background in microarrays modulated by micro/nano-structures, Dan V. Nicolau, Univ. of Liverpool (United Kingdom) . . . . . [8225-16]

SESSION 3 . . . . . Sat. 4:00 to 5:40 pm

Biophotonic techniques for regenerative medicine

Session Chair: **Dan V. Nicolau,** Univ. of Liverpool (United Kingdom)

Phase resolved and coherence gated en-face reflection imaging of multilayered embryonal carcinoma cells, Toyohiko Yamauchi, Tadashi Fukami, Hidenao Iwai, Yutaka Yamashita, Hamamatsu Photonics K.K. (Japan). . . . . [8225-17]

Label-free multiphoton fluorescence imaging monitors metabolism in living primary human cells used for tissue engineering, Leng-Chun Chen, William Lloyd, Shiuhyang Kuo, Cynthia Marcelo, Stephen Feinberg, Mary-Ann Mycek, Univ. of Michigan (USA) . . . . . [8225-18]

Targeting of engineered Mesenchymal stem cells to sites of inflammation as monitored using multicolor mixed mode intravital imaging, Luke J. Mortensen, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Debanjan Sarkar, Brigham and Women's Hospital (USA) and Harvard Medical School (USA); Joseph A. Phillips, Brigham and Women's Hospital (USA); Joel A. Spencer, Massachusetts General Hospital (USA) and Harvard Medical School (USA) and Tufts Univ. (USA); Rukmani Sridharan, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Sriram Kumar Sankaran, Brigham and Women's Hospital (USA) and Harvard Medical School (USA); Weian Zhao, Brigham and Women's Hospital (USA) and Harvard Medical School (USA) and Harvard Stem Cell Institute (USA); Praveen Kumar Vemula, Brigham and Women's Hospital (USA) and Harvard Medical School (USA); Rohit Karnik, Massachusetts Institute of Technology (USA); Jeffrey M. Karp, Brigham and Women's Hospital (USA) and Harvard Medical School (USA); Charles P. Lin, Massachusetts General Hospital (USA) and Harvard Medical School (USA) . . . . . [8225-19]

Investigation for the differentiation process of mouse ES cells by Raman spectroscopy, Yoshinori Yamaguchi, Maha El-Hagrasy, Eiichi Shimizu, Masato Saito, Eiichi Tamiya, Osaka Univ. (Japan). . . . . [8225-20]

Sensing end enumeration of rare circulating cells with diffuse fluorescence light in mice in vivo, Mark J. Niedre, Eric Zettergren, Northeastern Univ. (USA); Judith Runnels, Charles P. Lin, Wellman Ctr. for Photomedicine (USA). [8225-21]

BiOS Hot Topics
Sat. 7:00 to 9:00 pm
BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 4 . . . . . Sun. 8:30 am to 12:30 pm

Advanced Quantitation in Cells (Cytomics) and Tissues (Histomics)-Part 1

Session Chair: **Robert C. Leif,** Newport Instruments (USA)

MEM-FLIM: all-solid-state camera for fluorescence lifetime imaging *(Invited Paper)*, Ian T. Young, Qiaole Zhao, Raymond Schouten, Ben Schelen, Technische Univ. Delft (Netherlands); Rene Leenen, Harry van Kuijk, Inge Peters, Frank Polderdijk, Jan Bosiers, Teledyne DALSA (Netherlands); Kees Jalink, Netherlands Cancer Institute (Netherlands); Sander de Jong, Lambert van Geest, Karel Stoop, Lambert Instruments BV (Netherlands). . . . . [8225-22]

MB-FLIM: model-based fluorescence lifetime imaging, Ian T. Young, Qiaole Zhao, Raymond Schouten, Sjoerd Stallinga, Technische Univ. Delft (Netherlands); Kees Jalink, Netherlands Cancer Institute (Netherlands); Sander de Jong, Lambert Instruments BV (Netherlands) . . . . . [8225-23]

Quality testing of an innovative cascade separation system for multiple cell separation, Arkadiusz Pierzchalski, Aleksandra Moszczynska, Univ. Leipzig (Germany); Jan-Michael Heinrich, pluriSelect GmbH (Germany); Attila Tarnok, Univ. Leipzig (Germany) . . . . . [8225-24]

An optical platform for in vivo cell tracking and quantification in adult zebrafish, Li Zhang, Wellman Ctr. for Photomedicine (USA) and Fudan Univ. (China); Clemens Alt, Wellman Ctr. for Photomedicine (USA); Pulin Li, Richard M. White, Leonard I. Zon, Harvard Medical School (USA); Xunbin Wei, Shanghai Jiaotong Univ. (China) and Fudan Univ. (China); Charles P. Lin, Wellman Ctr. for Photomedicine (USA) . . . . . [8225-25]

Optofluidic tomographic microscopy: a new tool for optofluidics, Serhan O. Isikman, Waheb Bishara, Hongying Zhu, Aydogan Ozcan, Univ. of California, Los Angeles (USA). . . . . [8225-26]

Structural imaging of cell membranes using polarimetric fluorescence microscopy, Sophie Brasselet, Patrick Ferrand, Xiao Wang, Alla Kress, Hubert Ranchon, Hervé Rigneault, Institut Fresnel (France). . . . . [8225-27]

Optical coherence phase microscopy with a dual beam allows intracellular phase imaging, Frank Helderman, Mattijs de Groot, Johannes de Boer, Vrije Univ. Amsterdam (Netherlands) . . . . . [8225-28]

Monitoring protein-protein interactions in vivo: FLIM and FIDSAM as powerful time-resolved fluorescence techniques for quantitative FRET-analysis, Frank Schleifenbaum, Eberhard Karls Univ. Tübingen (Germany); Kirstin Elgass, La Trobe Univ. (Australia); Sebastien Peter, Alfred J. Meixner, Klaus Harter, Univ. of Tuebingen (Germany). . . . . [8225-29]

Delay time spectroscopy: a novel method for measuring nanoscale disorder in a biological cell and its application to early cancer detection, Prabhakar Pradhan, Daniel Park, Hariharan Subramanian, Dhwanil Damania, Lusik Cherkezyan, Vadim Backman, Northwestern Univ. (USA). . . . . [8225-30]

Chemometric analysis of multispectral FLIM data based on nonnegative matrix factorization methods, Paritosh Pande, Javier A. Jo, Texas A&M Univ. (USA) . . . . . [8225-31]

Lunch/BiOS Exhibition Break . . . . . 12:30 to 1:30 pm

Courses of Related Interest

SC1013	Choosing the Correct Optical Filter for Your Application (Reichel) Tuesday, 1:30 to 5:30 pm
SC1054	Bio-Interferometry (Nolte) Sunday, 8:30 am to 12:30 pm
SC868	Optical Design for Biomedical Imaging (Liang) Tuesday, 1:30 to 5:30 pm
SC532	Micro- and Nanofluidics - Technology and Applications (Gärtner) Wednesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

SESSION 5 . . . . . Sun. 1:30 to 3:10 pm

Advanced Quantitation in Cells (Cytomics) and Tissues (Histomics)-Part 2

Quantitative FRET measurements in live cell by fluorescence lifetime excitation-emission matrix imaging, Ming Zhao, Run Huang, Leilei Peng, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [8225-32]

Autofluorescence removal in images captured with multispectral line confocal microscope, Mark M. Meyers, GE Global Research (USA) . . [8225-33]

Lensfree incoherent color imaging using compressive decoding, Ikbal Sencan, Ahmet F. Coskun, Ting-Wei Su, David G. Herman, YeongSeok Suh, Aydogan Ozcan, Univ. of California, Los Angeles (USA). . . . . [8225-34]

A cost-effective analog method to produce time-gated luminescence images, Robert C. Leif, Sean Yang, Newport Instruments (USA); Yiqing Lu, Dayong Jin, Macquarie Univ. (Australia); Steven Chambers, Artemis CCD Ltd. (United Kingdom). . . . . [8225-35]

Toward a colony counting system using hyperspectral imaging, Bart Masschelein, IMEC (Belgium); Antonio Robles-Kelly, National ICT Australia (Australia); Shuyang Liu, Nicolaas Tack, Andy Lambrechts, IMEC (Belgium); Bill Simpson-Young, National ICT Australia (Australia); Francesco Pessolano, IMEC (Belgium) . . . . . [8225-36]

SESSION 6 . . . . . Sun. 3:40 to 5:00 pm

Image and Data Processing, Quantification, Standards, and Display Methods

Session Chair: **Robert C. Leif,** Newport Instruments (USA)

The effects of different gold standards on the assessment of the accuracy of different resampling techniques for optical coherence tomography, Christopher Copeland, Audrey K. Ellerbee, Stanford Univ. (USA) . . . . . [8225-37]

Comparison of measured and calculated quantitative flow cytometric data provided by panels with lower and increased color number, Jozsef Bocsi, Univ. Leipzig (Germany) and Leipzig Research Ctr. for Civilization Diseases (Germany); Anja Mittag, Arkadiusz Pierzchalski, Adolf Baumgartner, Ingo Dähnert, Attila Tarnok, Univ. Leipzig (Germany) . . . . . [8225-38]

Diffusion properties of single FoF1-ATP synthases in a living bacterium unraveled by superlocalization microscopy, Torsten Rendler, Univ. of Stuttgart (Germany); Marc Renz, Jena Univ. Hospital (Germany); Stefan Ernst, Jena Univ. Hospital (Germany) and Univ. of Stuttgart (Germany); Andrea Zappe, Univ. of Stuttgart (Germany); Michael Börsch, Jena Univ. Hospital (Germany) and Univ. of Stuttgart (Germany). . . . . [8225-39]

Sparsity reconstruction for bioluminescence tomography based on an augmented lagrangian method, Wei Guo, Kebin Jia, Beijing Univ. of Technology (China); Jie Tian, Dong Han, Institute of Automation (China); Xueyan Liu, Northeastern Univ. (China); Kai Liu, Qian Zhang, Chenghu Qin, Institute of Automation (China) . . . . . [8225-40]

Monday 23 January

SESSION 7 . . . . . Mon. 8:20 am to 12:00 pm

Spectral Imaging (Microscopic and Macroscopic)

Session Chair: **Daniel L. Farkas,** SMI (USA)

Raman imaging of alkyne as a small tag for biological molecules *(Invited Paper)*, Katsumasa Fujita, Osaka Univ. (Japan); Hiroyuki Yamakoshi, Japan Science and Technology Agency (Japan); Kosuke Dodo, RIKEN (Japan); Almar Palonpon, Japan Science and Technology Agency (Japan); Masaya Okada, Osaka Univ. (Japan); Jun Ando, Japan Science and Technology Agency (Japan); Satoshi Kawata, Osaka Univ. (Japan); Mikiko Sodeoka, RIKEN (Japan) [8225-41]

Two-photon cryomicroscope, Karsten König, Karoline Köhler, Hans-Georg Breunig, JenLab GmbH (Germany) . . . . . [8225-42]

Extraction of masked fluorescence peaks through polarized synchronous fluorescence spectroscopy, Meghdoot Mozumder, Seema Devi, Indian Institute of Technology Kanpur (India); Nirmalya Ghosh, Indian Institute of Science Education and Research Kolkata (India); Asima Pradhan, Indian Institute of Technology Kanpur (India); Asha Agarwal, Kiran Pandey, Ganesh Shanker Vidhyarthi Memorial Medical College (India). . . . . [8225-43]

Water's contribution and enzyme's work: a KITA study, Benjamin P. Born, Moran Grossman, The Weizmann Institute of Science (Israel); Martina Havenith, Ruhr-Univ. Bochum (Germany); Irit Sagi, The Weizmann Institute of Science (Israel) . . . . . [8225-44]

Chloroplast fluorescence excitation and emission spectroscopy in live plant cells, Sebastien Peter, Eberhard Karls Univ. Tübingen (Germany); Martina Zell, Univ. of Cologne (Germany); Christian Blum, Univ. of Twente (Netherlands); Kirstin Elgass, La Trobe Univ. (Australia); Veronica G. Maurino, Univ. of Cologne (Germany); Alfred J. Meixner, Univ. of Tuebingen (Germany); Vinod Subramaniam, Univ. of Twente (Netherlands); Frank Schleifenbaum, Univ. of Tuebingen (Germany) . . . . . [8225-45]

Examining aortic valvular interstitial cells live utilizing Raman spectroscopy, Kristy Cloyd, Ismail El-Hamamsy, Padmini Sarathchandra, Eileen Gentleman, Magdi H. Yacoub, Adrian H. Chester, Molly M. Stevens, Imperial College London (United Kingdom) . . . . . [8225-46]

Inhomogeneous Monte Carlo simulations of dermoscopic spectroscopy, Daniel S. Gareau, Ting Li, Steven Jacques, James Krueger, Oregon Health & Science Univ. (USA) . . . . . [8225-47]

Raman spectroscopic study of keratin 8 knockdown oral squamous cell carcinoma derived cells, S. P. Singh, Hunain Alam, Crismita Dmello, Milind M. Vaidya, C. Murali Krishna, Advanced Ctr. for Treatment, Research & Education in Cancer (India). . . . . [8225-48]

Multiphoton spectroscopy in human skin in vivo, Hans-Georg Breunig, Karsten Koenig, JenLab GmbH (Germany). . . . . [8225-49]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 8 . . . . . Mon. 1:30 to 3:10 pm

Multiparameter Measurements

Session Chair: **Daniel L. Farkas,** SMI (USA)

A non-iterative exact solution to the phase problem in optical imaging, Aaron Lewis, The Hebrew Univ. of Jerusalem (Israel). . . . . [8225-50]

Multimodal in-vivo MRI and NIRF imaging of bladder tumors using peptide conjugated glycol chitosan nanoparticles, Jaehong Key, Deepika Dhawan, Deborah W. Knapp, Purdue Univ. (USA); Kwangmeyung Kim, Ich Chan Kwon, Kuiwon Choi, Korean Institute of Science and Technology (Korea, Republic of); James F. Leary, Purdue Univ. (USA) . . . . . [8225-51]

Optical dry mass measurement in live cells: phase delay versus Raman scattering, Jeon Woong Kang, Niyom Lue, Yongjin Sung, Ishan Barman, Narahara Chari Dingari, Chae-Ryon Kong, Ramachandra R. Dasari, Michael S. Feld, Massachusetts Institute of Technology (USA) . . . . . [8225-52]

Dual imaging with fluorescence and full-field optical coherence microscopy, Egidijus Auksorius, Yaron Bromberg, Emmanuel Coron, Linbo Liu, Joe Gardecki, Brett Bouma, Guillermo Tearney, Massachusetts General Hospital (USA) . . . . . [8225-53]

Multimodal optical setup for nonlinear and fluorescence lifetime imaging microscopies: improvement on a commercial confocal inverted microscope, Vitor Bianchini Pelegati, Javier Adur, André A. de Thomaz, Diogo B. Almeida, Mariana O. Baratti, Hernandes F. Carvalho, Carlos L. Cesar, Univ. Estadual de Campinas (Brazil). . . . . [8225-54]

SESSION 9 . . . . . Mon. 3:40 to 5:20 pm

Biomedical Imaging and Cell Manipulation using a Digital Micromirror Device I

Joint Session with Conference 8254

Multivariate optical computing using a digital micromirror device for Raman and fluorescence spectroscopy, Zachary J. Smith, Sven Strombom, Sebastian Wachsmann-Hogiu, UC Davis Medical Ctr. (USA). . . . . [8225-55]

Realization of an endoscope equipped with microprojection system for optogenetics, Ramin Pashaie,. . . . . [8225-56]

Design and development of a wide-field structured illumination fluorescence imaging system for breast tumor margin assessment, Henry L. Fu, Nimmi Ramanujam, J. Quincy Brown, Duke Univ. (USA) . . . . . [8225-57]

Investigation of in situ fluorescence optical detection based on a programmable spatial light modulator, Jong-ryul Choi, Kyujung Kim, Donghyun Kim, Yonsei Univ. (Korea, Republic of) . . . . . [8225-58]

Distributed light delivery system (DLDS) for optogenetics, Ramin Pashaie, Univ. of Wisconsin-Milwaukee (USA) . . . . . [8225-59]

POSTERS-MONDAY . . . . . Mon. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

LED-induced chlorophyll fluorescence signatures from leaves of saccharum officinarum seedlings under water deficit stress, Artur S. Gouveia-Neto, Elias A. Silva, Jr., Patrícia C. Cunha, Ronaldo A. Oliveira-Filho, Ernande B. Costa, Terezinha J. R. Câmara, Lilia G. Willadino, Univ. Federal Rural de Pernambuco (Brazil) . . . . . [8225-60]

Hydrogen peroxide induces a rapid loss of mitochondrial membrane potential and apoptosis in chondrocytes, Zhuang Caiping, Wang Xiaoping, The First Affiliated Hospital Of Jinan Univ. (China); Chen Tongsheng, South China Normal Univ. (China) . . . . . [8225-61]

Combining nanoscale optical phenomena with atomic force microscopy for cellular studies, Sina Amini, Texas A&M Univ. (USA); Zhe Sun, Gerald A. Meininger, Univ. of Missouri-Columbia (USA); Kenith E. Meissner, Texas A&M Univ. (USA) . . . . . [8225-62]

Analysis of time-gated FLIM data by means of the phasor approach, Farzad Fereidouni, Dave van den Heuvel, Jarno Voortman, Erik Hofman, Hans C. Gerritsen, Utrecht Univ. (Netherlands) . . . . . [8225-63]

A study of the characteristics of the analog mean delay (AMD) method for fluorescence lifetime measurements, Young Jae Won, DugYoung Kim, Gwangju Institute of Science and Technology (Korea, Republic of). . . . [8225-64]

Development and Eigenvalue calibration of an automated spectral Mueller matrix system for biomedical polarimetry, Harsh Purwar, Indian Institute of Science Education and Research Kolkata (India); Shubham Chandel, Ctr. of Excellence in Lasers and Opto-electronic Sciences (India); Harshit Lakhotia, Chitram Banerjee, Jalpa Soni, Nirmalya Ghosh, Indian Institute of Science Education and Research Kolkata (India) . . . . . [8225-65]

Multimodal intravital microscopy for studying cellular dynamics of wound healing in mouse skin, Benedikt W. Graf, Maria C. Valero, Eric J. Chaney, Marina Marjanovic, Marni D. Boppart, Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign (USA). . . . . [8225-66]

The relationship between metabolic activity and collagen deposition during osteoblastic differentiation of mesenchymal stem cells, Kyle P. Quinn, Rebecca Scholl Hayden, David L. Kaplan, Irene Georgakoudi, Tufts Univ. (USA) . . . . . [8225-67]

Characterization of HER2 expression and therapy resistance of breast cancer cells by the optical redox ratio, Alexandra J. Walsh, Matthew Sundermann, Madison Olive, Rebecca Cook, Melissa Skala, Vanderbilt Univ. (USA) . . . . . [8225-68]

Milk phospholipid's protective effects against UV damage in skin equivalent models, Lily H. Laiho, Ashley Russell, Zyra Achay, Carl Dargitz, Michael Bingham, California Polytecnic State Univ., San Luis Obispo (USA) . . . . . [8225-69]

High-density microarrays using lithographically patterned polelectrolytes, Gurusiddhappa R. Prashanth, Venkanagouda S. Goudar, Swathi Suran, Manoj M. Varma, Indian Institute of Science (India). . . . . [8225-70]

Biological imaging with high-dynamic range using compressive imaging technique, Mehrdad Abolbashari, Faramarz Farahi, Awad S. Gerges, Gelareh Babaie, The Univ. of North Carolina at Charlotte (USA); Filipe Magalhães, Miguel V. Correia, Francisco M. Araújo, INESC Porto (Portugal) . . . . . [8225-71]

Measurement of depth-dependent elastic properties of breast tissue phantoms by holographic imaging of surface waves, Karan D. Mohan, The Univ. of North Carolina at Chapel Hill (USA); William W. Sanders, Amy L. Oldenburg, University of North Carolina at Chapel Hill (USA). . . . . [8225-72]

Single optical fiber probe for optogenetics, Ramin Pashaie, Univ. of Wisconsin-Milwaukee (USA) . . . . . [8225-73]

Fast and efficient phase extraction method for real-time quantitative phase imaging, Sanjit Kumar Debnath, YongKeun Park, KAIST (Korea, Republic of) . . . . . [8225-74]

Validating novel melanoma treatments via S100 protein, Ashley Russell, Carl Dargitz, Aaron Rowley, Zyra Achay, Michael Bingham, Rafael Jimenez, Lily H. Laiho, California Polytechnic State Univ., San Luis Obispo (USA) . . . . . [8225-75]

Tuesday 24 January

SESSION 10 . . . . . Tues. 1:30 to 3:10 pm

Biomedical Imaging and Cell Manipulation using a Digital Micromirror Device II

Joint Session with Conference 8254

Session Chairs: **Karel J. Zuzak,** Digital Light Innovations (USA); **James F. Leary,** Purdue Univ. (USA)

SESSION 11 . . . . . Tues. 3:40 to 5:20 pm

Biomedical Imaging and Cell Manipulation using a Digital Micromirror Device III

Joint Session with Conference 8254

Session Chairs: **Michael R. Douglass,** Texas Instruments Inc. (USA); **James F. Leary,** Purdue Univ. (USA)

Conference 8226

Sunday-Tuesday 22-24 January 2012 • Proceedings of SPIE Vol. 8226

Multiphoton Microscopy in the Biomedical Sciences XII

Conference Chairs: **Ammasi Periasamy,** Univ. of Virginia (USA); **Karsten König,** JenLab GmbH (Germany); **Peter T. C. So,** Massachusetts Institute of Technology (USA)

Program Committee: **Wolfgang Becker,** Becker & Hickl GmbH (Germany); **Keith M. Berland,** Emory Univ. (USA); **Guy C. Cox,** The Univ. of Sydney (Australia); **Alberto Diaspro,** Istituto Italiano di Tecnologia (Italy); **Chen-Yuan Dong,** National Taiwan Univ. (Taiwan); **Kevin W. Eliceiri,** Univ. of Wisconsin-Madison (USA); **Scott E. Fraser,** California Institute of Technology (USA); **Paul M. W. French,** Imperial College London (United Kingdom); **Hans C. Gerritsen,** Utrecht Univ. (Netherlands); **Stefan W. Hell,** Max-Planck-Institut für biophysikalische Chemie (Germany); **Brian A. Herman,** The Univ. of Texas Health Science Ctr. at San Antonio (USA); **Satoshi Kawata,** Osaka Univ. (Japan); **Arnd K. Krueger,** Spectra-Physics®, a Newport Corp. Brand (USA); **Joseph R. Lakowicz,** Univ. of Maryland School of Medicine (USA); **Steve M. McDonald,** Coherent, Inc. (USA); **Angelika C. Rueck,** Univ. Ulm (Germany); **Steven S. Vogel,** National Institutes of Health (USA); **Paul W. Wiseman,** McGill Univ. (Canada); **X. Sunney Xie,** Harvard Univ. (USA); **Warren R. Zipfel,** Cornell Univ. (USA)

Sunday 22 January

Opening Remarks . . . . . Sun. 8:15 to 8:30 am

Session Chair: **Ammasi Periasamy,** Univ. of Virginia (USA)

KEYNOTE SESSION . . . . . Sun. 8:30 to 10:00 am

Session Chair: **Ammasi Periasamy,** Univ. of Virginia (USA)

Innovative microscopes and labels for intravital imaging *(Invited Paper)*, Scott E. Fraser, California Institute of Technology (USA). . . . . [8226-01]

Fluorescence lifetime imaging and metrology for cell biology, drug discovery and label-free diagnosis *(Invited Paper)*, Paul M. W. French, Imperial College London (United Kingdom) . . . . . [8226-02]

The phasor approach to FLIM: exploiting phasor linear properties *(Invited Paper)*, Enrico Gratton, Michelle A. Digman, Univ. of California, Irvine (USA) . . . . . [8226-03]

SESSION 1 . . . . . Sun. 10:30 am to 12:15 pm

FRET, FLIM, FCS I

Session Chair: **Angelika C. Rueck,** Univ. Ulm (Germany)

Polarized fluorescence correlation spectroscopy (pFCS): a single-molecule method for simultaneously measuring homo-FRET, brightness, and the diffusion of protein complexes in living cells *(Invited Paper, Presentation Only)*, Tuan Nguyen, Pabak Sarkar, National Institutes of Health (USA); Jithesh V. Veetil, National Institutes of Health; Srinagesh V. Koushik, Christopher Thaler, National Institutes of Health (USA); Anna Seeman, National Institutes of Health; Steven S. Vogel, National Institutes of Health (USA) . . . . . [8226-04]

Monitoring nuclear protein interactions using FRET-FLIM *(Invited Paper)*, Amanda P. Siegel, Nichole Hays, Richard N. Day, Indiana Univ. (USA) . [8226-05]

Spatially resolved recording of transient fluorescence-lifetime effects by line-scanning TCSPC *(Invited Paper)*, Wolfgang Becker, Bertram Su, Becker & Hickl GmbH (Germany) . . . . . [8226-06]

Phasor FLIM metabolic mapping of stem cells and cancer cells in live tissues, Chiara Stringari, Univ. of California, Irvine (USA); Peter Donovan, Univ. of California. Irvine (USA); Enrico Gratton, Univ. of California, Irvine (USA) . . . . . [8226-07]

Fluorescence lifetime imaging microscopy (FLIM) studies of living primary human cells for applications in tissue regeneration, William R. Lloyd III, Leng-Chun Chen, Shiuhyang Kuo, Cynthia L. Marcelo, Stephen E. Feinberg, Mary-Ann Mycek, Univ. of Michigan (USA). . . . . [8226-08]

High speed 3D-resolved fluorescence and phosphorescence heterodyned wide field lifetime imaging, Heejin Choi, Dimitrios Tzeranis, Jaewon Cha, Peter T. C. So, Massachusetts Institute of Technology (USA) . . . . . [8226-09]

Lunch/Exhibition Break . . . . . 12:15 to 1:25 pm

SESSION 2 . . . . . Sun. 1:25 to 3:05 pm

FRET, FLIM, FCS II

Session Chair: **Steven S. Vogel,** National Institutes of Health (USA)

Multiwavelength FLIM: new concept for fluorescence diagnosis *(Invited Paper)*, Angelika C. Rueck, Univ. Ulm (Germany). . . . . [8226-10]

Clinical multiphoton FLIM tomography *(Invited Paper)*, Karsten König, JenLab GmbH (Germany) . . . . . [8226-11]

Monitoring transient elastic energy storage within the rotary motors of single FoF1-ATP synthase by DCO-ALEX FRET, Stefan Ernst, Jena Univ. Hospital (Germany) and Univ. Stuttgart (Germany); Monika G. Düser, Nawid Zarrabi, Univ. Stuttgart (Germany); Michael Börsch, Jena Univ. Hospital (Germany) and Univ. Stuttgart (Germany) . . . . . [8226-12]

Three-color FRET expands the ability to quantify the interactions of several proteins involved in actin nucleation, Horst K. Wallrabe, Yuansheng Sun, Ammasi Periasamy, Xiaolan Fang, George S. Bloom, Univ. of Virginia (USA) . . . . . [8226-13]

New detection and analysis FLIM and FCS techniques for confocal laser scanning microscopes, Samantha Fore, PicoQuant Photonics North America, Inc. (USA); Benedikt Krämer, Felix Koberling, Marcelle König, Volker Buschmann, Michael Wahl, Uwe Ortmann, Sandra Orthaus, Rainer Erdmann, PicoQuant GmbH (Germany). . . . . [8226-14]

In vivo, high resolution measurement of cerebral oxygen tension and NADH using phosphorescence- and fluorescence- lifetime imaging, Mohammad A. Yaseen, Sava Sakad?ić, Jonghwan Lee, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA); Sergei Vinogradov, Univ. of Pennsylvania (USA); Wolfgang Becker, Becker & Hickl GmbH (Germany); David A. Boas, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA) . . . . . [8226-15]

SESSION 3 . . . . . Sun. 3:30 to 5:30 pm

FRET, FLIM, FCS III

Session Chair: **Karsten König,** JenLab GmbH (Germany)

An automated approach for the analysis of multispectral multiphoton FLIM data and its application to the diagnosis of skin cancer, Yuriy Alexandrov, Rakesh Patalay, Clifford Talbot, Sean Warren, Ian Munro, Imperial College London (United Kingdom); Hans G. Breunig, Karsten König, JenLab GmbH (Germany); Mark A. A. Neil, Paul M. W. French, Imperial College London (United Kingdom); Anthony Chu, Imperial College Healthcare NHS Trust (United Kingdom); Gordon W. Stamp, The Royal Marsden Hospital NHS Trust (United Kingdom); Christopher W. Dunsby, Imperial College London (United Kingdom) . . . . . [8226-16]

Multiphoton fluorescence lifetime imaging of cleared mouse organs, Sam Vesuna, Richard Torres, Michael J. Levene, Yale Univ. (USA) . . . . . [8226-17]

Ion-beam sputtered (IBS) thin-film interference filters for nonlinear optical imaging, Neil Anderson, Prashant Prabhat, Turan Erdogan, Semrock Inc. (USA) . . . . . [8226-18]

Recent development in ultrafast lasers for multimodal nonlinear imaging, Marco F. Arrigoni, David Armstrong, Coherent, Inc. (USA). . . . . [8226-19]

Latest advances in ultrafast laser sources for multiphoton microscopy, Phil G. Smith, Spectra-Physics®, a Newport Corp. Brand (USA). . . . . [8226-20]

POSTERS - SUNDAY . . . . . Sun. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Conference 8226

Sensitive fluorescence detection using a camera from the gaming industry, Brian L. Van Hoozen, Jr., Jeroen P. Korterik, Univ. Twente (Netherlands); Karla de Bruin, Netherlands Forensic Institute (Netherlands); Wouter Nagengast, Univ. Medical Ctr. Groningen (Netherlands); Jennifer L. Herek, Herman L. Offerhaus, Univ. Twente (Netherlands) . . . . . [8226-111]

Three-photon fluorescence imaging of melanin with a CW laser and a dual-wedge scanning system, Yair J. Mega, Charles A. DiMarzio, Northeastern Univ. (USA) . . . . . [8226-112]

Two-photon imaging of advanced environment sensitive probes for lipid membrane applications, Yves Mely, Univ. Louis Pasteur (France); Zeinab Darwich, Olexandr Kucherak, Univ. de Strasbourg (France); Pascal Didier, Andrey Klymchenko, Univ. Louis Pasteur (France) . . . . . [8226-113]

Improvement of the spatial resolution in two-photon excitation fluorescence microscopy by saturated excitation (SAX), Masahito Yamanaka, Yasuo Yonemaru, Nicholas I. Smith, Satoshi Kawata, Katsumasa Fujita, Osaka Univ. (Japan) . . . . . [8226-114]

Totally integrated linear and nonlinear optics multimodal microscopy platform to understand single cell processes, Vitor B. Pelegati, André A. de Thomaz, Diogo B. Almeida, Javier Adur, Mariana O. Baratti, Hernandes F. Carvalho, Carlos Lenz Cesar, Univ. Estadual de Campinas (Brazil) . . . [8226-115]

Automated control of optical polarization for nonlinear microscopy, Craig Brideau, Ileana Micu, Peter Stys M.D., Univ. of Calgary (Canada) . . . . [8226-116]

Oxygen-glucose deprivation (OGD) induced changes in the microtubules structure of cultured rat cortical neurons' axons studied using polarization SHG imaging, Sotiris Psilodimitrakopoulos, ICFO - Institut de Ciències Fotòniques (Spain); Valerie Petegnief, Nuria de Vera, IBIB, Consejo Superior de Investigaciones Científicas (Spain); Oscar Hernandez, ICFO - Institut de Ciències Fotòniques (Spain); David Artigas, ICFO - Institut de Ciències Fotòniques (Spain) and Univ. Politecnica de Catalunya (Spain); Anna M. Planas, IBIB, Consejo Superior de Investigaciones Científicas (Spain); Pablo Loza-Alvarez, ICFO - Institut de Ciències Fotòniques (Spain) . . . . . [8226-117]

Probing live samples in secondhHarmonic generation microscopy using specific markers and fluorescent proteins, Evelien De Meulenaere, Katholieke Univ. Leuven (Belgium); Sotiris Psilodimitrakopoulos, Pablo Loza-Alvarez, ICFO - Institut de Ciències Fotòniques (Spain); Koen Clays, Jozef Vanderleyden, Katholieke Univ. Leuven (Belgium) . . . . . [8226-118]

The structural origin of second-harmonic generation in fascia, Maxime Rivard, Mathieu Laliberté, Antony Bertrand-Grenier, Catalin Harnagea, Institut National de la Recherche Scientifique (Canada); Christian P. Pfeffer, Harvard Medical School (USA); Martin Vallières, Yves St-Pierre, Alain Pignolet, My Ali El Khakani, François Légaré, Institut National de la Recherche Scientifique (Canada) . . . . . [8226-119]

Application of second-harmonic generation microscopy for in vivo observation of structural change in human dermal collagen fiber caused by aging and/or UV exposure, Takeshi Yasui, Univ. of Tokushima (Japan); Makoto Yonetsu, Ryosuke Tanaka, Shu-ichiro Fukushima, Osaka Univ. (Japan); Toyonobu Yamashita, Yuki Ogura, Tetsuji Hirao, Shiseido Co., Ltd. (Japan); Tsutomu Araki, Osaka Univ. (Japan) . . . . . [8226-120]

Second harmonic generation microscopy differentiates collagen Type I and Type III in diseased lung tissues, Thomas Abraham, Masaru Suzuki M.D., W. Mark Elliott, The Univ. of British Columbia (Canada); James C. Hogg M.D., St. Paul's Hospital (Canada) . . . . . [8226-121]

Second-harmonic generation microscopy used to evaluate the effect of the Dimethyl sulfoxide in the cryopreservation process of collagen fibers to differentiated chondrocytes, Marilisa F. Andreoli-Risso, Adriana S. S. Duarte, Thiago B. Ribeiro, Pedro Bordeaux-Rego, Angela Luzo, Mariana O. Baratti, Javier Adur M.D., André A. de Thomaz, Vitor B. Pelegati, Hernandes F. Carvalho, Carlos Lenz Cesar, Fernado F. Costa, Sara T. Olalla-Saad, Univ. Estadual de Campinas (Brazil). . . . . [8226-122]

Three-dimensional analysis of muscle fiber orientation in a single-shot through polarization-resolved second-harmonic generation holography, David Smith, Philip Schlup, Randy Bartels, Colorado State Univ. (USA) . . . . . [8226-123]

Hilbert-transform phase shifting second-harmonic generation holographic imaging, David Smith, Philip Schlup, Randy Bartels, Colorado State Univ. (USA) . . . . . [8226-124]

Nonlinear optics for the study of human scar tissue, Daniela Peixoto Ferro, Gislaine Vieira-Damiani, Randall L. Adam, André A. de Thomaz, Vitor B. Pelegati, Carlos L. César, Konradin Metze, Univ. Estadual de Campinas (Brazil) . . . . . [8226-125]

Multiphoton imaging with 10 fs pulses: comparing signal strength and photo damage, Lisa Krapf, Regina Orzekowsky-Schröder, Norbert Koop, Heyke Diddens-Tschoeke, Gereon Hüttmann, Univ. zu Lübeck (Germany) . . . . . [8226-126]

Breast pathology assessment using two-photon microscopy, Yuankai K. Tao, Osman O. Ahsen, Massachusetts Institute of Technology (USA); Peter Fendel, Idesta Quantum Electronics (USA); Alex E. Cable, Thorlabs Inc. (USA); Dejun Shen, James L. Connolly, Beth Israel Deaconess Medical Ctr. (USA); James G. Fujimoto, Massachusetts Institute of Technology (USA) . . . [8226-127]

SHG microscopy of articular cartilage to image osteoarthritis, Marie-Andrée Houle, Institut National de la Recherche Scientifique (Canada); Cameron P. Brown, Univ. of Oxford (United Kingdom); Mischa Nicklaus, Institut National de la Recherche Scientifique (Canada); Andrew Price, Univ. of Oxford (United Kingdom); Andreas Ruediger, Institut National de la Recherche Scientifique (Canada); Harinderjit Gill, Univ. of Oxford (United Kingdom); François Légaré, Institut National de la Recherche Scientifique (Canada) . . . . . [8226-128]

Second-harmonic generation microscopy used to evaluate chondrogenic differentiation of mesenchymal stem cells for cartilage repair, Pedro Bordeaux-Rego, Marilisa F. Andreoli-Risso, Adriana S. Duarte, Thiago B. Ribeiro, Mariana O. Baratti, Benedicto d. C. Vidal, J. B. Miranda, Javier F. Adur, André A. de Thomaz, Vitor B. Pelegati, Fernado F. Costa, Hernandes F. Carvalho, Carlos L. Cesar, Angela Luzo, P. Kharmadayan, Sara T. Olalla-Saad, Univ. Estadual de Campinas (Brazil) . . . . . [8226-129]

In vivo multiphoton microscopy associated to 3D image processing for human skin characterization, Thérèse Baldeweck, L'Oréal Recherche et Innovation (France); Emmanuelle Tancrède, L'Oréal Recherche et Innovation (France) and Service de dermatologie Hôpital St. Louis (France); Petr Dokladal, Serge Koudoro, Vincent Morard, Fernand Meyer, Etienne Decencière, École Nationale Supérieure des Mines de Paris (France); Ana-Maria Pena, L'Oréal Recherche et Innovation (France) . . . . . [8226-130]

Quantitative second-harmonic generation imaging to detect osteogenesis imperfecta in human skin samples, Javier F. Adur, Univ. Estadual de Campinas (Brazil) and National Univ. of Entre Rios (Argentina); Ana Ferreira, Lilia D'Souza-Li, Vitor Pelegati, Andre de Thomaz, Diogo Almeida, Mariana Baratti, Hernandes Carvalho, Carlos Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [8226-131]

Applications of second-harmonic (SHG) and third-harmonic generation(THG) in diagnostic cytology and histology, Daniela Peixoto Ferro, Gislaine Vieira-Damiani, Javier F. Adur, Randall L. Adam, Irene Lorand-Metze, Victor Pelegati, André A. de Thomaz, Carlos Lenz Cesar, Konradin Metze, Univ. Estadual de Campinas (Brazil). . . . . [8226-132]

A study on the spectral dependence of SHG generation from collagen tissues, Mengzhe Shen, The Univ. of British Columbia (Canada); Hequn Wang, Anthony Lee, Jianhua Zhao, Haishan Zeng, The BC Cancer Agency Research Ctr. (Canada); Shuo Tang, The Univ. of British Columbia (Canada) . . . [8226-133]

Two-photon imaging and spectroscopy of fresh human colon biopsies, Riccardo Cicchi, Alessandro Sturiale, Gabriella Nesi, Francesco Tonelli, Francesco S. Pavone, Univ. degli Studi di Firenze (Italy) . . . . . [8226-134]

Investigating protein-protein interactions in living cells with FRET, FLIM, FCCS and ICCS, Yuansheng Sun, Ammasi Periasamy, Univ. of Virginia (USA) . . . . . [8226-135]

Spectral FLIM detection and new analysis schemes for confocal laser scanning microscopes, Felix Koberling, Benedikt Krämer, Marcelle Koenig, Volker Buschmann, Michael Wahl, Hans-Jürgen Rahn, Uwe Ortmann, Rainer Erdmann, PicoQuant GmbH (Germany); Samantha Fore, PicoQuant Photonics North America Inc. (USA); Gregor Weiß, PicoQuant GmbH (Germany); Ingo Gregor, Jörg Enderlein, Georg-August-Univ. Göttingen (Germany) . . . [8226-136]

Fluorescence lifetime imaging microscopy with acousto-optic deflectors, Kaige Wang, Jing Qi, Yonghong Shao, Junle Qu, Hanben Niu, Shenzhen Univ. (China) . . . . . [8226-137]

A simple laser Ti:Sapphire system upgrade for multimodal nonlinear optical microscopy, Mathieu Laliberté, Antony Bertrand-Grenier, Institut National de la Recherche Scientifique (Canada); Youngjae Kim, Bryan Burgoyne, Alain Villeneuve, Genia Photonics Inc. (Canada); François Légaré, Institut National de la Recherche Scientifique (Canada) . . . . . [8226-138]

Integrated multimodality microscope for functional imaging of engineered and natural tissues, Youbo Zhao, Benedikt W. Graf, Ross Devolder, Hyunjoon Kong, Ziad Mahmassani, Marni Boppart, Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign (USA). . . . . [8226-139]

High-resolution wide-field stimulated Raman scattering microscopy, Yang-Hyo Kim, Massachusetts Institute of Technology (USA); Shyamsunder Erramilli, Boston Univ. (USA); Peter T. C. So, Massachusetts Institute of Technology (USA) . . . . . [8226-140]

Building an "affordable" coherent Raman scattering (CRS) microscope, Christian W. Freudiger, Harvard Univ. (USA); Khanh Kieu, College of Optical Sciences, The Univ. of Arizona (USA); Gary R. Holtom, Harvard Univ. (USA); Nasser Peyghambarian, College of Optical Sciences, The Univ. of Arizona (USA); Sunney Xie, Harvard Univ. (USA) . . . . . [8226-141]

Multicolor stimulated Raman scattering (SRS) microscopy, Fa-Ke Frank Lu, Dan Fu, Minbiao Ji, Christian W. Freudiger, Xu Zhang, Xiaohui Ni, Gary R. Holtom, X. Sunney Xie, Harvard Univ. (USA). . . . . [8226-142]

Evaluation of atherosclerotic plaque development by texture analysis of multimodal CARS images of rabbit arteries, Alex C. Ko, National Research Council Canada (Canada) . . . . . [8226-143]

Application of hyperspectral coherent anti-Stokes Raman scattering microscopy to pharmaceutics, Andrew L. Fussell, Erik T. Garbacik, Univ. Twente (Netherlands); Sinan Gueres, Heinrich-Heine-Univ. Düsseldorf (Germany); Clare Strachan, Univ. of Otago (New Zealand); Peter Kleinebudde, Heinrich-Heine-Univ. Düsseldorf (Germany); Herman L. Offerhaus, Univ. Twente (Netherlands) . . . . . [8226-144]

The use of two-photon microscopy to study the biological effects of focused ultrasound on the brain, Alison Burgess, Eunice E. Cho, Leila Shaffaf, Tam Nhan, Charissa Poon, Kullervo H. Hynynen, Sunnybrook Health Sciences Ctr. (Canada) . . . . . [8226-145]

Monday 23 January

SESSION 4 . . . . . Mon. 8:00 to 9:40 am

Technology Development & Applications I

Session Chair: **Peter T. C. So,** Massachusetts Institute of Technology (USA)

Multiphoton tomography in animal research *(Invited Paper)*, Karsten König, JenLab GmbH (Germany) and Saarland Univ. (Germany). . . . . [8226-24]

Looking stem cells at work with a flexible multiphoton tomograph *(Invited Paper)*, Aisada Uchugonova, Univ. des Saarlandes (Germany); Robert M. Hoffman, Anticancer Inc. (USA); Martin Weinigel, Karsten König, JenLab GmbH (Germany) . . . . . [8226-25]

Spectral phasor analysis allows rapid and easy unmixing of fluorescence microscopy spectral images, Farzad Fereidouni, Arjen Bader, Hans C. Gerritsen, Utrecht Univ. (Netherlands) . . . . . [8226-26]

Photon reassignment for structured light imaging based microscopy, Vijay Raj Singh, Singapore-MIT Alliance (Singapore); Jagath Rajapakse, Nanyang Technological Univ. (Singapore); Peter T. C. So, Massachusetts Institute of Technology (USA) . . . . . [8226-27]

Single-shot 3D multi-photon microscopy, Elijah Y. S. Yew, Singapore-MIT Alliance (Singapore); Peter T. C. So, Massachusetts Institute of Technology (USA) . . . . . [8226-28]

Multimodal polarimetric nonlinear microscopy in tissues, Sophie Brasselet, Hervé Rigneault, Julien Duboisset, Patrick Ferrand, Dora Ait-Belkacem, Sophie Brustlein, Fatma-Zhora Bioud, Fabiana Munhoz, Institut Fresnel (France) . . . . . [8226-29]

Mon. 9:40 to 10:10 am

JenLab Young Investigator Award

SESSION 5 . . . . . Mon. 10:40 am to 12:10 pm

Technology Development & Applications II

Session Chair: **Richard N. Day,** Indiana Univ. (USA)

Ray-tracing study on the post-scanner variable beam expansion optics of a two-photon microscopy system, Do-Hyun Kim, Cristin Welle, Victor Krauthamer, U.S. Food and Drug Administration (USA) . . . . . [8226-30]

Scanning fiber optic two-photon excitation endomicroscopy with reduced photo damage and precision focal position localization, Wenxuan Liang, Yuying Zhang, Kartikeya Murari, Yongping Chen, The Johns Hopkins Univ. (USA); Ming-Jun Li, Corning Incorporated (USA); Xingde Li, The Johns Hopkins Univ. (USA) . . . . . [8226-31]

Two-photon imaging based on both tryptophan autofluorescence and exogenous fluorescence, HyoSeok Nam, Kwang Hoon Song, Bosu Jeong, Taejun Wang, Min Sung Jang, Junsang Doh, Bo Gi Yang, Ki Hean Kim, Pohang Univ. of Science and Technology (Korea, Republic of). . . . . [8226-32]

Targeted nanosensor aided three-dimensional pH mapping in tumor spheroids using two-photon microscopy, Aniruddha Ray, Yong-Eun L. Koo, Remy Elbez, Raoul Kopelman, Univ. of Michigan (USA). . . . . [8226-33]

Implementation and characterization of an axicon-based nonlinear digital line-scanning microscope, Omar E. Olarte, ICFO - Institut de Ciències Fotòniques (Spain); Jacob Licea-Rodriguez, Ctr. de Investigación Científica y de Educación Superior de Ensenada (Mexico); Jonathan A. Palero, Emilio J. Gualda, ICFO - Institut de Ciències Fotòniques (Spain); David Artigas, ICFO - Institut de Ciències Fotòniques (Spain) and Univ. Politecnica de Catalunya (Spain); Pablo Loza-Alvarez, ICFO - Institut de Ciències Fotòniques (Spain) . . . . . [8226-34]

Chronic, simultaneous multiphoton imaging of cortical layers I to V with microprism implants, Nathan B. Gilfoy, Robert N. S. Sachdev, David A. McCormick, Michael J. Levene, Yale Univ. (USA). . . . . [8226-35]

Lunch Break . . . . . 12:10 to 1:15 pm

SESSION 6 . . . . . Mon. 1:15 to 3:05 pm

Harmonic Generation Microscopy I

Session Chair: **Chen-Yuan Dong,** National Taiwan Univ. (Taiwan)

Polarization resolved SHG as a robust means to quantify changes in collagen in fibrotic diseases *(Invited Paper)*, Paul J. Campagnola, Visar Ajeti, Karissa B. Tilbury, Kirby Campbell, Sameer Mathur, Nizar Jarjour, Suzanne M. Ponik, Patricia J. Keely, Kevin W. Eliceiri, Univ. of Wisconsin-Madison (USA) . . . . . [8226-36]

Analysis of collagen structure changes in ovarian tumor development, Jennifer M. Watson, Photini F. Rice, Samuel L. Marion, The Univ. of Arizona (USA); Molly Brewer, Neag Cancer Ctr. (USA); John Davis, Urs Utzinger, Patricia B. Hoyer, Jennifer Barton, The Univ. of Arizona (USA) . . . . . [8226-37]

In vivo characterization of organizational and orientation changes in precancerous submucosal collagen via polarization SHG, Kert Edward, Tuya Shilagard, Jinping Yang, Suimin Qiu, Gracie Vargas, The Univ. of Texas Medical Branch (USA). . . . . [8226-38]

Polarization-resolved SHG microscopy of collagenous tissues with controlled mechanical strain, Ivan Gusachenko, Yannick Goulam Houssen, Gaël Latour, Stéphane Bancelin, Viet Tran, Jean-Marc Allain, Marie-Claire Schanne-Klein, Ecole Polytechnique (France) . . . . . [8226-39]

Combined nonlinear laser imaging (two-photon excitation fluorescence, second and third-harmonic generation, and fluorescence lifetime imaging microscopies) in ovarian tumors, Javier F. Adur, Univ. Estadual de Campinas (Brazil) and National Univ. of Entre Rios (Argentina); Vitor Pelegati, Andre de Thomaz, Fatima Bottcher-Luiz, Liliana Andrade, Diogo Almeida, Hernandes F. Carvalho, Carlos Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [8226-40]

Third-harmonic (THG) and four-wave mixing microscopy (FWM) of cells and biological tissues, Pierre Mahou, Ecole Polytechnique (France); Nicolas Olivier, Ecole Polytechnique Fédérale de Lausanne (France); Guillaume Labroille, Maxwell Zimmerley, Delphine Débarre, Emmanuel Beaurepaire, Ecole Polytechnique (France) . . . . . [8226-41]

Second-harmonic generation endomicroscopy imaging system for preterm birth imaging, Yuying Zhang, Kartikeya Murari, Wenxuan Liang, The Johns Hopkins Univ. (USA); Meredith L. Akins, Katherine Luby-Phelps, Mala Mahendroo, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA); Ming-Jun Li, Corning Incorporated (USA); Xingde Li, The Johns Hopkins Univ. (USA) . . . . . [8226-42]

AWARD PRESENTATIONS . . . . . Mon. 3:05 pm

Session Chair: **Ammasi Periasamy,** Univ. of Virginia (USA)

JenLab Young Investigator Award
Best Student Poster Awards

SESSION 7 . . . . . Mon. 3:35 to 5:35 pm

Harmonic Generation Microscopy II

Session Chair: **Paul J. Campagnola,** Univ. of Wisconsin-Madison (USA)

Studies of human skin glycation by the use of multiphoton microscopy and spectroscopy, Ara Ghazaryan, Hans Hu, National Taiwan Univ. (Taiwan); Shean-Jen Chen, National Cheng Kung Univ. (Taiwan); Hsin-Yuan Tan, Chang Gung Memorial Hospital (Taiwan) and Department of Biomedical Engineering, National Taiwan University (Taiwan); Chen-Yuan Dong, National Taiwan Univ. (Taiwan) and Center for Quantum Science and Engineering, National Taiwan University, Taipei (Taiwan) and Biomedical Molecular Imaging Core, Div. of Genomic Medicine, Research Center for Med. Exc., NTU (Taiwan) . . . . [8226-43]

High-speed vibrational sum frequency generation microscopy, Varun Raghunathan, Univ. of California Irvine (USA); Yang Han, Nien-Hui Ge, Eric Potma, Univ. of California, Irvine (USA). . . . . [8226-44]

Generic model for the biomolecular organization probed by second-harmonic generation polarization microscopy, Julien Duboisset, Philippe Refregier, Hervé Rigneault, Muriel Roche, Patrick Ferrand, Dora Ait-Belkacem, Sophie Brasselet, Institut Fresnel (France) . . . . . [8226-45]

In vivo multiphoton imaging of the cornea: polarization-resolved second-harmonic generation from corneal collagen, Gaël Latour, Ivan Gusachenko, Ecole Polytechnique (France); Laura Kowalczuk, Ecole Nationale Supérieure de Techniques Avancées (France); Isabelle Lamarre, Marie-Claire Schanne-Klein, Ecole Polytechnique (France) . . . . . [8226-46]

Investigation of the wavelength dependence of SHG from various tissues, Stephen J. Matcher, Hannah Askew, The Univ. of Sheffield (United Kingdom) . . . . . [8226-47]

Adaptive multiphoton and harmonic generation microscopy for whole tissue imaging, Marie Caroline Muellenbroich, Univ. of Strathclyde (United Kingdom); Ewan J. McGhee, Kurt I. Anderson, Beatson Institute for Cancer Research (United Kingdom); Amanda J. Wright, Univ. of Strathclyde (United Kingdom) . . . . . [8226-48]

The use of a sub-25 fs Yb fiber laser for multiphoton SHG and THG imaging, Marcos M. Dantus, Ilyas Saytashev, Bai Nie, Sergey N. Arkhipov, Michigan State Univ. (USA); Andy Chong, Hui Liu, Frank W. Wise, Cornell Univ. (USA) . . . . . [8226-49]

Video-rate, label-free second-harmonic generation holographic imaging of biological specimens, David Smith, David Winters, Randy Bartels, Colorado State Univ. (USA). . . . . [8226-50]

Structure of collagen fibers revealed with polarization dependent second-harmonic generation microscopy, Virginijus Barzda, Adam E. Tuer, Sergey I. Kruglov, Nicole Prent, Richard Cisek, Daaf Sandkuijl, Univ. of Toronto Mississauga (Canada) . . . . . [8226-51]

Tuesday 24 January

SESSION 8 . . . . . Tues. 8:00 to 10:05 am

Hyperspectral Imaging with CRS

Session Chair: **X. Sunney Xie,** Harvard Univ. (USA)

Lock-in free stimulated Raman microscopy *(Invited Paper)*, Ji-Xin Cheng, Mikhail N. Slipchenko, Purdue Univ. (USA). . . . . [8226-52]

High-speed spectral tuning CARS microscopy using AOTF laser, Mamoru Hashimoto, Junichi Iwatsuka, Hirohiko Niioka, Tsutomu Araki, Osaka Univ. (Japan). . . . . [8226-53]

Ultra-broadband time-resolved coherent anti-Stokes Raman scattering microspectroscopy, Jun Yin, Shenzhen Univ. (China) . . . . . [8226-54]

Broadband CARS microscopy: phenotypic and functional imaging for biology, Marcus T. Cicerone, Young Jong Lee, Khaled H. Aamer, National Institute of Standards and Technology (USA) . . . . . [8226-55]

High-resolution, high-speed tunable grating filter for stimulated Raman spectral imaging, Wataru Umemura, Yasuyuki Ozeki, Kenta Fujita, Kazuhiko Sumimura, Osaka Univ. (Japan); Norihiko Nishizawa, Nagoya Univ. (Japan); Kazuyoshi Itoh, Osaka Univ. (Japan). . . . . [8226-56]

A spectrally modulated stimulated Raman scattering microscope, Delong Zhang, Mikhail N. Slipchenko, Daniel E. Leaird, Rui Wu, Andrew M. Weiner, Ji-Xin Cheng, Purdue Univ. (USA) . . . . . [8226-57]

From coherent Raman microscopy to quantitative coherent Raman spectral imaging *(Invited Paper)*, Dan Fu, Fa-Ke F. Lu, Xu Zhang, Gary R. Holtom, Christian W. Freudiger, Minbiao Ji, Xiaohui Ni, Xiaoliang S. Xie, Harvard Univ. (USA) . . . . . [8226-58]

SESSION 9 . . . . . Tues. 10:25 am to 12:20 pm

Applications of CRS Microscopy

Session Chair: **Jixin B. Chen,**
China Academy of Engineering Physics (China)

CARS for catalysis *(Invited Paper)*, Mischa Bonn, FOM Institute for Atomic and Molecular Physics (Netherlands) . . . . . [8226-59]

CARS spectro-microscopy of cell patterns in Drosophila melanogaster wing imaginal disc, Gianluca Rago, FOM Institute for Atomic and Molecular Physics (Netherlands); Florian Marty, Univ. of Zürich (Switzerland); Gert Eijkel, James P. R. Day, Ron M. A. Heeren, FOM Institute for Atomic and Molecular Physics (Netherlands); Konrad Basler, Erich Brunner, Univ. of Zürich (Switzerland); Mischa Bonn, FOM Institute for Atomic and Molecular Physics (Netherlands) . . . . . [8226-60]

Coherent Raman scattering microscopy for label-free imaging of live amphioxus, Tao Chen, Zhilong Yu, Xiannian Zhang, Jie Shen, Peking Univ. (China); Junyuan Chen, Nanjing Univ. (China); Yanyi Huang, Peking Univ. (China) . . . . . [8226-61]

Neuronal cell growth on polymeric scaffolds studied by CARS microscopy, Annika M. Enejder, Helen Fink, Malin Jonsson, Christian Brackmann, Paul Gatenholm, Andrew Ewing, Chalmers Univ. of Technology (Sweden); Hans-Georg Kuhn, Univ. of Gothenburg (Sweden). . . . . [8226-62]

Study of signal relay and chemotaxis of neutrophils using broadband CARS microscopy, Young Lee, National Institute of Standards and Technology (USA); Philippe Afonso, Carole A. Parent, National Institutes of Health (USA); Khaled Aamer, Marcus T. Cicerone, National Institute of Standards and Technology (USA) . . . . . [8226-63]

Live animal nervous system imaging with video-rate multimodal coherent anti-Stokes Raman scattering microendoscopy, Erik Bélanger, Joël Crépeau, Sophie Laffray, Réal Vallée, Daniel Côté, Univ. Laval (Canada) . . . . . [8226-64]

Surface-mediated four-wave mixing microscopy *(Invited Paper)*, Eric O. Potma, Yong Wang, Xuejun Liu, Univ. of California, Irvine (USA) [8226-65]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 10 . . . . . Tues. 1:20 to 2:40 pm

CRS for Medical Diagnostics

Session Chair: **Annika M. Enejder,**
Chalmers Univ. of Technology (Sweden)

Early demyelinating lesions of the nervous system: a multimodal approach with CARS imaging *(Invited Paper)*, Daniel Cote, Ctr. de Recherche de l'Univ. Laval Robert-Giffard (Canada) . . . . . [8226-66]

Chemically selective spectral imaging of bone mineral density and the collagen manifold in bulk bone using CARS and SHG, Aaron D. Slepkov, National Research Council of Canada (Canada) and Trent Univ. (Canada); Adrian F. Pegoraro, Andrew Ridsdale, Douglas J. Moffatt, Albert Stolow, National Research Council of Canada (Canada) . . . . . [8226-67]

Clinical multiphoton CARS, Hans-Georg Breunig, Karsten König, Martin Weinigel, JenLab GmbH (Germany) . . . . . [8226-68]

In vivo monitoring specialized hepatocyte-like cells in Drosophila by coherent anti-Stokes Raman scattering (CARS) and two-photon excitation fluorescence (TPE-F) microscopy, Cheng-Hao Chien, Wei-Wen Chen, Academia Sinica (Taiwan); June-Tai Wu, National Taiwan Univ. (Taiwan); Ta-Chau Chang, Academia Sinica (Taiwan) . . . . . [8226-69]

An integrated coherent anti-Stokes Raman scattering and multiphoton imaging technique for liver disease diagnosis, Jian Lin, Fake Lu, Wei Zheng, National Univ. of Singapore (Singapore); Hanry Yu, National Univ. of Singapore (Taiwan); Colin Sheppard, Zhiwei Huang, National Univ. of Singapore (Singapore) . . . . . [8226-70]

SESSION 11 . . . . . Tues. 2:40 to 4:10 pm

Fiber Laser Technology for CRS

Session Chair: **Eric Olaf Potma,** Univ. of California, Irvine (USA)

All-fiber tunable picosecond laser source for coherent Raman scattering microscopy *(Invited Paper)*, Khanh Q. Kieu, College of Optical Sciences, The Univ. of Arizona (USA); Christian Freudiger, Gary Holtom, Harvard Univ. (USA); Nasser Peyghambarian, College of Optical Sciences, The Univ. of Arizona (USA); Sunney Xie, Harvard Univ. (USA) . . . . . [8226-71]

Active and passive photonic crystal fibers for compact coherent Raman scattering (CRS) microscope and endoscopes, Hervé Rigneault, Sophie Brustlein, Institut Fresnel (France); Alistair Muir, Univ. of Bath (United Kingdom); Pascal Berto, Esben Andresen, Patrick Ferrand, Institut Fresnel (France); Cyrille Billaudeau, Didier Marguet, CIML, Univ. de la Méditerranée (France); Jonathan Knight, Univ. of Bath (United Kingdom) . . . . . [8226-72]

Fiber delivered two-color picosecond source for coherent Raman scattering imaging *(Invited Paper)*, Ke Wang, Chris Xu, Cornell Univ. (USA) . . . . . [8226-73]

A novel multimodal CARS miniaturized microscope, Brett D. W. Smith, Majid Naji, Sangeeta Murugkar, Univ. of Ottawa (Canada); Craig Brideau, Peter Stys, Univ. of Calgary (Canada); Hanan Anis, Univ. of Ottawa (Canada) . . . . . [8226-74]

SESSION 12 . . . . . Tues. 4:10 to 5:55 pm

Advanced CRS Microscopy Instrumentation

Session Chair: **Christian W. Freudiger,** Harvard Univ. (USA)

SLM-aided wide-field CARS microscopy, Alexander Jesacher, Clemens Roider, Saranjam Khan, Stefan Bernet, Monika A. Ritsch-Marte, Innsbruck Medical Univ. (Austria). . . . . [8226-75]

Computational optimization of phase shaped CARS, Alexander C. W. van Rhijn, Aliakbar S. Jafarpour, Martin Jurna, Jennifer L. Herek, Herman L. Offerhaus, Univ. Twente (Netherlands) . . . . . [8226-76]

Stimulated Raman scattering based multimodal nonlinear optical microscopy, Dong Li, Hong Kong Univ. of Science and Technology (Hong Kong, China) . . . . . [8226-77]

In-vivo SRS microscopy in biomedical applications by using longer wavelength excitation, Minbiao Ji, Harvard Univ. (USA); Terumasa Ito, Sony Corp. (Japan); Gary Holtom, Harvard Univ. (USA); Manoj Misra, Unilever HPC USA (USA); Sunney Xie, Harvard Univ. (USA). . . . . [8226-78]

Parallel CARS and OCT imaging, Angelika Unterhuber, Boris Považay, Medizinische Univ. Wien (Austria); Tuan Le, FEMTOLASERS Produktions GmbH (Austria); Tschackad Kamali, Bernd Hofer, Medizinische Univ. Wien (Austria); Gabriel Tempea, FEMTOLASERS Produktions GmbH (Austria); Wolfgang Drexler, Medizinische Univ. Wien (Austria) . . . . . [8226-79]

Simple and robust interferometric non-resonant background removal for broadband coherent anti-Stokes Raman scattering, Bradley Littleton, David R. Richards, King's College London (United Kingdom) . . . . . [8226-80]

Phase contrast in wide-field coherent anti-Stokes Raman scattering (CARS) microscopy, Pascal Berto, David Gachet, Serge Monneret, Hervé Rigneault, Institut Fresnel (France) . . . . . [8226-81]

Courses of Related Interest

SC1051	Fundamentals of Microscope Design (Seward) Wednesday, 8:30 am to 12:30 pm
SC978	Light Microscopy (Tkaczyk) Sunday, 1:30 to 5:30 pm
SC1013	Choosing the Correct Optical Filter for Your Application (Reichel) Tuesday, 1:30 to 5:30 pm
SC1053	Ultrafast Laser Pulse Shaping and Adaptive Pulse Compression (Dantus) Tuesday, 1:30 to 5:30 pm
SC1054	Bio-Interferometry (Nolte) Sunday, 8:30 am to 12:30 pm
SC868	Optical Design for Biomedical Imaging (Liang) Tuesday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8227

Tuesday-Thursday 24-26 January 2012 • Proceedings of SPIE Vol. 8227

Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XIX

Conference Chairs: **Jose-Angel Conchello,** Harvard Univ. (USA); **Carol J. Cogswell,** Univ. of Colorado at Boulder (USA); **Tony Wilson,** Univ. of Oxford (United Kingdom); **Thomas G. Brown,** Univ. of Rochester Medical Ctr. (USA)

Program Committee: **G. J. Brakenhoff,** Univ. van Amsterdam (Netherlands); **Charles A. DiMarzio,** Northeastern Univ. (USA); **Raimund J. Ober,** The Univ. of Texas at Dallas (USA); **Chrysanthe Preza,** The Univ. of Memphis (USA); **Monika A. Ritsch-Marte,** Innsbruck Medical Univ. (Austria)

Tuesday 24 January

SESSION 1 . . . . . Tues. 8:00 to 10:00 am

Wavefront Shaping

Session Chair: **Charles A. DiMarzio,** Northeastern Univ. (USA)

Measuring aberrations in the rat brain by a new coherence-gated wavefront sensor using a Linnik interferometer, Jinyu Wang, Ecole Supérieure de Physique et de Chimie Industrielles (France) and Institut Langevin, ESPCI ParisTech, CNRS UMR 7587, ESPCI, 10 rue Vauquelin, 75005 Paris, France (France); Jean-Francois Leger, Ecole Normale Supérieure (France); Jonas Binding, Ecole Supérieure de Physique et de Chimie Industrielles (France) and Institut Langevin, ESPCI ParisTech, CNRS UMR 7587, ESPCI, 10 rue Vauquelin, 75005 Paris, France (France); Claude Boccara, Sylvain Gigan, Ecole Supérieure de Physique et de Chimie Industrielles (France); Laurent Bourdieu, Ecole Normale Supérieure (France). . . . . [8227-01]

Point-spread function engineering to reduce the impact of depth-induced aberrations on high-NA 3D extended depth-offField microscopy, Shuai Yuan, Chrysanthe Preza, The Univ. of Memphis (USA) . . . . . [8227-02]

Imaging sharper and deeper in a spinning disk microscope by using adaptive optics, Jordi Andilla, Imagine Optic SA (France); Vincent Fraisier, Tristan Piolot, Institut Curie (France); Jerome Ballesta, Imagine Optic Inc. (USA); Xavier Levecq, Imagine Optic SA (France); Jean Salamero, Institut Curie (France) . . . . . [8227-03]

Real-time 3D microscopy made possible through PSF engineering designs that simultaneously record depth locations while extending the depth of focus of live cell features, Ramzi N. Zahreddine, Robert H. Cormack, Carol J. Cogswell, Univ. of Colorado at Boulder (USA) . . . . . [8227-04]

Electrowetting lens arrays for microscopy, Carol J. Cogswell, Robert G. Niederriter, Keith Cobry, Robert H. Cormack, Victor M. Bright, Juliet T. Gopinath, Univ. of Colorado at Boulder (USA) . . . . . [8227-05]

Measurement and correction of spatially dependent aberrations in adaptive optical microscopy, Martin Booth, Univ. of Oxford (United Kingdom) . [8227-06]

SESSION 2 . . . . . Tues. 10:30 to 11:50 am

Fluorescence and Non-linear Microscopy

Session Chair: **Chrysanthe Preza,** The Univ. of Memphis (USA)

Calibration of an adaptive microscope using phase diversity, Delphine Débarre, Thibault Vieille, Emmanuel Beaurepaire, Ecole Polytechnique (France) . . . . . [8227-07]

Correction precision in image-based adaptive optics for nonlinear microscopy, Delphine Débarre, Aurélie Facomprez, Emmanuel Beaurepaire, Ecole Polytechnique (France) . . . . . [8227-08]

Real-time visualization of cardiomyocytes contractions resolved with multidepth nonlinear optical microscopy, Masood Samim, Univ. of Toronto (Canada); Ian Tretyakov, Nicole Prent, Richard Cisek, Daaf Sandkuijl, Sergey Musikhin, Virginijus Barzda, Univ. of Toronto Mississauga (Canada) . . . [8227-09]

A new calibration tool for fluorescence microscopy, Arnaud Royon, Philippe Legros, Gautier Papon, Thierry Cardinal, Lionel S. Canioni, Argolight (France) . . . . . [8227-10]

Lunch/Exhibition Break . . . . . 11:50 am to 1:20 pm

SESSION 3 . . . . . Tues. 1:20 to 3:20 pm

Computational Microscopy

Session Chair: **Raimund J. Ober,** The Univ. of Texas at Dallas (USA)

Comparison of 3D imaging of the blood drops and splatters using multiframe microscopy and structured light profilometry, Wojciech Walecki, Fanny Szondy, Peter S. Walecki, Sunrise Optical LLC (USA) . . . . . [8227-11]

Hyperspectral fluorescence microscopy based on compressed sensing, Vincent Studer, Interdisciplinary Institute for NeuroScience (France); Jérome Bobin, Commissariat à l'Énergie Atomique (France); Makhlad Chahid, Hamed Mousavi, Interdisciplinary Institute for NeuroScience (France); Emmanuel J. Candes, Stanford Univ. (USA); Maxime Dahan, Lab. Kastler Brossel (France). . . . . [8227-12]

Optimisation of the diffractive optical element for snapshot spectral imaging used in fluorescence microscopy, Raimund Leitner, Martin De Biasio, Thomas Arnold, Gerald McGunnigle, Carinthian Tech Research AG (Austria) . . . . . [8227-13]

Computational imaging for fluorescence microscopy using a double helix PSF engineering, Sreya Ghosh, The Univ. of Memphis (USA); Sean A. Quirin, Ginni Grover, Rafael Piestun, Univ. of Colorado at Boulder (USA); Chrysanthe Preza, The Univ. of Memphis (USA) . . . . . [8227-14]

Three-dimensional refractive index imaging with differential interference contrast microscopy, Htet Aung, Jared Buckley, Piotr Kostyk, Braulio Rodriguez, Shelley Phelan, Min Xu, Fairfield Univ. (USA) . . . . . [8227-15]

Performance evaluation of an image estimation method based on principal component analysis (PCA) developed for quantitative depth-variant fluorescence microscopy imaging, Shuai Yuan, Chrysanthe Preza, The Univ. of Memphis (USA) . . . . . [8227-16]

SESSION 4 . . . . . Tues. 3:50 to 5:10 pm

Modulated Illumination Microscopy

Session Chair: **Monika A. Ritsch-Marte,** Innsbruck Medical Univ. (Austria)

Multicolor focal modulation microscopy, Guangjun Gao, Shau Poh Chong, Nanguang Chen, National Univ. of Singapore (Singapore) . . . . . [8227-17]

Imaging of melanin by modulation and dual-beam excitation, Josef Kerimo, Charles A. DiMarzio, Northeastern Univ. (USA). . . . . [8227-18]

Holographic linear imaging with a single-pixel using spatial frequency modulated microscopy, Daniel Higley, David G. Winters, Randy Bartels, Colorado State Univ. (USA). . . . . [8227-19]

Structured-illumination two-photon scanned light sheet microscopy, Thai V. Truong, Xiquan Cui, Scott E. Fraser, California Institute of Technology (USA) . . . . . [8227-20]

Wednesday 25 January

SESSION 5 . . . . . Wed. 8:00 to 10:00 am

Phase and Polarization Microscopy

Session Chair: **Jose-Angel Conchello,** Harvard Univ. (USA)

Tomographic phase microscopy combined with light scattering measurements to investigate the structure and light scattering properties of live epithelial cells for early cancer detection, Jing-Wei Su, Wei-Chen Hsu, Kung-Bin Sung, National Taiwan Univ. (Taiwan) . . . . . [8227-21]

Dynamic phase imaging and processing of biological processes and moving organisms, Katherine Creath, Goldie Goldstein, 4D Technology Corp. (USA) and College of Optical Sciences, The Univ. of Arizona (USA) . . . [8227-22]

Low-coherence reflection tomography, Yongjin Sung, Massachusetts Institute of Technology (USA); Dan Fu, Harvard Univ. (USA); Wonshik Choi, Korea Univ. (Korea, Republic of); Ramachandra R. Dasari, Zahid Yaqoob, Massachusetts Institute of Technology (USA) . . . . . [8227-23]

Low-coherence quantitative phase microscopy with a rapidly tunable broadband source, Matthew T. Rinehart, Francisco E. Robles, Yizheng Zhu, Michael G. Giacomelli, Adam P. Wax, Duke Univ. (USA) . . . . . [8227-24]

Polarimetric microscopy of Si:Ga nanostructures, Michael Theisen, Brian McIntyre, Thomas G. Brown, Univ. of Rochester (USA) . . . . . [8227-25]

Point spread function polarimetry using stressed engineered optical elements, Roshita Ramkhalawon, Amber M. Beckley, Thomas G. Brown, Univ. of Rochester (USA) . . . . . [8227-26]

SESSION 6 . . . . . Tues. 11:50 am to 1:10 pm

Holographic Microscopy

Session Chair: **Thomas G. Brown,**
Univ. of Rochester Medical Ctr. (USA)

Lensless holographic volume imaging using a pseudo-random phase mask, Walter H. Harm, Alexander Jesacher, Stefan Bernet, Monika A. Ritsch-Marte, Innsbruck Medical Univ. (Austria) . . . . . [8227-27]

Digital holographic microscopy for the cytomorphological imaging of cells under zero gravity, Muhammed Fatih Toy, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Stephane Richard, ETH Zurich (Switzerland); Jonas Kühn, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Alfredo Franco-Obregón, Marcel Egli, ETH Zurich (Switzerland); Christian Depeursinge, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8227-28]

Lensless holographic microscopy with high-resolving power for 4D measurement of micro-organism swimming in water, Mayu Otani, Kunihiro Sato, Univ. of Hyogo (Japan) . . . . . [8227-29]

Resolving 3D trajectories of sperms on a chip using multi-angle lensfree digital holography, Ting-Wei Su, Aydogan Ozcan, Univ. of California, Los Angeles (USA) . . . . . [8227-30]

Lunch/Exhibition Break . . . . . 11:50 am to 1:50 pm

SESSION 7 . . . . . Wed. 1:50 to 3:10 pm

Tomographic Microscopy

Session Chair: **G. J. Brakenhoff,** Univ. van Amsterdam (Netherlands)

Lensfree optical tomographic microscopy: from bench-top to field use, Serhan O. Isikman, Waheb Bishara, Oguzhan Yaglidere, Uzair Y. Sikora, John Yeah, Aydogan Ozcan, Univ. of California, Los Angeles (USA) . . . . . [8227-31]

A quantitative analysis of the effects of different resampling techniques for optical coherence tomography, Christopher Copeland, Audrey K. Ellerbee, Stanford Univ. (USA) . . . . . [8227-32]

Multi-angle view of lung using optical coherence tomography(OCT), Ali Golabchi, Charles A. DiMarzio, Northeastern Univ. (USA) . . . . . [8227-33]

Optical projection tomography for imaging zebrafish vascular network in vivo, Andrea Bassi, Luca Fieramonti, Cosimo D'Andrea, Gianluca Valentini, Politecnico di Milano (Italy) . . . . . [8227-34]

SESSION 8 . . . . . Wed. 3:40 to 4:20 pm

Modeling the Microscope

Session Chair: **Carol J. Cogswell,** Univ. of Colorado at Boulder (USA)

Simulating optical sectioned differential-interference-contrast images of thick microscopic objects, Sigal Trattner, Micha Feigin, Eugene Kashdan, Nir Sochen, Tel Aviv Univ. (Israel) . . . . . [8227-35]

Comparison of varying pupil configurations in line-scanning confocal reflectance microscopy, Yogesh G. Patel, Northeastern Univ. (USA); Milind Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. (USA); Charles A. DiMarzio, Northeastern Univ. (USA) . . . . . [8227-36]

POSTERS - WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the BiOS poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Generalized pulse spectrum technique for diffuse optical tomography based on the third-order spherical harmonics approximation to radiative transfer equation, Wenjuan Ma, Feng Gao, Linhui Wu, Xi Yi, Huijuan Zhao, Tianjin Univ. (China) . . . . . [8227-44]

Time-resolved single-molecule microscopy coupled with atomic force microscopy, Samantha Fore, PicoQuant Photonics North America, Inc. (USA); Marcus Sackrow, Uwe Ortmann, Felix Koberling, Rainer Erdmann, PicoQuant GmbH (Germany) . . . . . [8227-45]

Restoration of high-resolution AFM images captured with broken probes, Yun feng Wang, Trinity College Dublin (Ireland) . . . . . [8227-46]

A novel, fast approach to light-sheet microscopy to perform scattering-free, high-resolution fluorescence imaging on whole brains, Ludovico Silvestri, Leonardo Sacconi, Univ. degli Studi di Firenze (Italy); Alessandro Bria, Giulio Iannello, Univ. Campus Bio-Medico (Italy); Francesco S. Pavone, Univ. degli Studi di Firenze (Italy) . . . . . [8227-47]

Determination of cellular mass, volume, and density using differential interference contrast microscopy, Kevin G. Phillips, Oregon Health & Science Univ. (USA); Anand Koltkar, The Scripps Research Institute (USA); Cassie Loren, Allie McClain, William Potter, Steven L. Jacques, Oregon Health & Science Univ. (USA); Peter Kuhn, The Scripps Research Institute (USA); Owen J. T. McCarty, Oregon Health & Science Univ. (USA) . . . . . [8227-48]

Depth aberrations characterization in linear and nonlinear microscopy schemes using a shack-Hartmann wavefront sensor, Rodrigo Aviles-Espinosa, ICFO - Institut de Ciències Fotòniques (Spain); Jordi Andilla, Rafael Porcar-Guezenec, Xavier Levecq, Imagine Optic SA (France); David Artigas, ICFO - Institut de Ciències Fotòniques (Spain) and Univ. Politècnica de Catalunya (Spain); Pablo Loza-Alvarez, ICFO - Institut de Ciències Fotòniques (Spain) . . . . . [8227-49]

Phase-sensitive optical coherence reflectometer using a supercontinuum source, Hoseong Song, Dong-Uk Kim, Seung Bum Cho, Sung Ho Jeong, Gwangju Institute of Science and Technology (Korea, Republic of); Dug Young Kim, Yonsei Univ. (Korea, Republic of) . . . . . [8227-50]

A custom-built two-photon microscopy based on a mode-locked Yb^{3+} doped fiber laser, Dong-Uk Kim, Hoseong Song, Woosub Song III, Hyuk-Sang Kwon, Gwangju Institute of Science and Technology (Korea, Republic of); Dug Young Kim, Yonsei Univ. (Korea, Republic of) . . . . . [8227-51]

Quantifying fluorescence signals in confocal image stacks deep in turbid media, Sebastian Beer, Ulf Maeder, Thorsten Bergmann, Jan Michael Burg, Martin Fiebich, Technische Hochschule Mittelhessen (Germany) . . . . . [8227-52]

Multimodal light-sheet microscopy for fluorescence live imaging, Yusuke Oshima, Shigenori Nonaka, National Institute for Basic Biology (Japan) . . . . . [8227-53]

Quantitative tracking of tumor cells in phase contrast microscopy exploiting halo artifact pattern, SooMin Song, Misun Kang, Myoung-Hee Kim, Ewha Womans Univ. (Korea, Republic of) . . . . . [8227-54]

Full-field OCT combined with optical tweezer, Woo June Choi, Kwan Seob Park, Tae Joong Eom, Byeong-Ha Lee, Gwangju Institute of Science and Technology (Korea, Republic of) . . . . . [8227-55]

Three-dimensional imaging of the mouse pituitary: reconstructing a mammalian organ at cellular resolution, Emmet J. O'Reilly, Francois Molino, Institut de Génomique Fonctionnelle (France); Tia E. Keyes, Dublin City Univ. (Ireland); Patrice Mollard, Chrystel Lafont, Institut de Génomique Fonctionnelle (France) . . . . . [8227-56]

Spatial coherence and transfer function analysis of structured illumination superresolution microscopy, Shwetadwip Chowdhury, Al-Hafeez Z. Dhalla, Joseph A. Izatt, Duke Univ. (USA) . . . . . [8227-57]

Optical sectioning properties of single-pixel line imaging with spatial frequency modulated microscopy, David G. Winters, Daniel Higley, Randy A. Bartels, Colorado State Univ. (USA) . . . . . [8227-58]

High-speed single-pixel line-scan imaging with a time sequence of intensity masks reconstructed through compressed sensing, Wenbing Dang, David G. Winters, Daniel Higley, Ali Pezeshki, Randy A. Bartels, Colorado State Univ. (USA) . . . . . [8227-59]

A wavelet-SVM based Bayesian framework for 3D object segmentation in microscopy, Kangyu Pan, Anil C. Kokaram, Mani Ramaswami, Jens Hillebrand, Trinity College Dublin (Ireland) . . . . . [8227-60]

Localization accuracy in single-molecule microscopy using electron-multiplying charge-coupled device cameras, Jerry Chao, The Univ. of Texas at Dallas (USA); Elizabeth S. Ward, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA); Raimund J. Ober, The Univ. of Texas at Dallas (USA) . . . . . [8227-61]

Comparison of analysis methods for fluorescence lifetime imaging, Tavis Hall, Dustin Dorroh, Elizabeth Robertson, David Schaafsma, California Optical Engineering, Inc. (USA) . . . . . [8227-62]

Prospective gating for 3D imaging of the beating zebrafish heart in embryonic development studies, Jonathan M. Taylor, John M. Girkin, Gordon D. Love, Durham Univ. (United Kingdom) . . . . . [8227-63]

Modeling the effect of refraction on OCT imaging of lung tissue: a ray-tracing approach, Fatemeh Noushin Golabchi, Dana H. Brooks, Andrew Gouldstone, Charles A. DiMarzio, Northeastern Univ. (USA) . . . . . [8227-64]

Common-path, wide-field reflection phase microscopy, Yongjin Sung, Timothy R. Hillman, Niyom Lue, Ramachandra R. Dasari, Peter T. C. So, Zahid Yaqoob, Massachusetts Institute of Technology (USA) . . . . . [8227-65]

A reflection-mode configuration for enhanced light delivery through turbidity, Youngwoon Choi, Timothy R. Hillman, Niyom Lue, Yongjin Sung, Ramachandra R. Dasari, Massachusetts Institute of Technology (USA); Wonshik Choi, Korea Univ. (Korea, Republic of); Zahid Yaqoob, Massachusetts Institute of Technology (USA) . . . . . [8227-66]

Image registration and refractive index measurement based on combined optical coherence tomography and multiphoton microscopy, Yifeng Zhou, The Univ. of British Columbia (Canada) . . . . . [8227-67]

Manipulating and visualizing non-adherent cells in four dimensions, Deanna L. Thompson, NSF Ctr. for Biophotonics Science and Technology (USA); Gregory P. McNerney, Univ. of California, Davis (USA); Martin P. Persson, Mattias Goksor, Göteborg Univ. (Sweden); Thomas R. Huser, Univ. Bielefeld (Germany) . . . . . [8227-68]

Single-shot optical sectioning using polarisation-coded structured illumination, Daniel Appelt, King's College London (United Kingdom); Kai Wicker, Friedrich-Schiller-Univ. Jena (Germany) and Institut für Photonische Technologien e.V. (Germany); Rainer Heintzmann, Friedrich-Schiller-Univ. Jena (Germany) and Institut für Photonische Technologien e.V. (Germany) and King's College London (United Kingdom) . . . . . [8227-69]

Thursday 26 January

SESSION 9 . . . . . Thurs. 8:50 to 10:10 am

Nomarski, Quantitative, and Diagnostic Imaging

Session Chair: **Tony Wilson,** Univ. of Oxford (United Kingdom)

Background and speckle suppression with a divided pupil and Nomarski prism for reflectance line-scanning confocal microscopy of human tissues, Christopher Glazowski, Memorial Sloan-Kettering Cancer Ctr. (USA); James M. Zavislan, Univ. of Rochester (USA); Milind Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. (USA) . . . . . [8227-37]

Real-time quantitative differential interference contrast microscopy implemented using novel liquid crystal prisms, Ramzi N. Zahreddine, Univ. of Colorado at Boulder (USA); Sharon V. King, Hugh Masterson, Boulder Nonlinear Systems (USA); Robert H. Cormack, Carol J. Cogswell, Univ. of Colorado at Boulder (USA) . . . . . [8227-38]

Dynamic quantitative microscopy and nanoscopy of red blood cells in sickle cell disease, Natan T. Shaked, Tel Aviv Univ. (Israel) and Duke Univ. (USA); Lisa L. Satterwhite, Duke Univ. (USA); Marilyn J. Telen, Duke Univ. Medical Ctr. (USA); George A. Truskey, Adam P. Wax, Duke Univ. (USA) . . . . . [8227-39]

Analyze fluorescent characteristic of cancer cell using hyperspectroscopic imaging system (HIS), Yao-Fang Hsieh, National Central Univ. (Taiwan); Ou-Yang Mang, National Chiao Tung Univ. (Taiwan); Jeng-Ren Duann, China Medical Univ. (China); Chih-Hsien Chen, Jin-Chern Chiou, National Chiao Tung Univ. (Taiwan); Yong-Jun Lin, China Medical Univ. (USA); Ming-Hsui Tsai, China Medical Univ. (China); Shun-De Wu, National Taiwan Normal Univ. (Taiwan) . . . . . [8227-40]

SESSION 10 . . . . . Thurs. 10:40 to 11:40 am

Scanning and New Microscopies

Session Chair: **Carol J. Cogswell,** Univ. of Colorado at Boulder (USA)

Parallel depth resolved spectral encoded high-speed reflectometry of biological tissue, Boris Pova?ay, Abishek Kumar, Daniel Fechtig, Angelika Unterhuber, Medizinische Univ. Wien (Austria); Tuan Le, FEMTOLASERS Produktions GmbH (Austria); James R. Fergusson, Cardiff Univ. (United Kingdom); Matthias Eibl, Wolfgang Drexler, Medizinische Univ. Wien (Austria) . . . . . [8227-41]

Deep-focus compound-eye camera with polarization filters for 3D endoscopes, Keiichiro Kagawa, Shizuoka Univ. (Japan); Eiji Tanaka, Panasonic Electronic Devices Co., Ltd. (Japan); Kenji Yamada, Osaka Univ. (Japan); Shoji Kawahito, Shizuoka Univ. (Japan); Jun Tanida, Osaka Univ. (Japan) . . . [8227-42]

Improved contrast by modal illumination in scanning reflectance confocal microscopy, Christopher Glazowski, James M. Zavislan, Univ. of Rochester (USA) . . . . . [8227-43]

Courses of Related Interest

SC978	Light Microscopy (Tkaczyk) Sunday, 1:30 to 5:30 pm
SC1051	Fundamentals of Microscope Design (Seward) Wednesday, 8:30 am to 12:30 pm
SC1013	Choosing the Correct Optical Filter for Your Application (Reichel) Tuesday, 1:30 to 5:30 pm
SC1054	Bio-Interferometry (Nolte) Sunday, 8:30 am to 12:30 pm
SC868	Optical Design for Biomedical Imaging (Liang) Tuesday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8228

Saturday-Sunday 21-22 January 2012 • Proceedings of SPIE Vol. 8228

Single Molecule Spectroscopy and Superresolution Imaging V

Conference Chairs: **Jörg Enderlein,** Georg-August-Univ. Göttingen (Germany); **Zygmunt Karol Gryczynski,** Texas Christian Univ. (USA); **Rainer Erdmann,** PicoQuant GmbH (Germany); **Felix Koberling,** PicoQuant GmbH (Germany)

Program Committee: **Michael Börsch,** Univ. Stuttgart (Germany); **Christian Eggeling,** Max-Planck-Institut für biophysikalische Chemie (Germany); **Paul M. W. French,** Imperial College London (United Kingdom); **Ewa M. Goldys,** Macquarie Univ. (Australia); **Ingo Gregor,** Georg-August-Univ. Göttingen (Germany); **Johan Hofkens,** Katholieke Univ. Leuven (Belgium); **Thomas R. Huser,** Univ. of California, Davis (USA); **Maria Teresa Neves-Petersen,** Aalborg Univ. (Denmark); **Markus Sauer,** Univ. Bielefeld (Germany); **Shimon Weiss,** Univ. of California, Los Angeles (USA); **Andong Xia,** Institute of Chemistry (China)

Saturday 21 January

Welcome and Introduction . . . . . Sat. 9:00 to 9:05 am

SESSION 1 . . . . . Sat. 9:05 to 10:25 am

FLIM / FRET / FCS I

Session Chair: **Rainer Erdmann,** PicoQuant GmbH (Germany)

Fluorescence intensity fluctuations in single-molecule polarization sensitive measurements, Lior Turgeman, Bar-Ilan Univ. (Israel); Dror Fixler, Bar Ilan Univ. (Israel) . . . . . [8228-01]

Fluorescence antibunching microscopy, Osip Schwartz, Jonathan Levitt, Dan Oron, Weizmann Institute of Science (Israel) . . . . . [8228-02]

Giant unilamellar vesicle (GUV) as model system in advanced 3D orientation determination, Richard Börner, Univ. zu Lübeck (Germany); Nicky Ehrlich, Univ. of Copenhagen (Denmark); Christian G. Hübner, Univ. zu Lübeck (Germany) . . . . . [8228-03]

Monitor single-lipid dynamics during ligand-induced signaling in living cells with FCS and STED nanoscopy, Chia-Fen Hsieh, Li-Ling Yang, Academia Sinica (Taiwan); Yii-Lih Lin, National Taiwan Univ. (Taiwan); Jie-Pan Shen, Yi-Ren Chang, Academia Sinica (Taiwan); Yu-Chung Chang, National Changhua Univ. of Education (Taiwan); Chia-Fu Chou, Academia Sinica (Taiwan) . [8228-04]

SESSION 2 . . . . . Sat. 10:55 am to 12:55 pm

Single Molecule Spectroscopy in Biology

Session Chair: **Ingo Gregor,** Georg-August-Univ. Göttingen (Germany)

Conformational dynamics of single G protein-coupled receptors in solution, Samuel Bockenhauer, Alexandre Fuerstenberg, Xiao Jie Yao, Brian Kobilka, W. E. Moerner, Stanford Univ. (USA) . . . . . [8228-05]

Micro-injection and single-particle-tracking of individual DNA-binding proteins in the nucleus of living human cells, Davide Normanno, Ecole Normale Supérieure (France); Claire Dugast-Darzacq, Ecole Normale Supérieure (France) and Univ. Paris-Diderot, Paris 7 (France); Xavier Darzacq, Ecole Normale Supérieure (France); Maxime Dahan, Ecole Normale Supérieure (France) and HHMI's Janelia Farm Reasearch Campus (USA) . . . . . [8228-06]

Biological structure from precise and accurate estimation of fluorophore orientations and distances: proof-of-principle using internally labeled dsDNA, Kim I. Mortensen, Jongmin Sung, Stanford Univ. (USA); Henrik Flyvbjerg, Technical Univ. of Denmark (Denmark); James A. Spudich, Stanford Univ. (USA) . . . . . [8228-07]

Novel bimolecular fluorescence complementation (BiFC) protein complexes as innovative tools for in vivo interaction studies and their characterization by single-molecule spectroscopy, Sven zur Oven-Krockhaus, Sebastien Peter, Alfred J. Meixner, Klaus Harter, Frank Schleifenbaum, Univ. of Tuebingen (Germany) . . . . . [8228-08]

New tools for discovering the role sRNA plays in cell regulation, Douglas P. Shepherd, Nan Li, Elizabeth Hong-Geller, Brian Munsky, James Werner, Los Alamos National Lab. (USA) . . . . . [8228-09]

Fluorescent saxitoxins for live cell imaging of single voltage-gated sodium ion channels beyond the optical diffraction limit, Hsiaolu D. Lee, Alison Ondrus, Stanford Univ. (USA); Shigeki Iwanaga, Sysmex Corp. (Japan); Justin Dubois, William E. Moerner, Stanford Univ. (USA) . . . . . [8228-10]

Lunch/Exhibition Break . . . . . 12:55 to 2:15 pm

SESSION 3 . . . . . Sat. 2:15 to 3:40 pm

FLIM / FRET / FCS II

Session Chair: **Zygmunt Karol Gryczynski,**
Univ. of North Texas Health Science Ctr. at Fort Worth (USA)

Stepsize of the rotary proton motor in single FoF1-ATP synthase from a thermophilic bacterium by DCO-ALEX FRET *(Invited Paper)*, Eva Hammann, Andrea Zappe, Univ. of Stuttgart (Germany); Stefanie Keis, Univ. of Otago (New Zealand); Stefan Ernst, Jena Univ. Hospital (Germany) and Univ. of Stuttgart (Germany); Gregory M. Cook, Univ. of Otago (New Zealand); Michael Börsch, Jena Univ. Hospital (Germany) and Univ. of Stuttgart (Germany) . . . . . [8228-11]

Parallel multispot smFRET analysis using an 8-pixel SPAD array, Antonino Ingargiola, Univ. of California, Los Angeles (USA) and Politecnico di Milano (Italy); Ryan Colyer, Univ. of California, Los Angeles (USA); Dongsik Kim, Nesher Technologies, Inc. (USA); Ron Lin, Univ. of California, Los Angeles (USA); Angelo Gulinatti, Ivan Rech, Massimo Ghioni, Politecnico di Milano (Italy); Shimon Weiss, Xavier Michalet, Univ. of California, Los Angeles (USA). [8228-12]

Development of time-resolved Mueller polarization microscopy through time-correlated single-photon counting, Jianjun Qiu, Nirmal Mazumder, Tsung-Lin Kuo, Po-Yen Lin, Han-Ruei Tsai, Chih-Wei Hu, Fu-Jen Kao, National Yang-Ming Univ. (Taiwan) . . . . . [8228-13]

Multiplexing and confinement in fluorescence correlation spectroscopy with an array of optical fibers, Fiona Quinlan-Pluck, ESPCI Paris Tech (France) and CNRS (France); Quentin Wilmart, ESPCI Paris Tech (France); Emmanuel Fort, ESPCI Paris Tech (France) and Univ. Denis Diderot (France); Sandrine Leveque-Fort, Univ. Paris Sud 11, CNRS (France); Neso Sojic, Univ. Bordeaux 1 (France) and ENSCBP (France); Samuel Gresillon, ESPCI Paris Tech (France) and Univ. Pierre and Marie Curie (France) . . . . . [8228-14]

SESSION 4 . . . . . Sat. 4:10 to 5:30 pm

New Developments in Methods and Systems

Session Chair: **Rainer Erdmann,** PicoQuant GmbH (Germany)

Next-generation TCSPC detection *(Invited Paper)*, Felix Koberling, Uwe Ortmann, Hans-Jürgen Rahn, Benedikt Kraemer, Marcelle Koenig, Peter Kapusta, Michael Wahl, Rainer Erdmann, PicoQuant GmbH (Germany) [8228-15]

Multiplex tumor marker quantification with spectrally-resolved fluorescence lifetime imaging, Ingo Gregor, Georg-August-Univ. Göttingen (Germany); Anastasia Loman, Fred S. Wouters, Univ. Medicine Göttingen (Germany); Jörg Enderlein, Georg-August-Univ. Göttingen (Germany); Gertrude Bunt, Univ. Medicine Göttingen (Germany) . . . . . [8228-16]

Ultrasensitive fluorescence correlation spectroscopy of highly parallelized microfluidic devices, Brian K. Canfield, William N. Robinson, Jason K. King, William H. Hofmeister, Lloyd M. Davis, The Univ. of Tennessee Space Institute (USA) . . . . . [8228-17]

High-performance SPAD array detectors for parallel photon timing applications, Ivan Rech, Angelo Gulinatti, Corrado Cammi, Massimo Ghioni, Politecnico di Milano (Italy) . . . . . [8228-18]

BiOS Hot Topics
Sat. 7:00 to 9:00 pm
BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 5 . . . . . Sun. 9:00 to 10:25 am

FLIM / FRET / FCS III

Session Chair: **Ingo Gregor,** Georg-August-Univ. Göttingen (Germany)

'Sizing' the oligomers of Azami green fluorescent protein with FCS and antibunching *(Invited Paper)*, Jamshid Temirov, St. Jude Children's Research Hospital (USA); James Werner, Peter Goodwin, Andrew Bradbury, Los Alamos National Lab. (USA) . . . . . [8228-19]

A designed DNA probe to evaluate counting single molecules by photon antibunching, Anton Kurz, Univ. of Heidelberg (Germany); Haisen Ta, Max-Planck-Institut für biophysikalische Chemie (Germany) and Univ. of Göttingen (Germany); Dirk-Peter Herten, Univ. of Heidelberg (Germany) . . . . . [8228-20]

Fluorescence correlation spectroscopy and scanning correlation spectroscopy techniques to quantify dynamics and kinetics of EGFR in vivo before and after γ-irradiation, Salim Abdisalaam, The Univ. of Texas at Arlington (USA) . . . . . [8228-21]

Understanding the synapse at nanoscale using hyperresolved molecular interaction imaging, Christian Tardif, Hugues Dufour, Daniel Côté, Paul De Koninck, Laval Univ. (Canada) . . . . . [8228-22]

SESSION 6 . . . . . Sun. 10:55 am to 12:45 pm

Nanoscopy and Superresolution Microscopy I

Session Chairs: **Rainer Erdmann,** PicoQuant GmbH (Germany); **Felix Koberling,** PicoQuant GmbH (Germany)

Nanoscopy with focused light, Stefan W. Hell, Max-Planck-Institut für biophysikalische Chemie (Germany) . . . . . [8228-23]

Full-field stimulated emission depletion (STED) imaging by surface plasmon resonance (SPR) enhancement, Han Zhang, Ming Zhao, Leilei Peng, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [8228-24]

Superresolution imaging of diffusing analyte in surface-enhanced Raman scattering hotspots, Katherine A. Willets, Sarah M. Stranahan, Maggie L. Weber, Univ. of Texas at Austin (USA) . . . . . [8228-25]

Optimal acquisition schemes for superresolution localization microscopy of bleachable fluorophores, Alexander R. Small, Edward Shore, California State Polytechnic Univ., Pomona (USA) . . . . . [8228-26]

Lunch/Exhibition Break . . . . . 12:45 to 2:05 pm

SESSION 7 . . . . . Sun. 2:05 to 3:25 pm

Nanoscopy and Superresolution Microscopy II

Session Chair: **Rainer Erdmann,** PicoQuant GmbH (Germany)

Recent developments in GSDIM microscopy, Marcus Dyba, Jonas Fölling, Leica Microsystems CMS GmbH (Germany) . . . . . [8228-27]

SIM and PALM as tools to study protein structural organization, numbers, interaction and dynamics, Klaus Weisshart, Carl Zeiss MicroImaging GmbH (Germany) . . . . . [8228-28]

Optimization of precision localization microscopy using CMOS camera technology, Eiji Toda, Teruo Takahashi, Tadashi Maruno, Jiro Yamashita, Hamamatsu Photonics K.K. (Japan); Stephanie M. Fullerton, Hamamatsu Corp. (USA) . . . . . [8228-29]

Advances in super resolution technology and application in biomedical research, Stephen Ross, Nikon Instruments Inc. (USA). . . . . [8228-30]

SESSION 8 . . . . . Sun. 3:55 to 5:35 pm

Nanoscopy and Superresolution Microscopy III

Session Chair: **Zygmunt Karol Gryczynski,** Univ. of North Texas Health Science Ctr. at Fort Worth (USA)

Superresolution imaging using fluctuations, Felix Koberling, Volker Buschmann, Rainer Erdmann, Marcelle Koenig, PicoQuant GmbH (Germany); Thomas Dertinger, Univ. of California, Los Angeles (USA); Sebastian van de Line, Julius-Maximilians-Univ. Würzburg (Germany); Samantha Fore, PicoQuant Photonics North America Inc. (USA); Markus Sauer, Julius-Maximilians-Univ. Würzburg (Germany); Jörg Enderlein, Georg-August-Univ. (Germany) . [8228-31]

Latest advances in commercially available STED microscopy, Wernher Fouquet, Arnold Giske, Leica Microsystems CMS GmbH (Germany) . . [8228-32]

Improvement of 3D localization in PALM, STORM, and single particle tracking by using adaptive optics, Jordi Andilla, Imagine Optic SA (France); Ignacio Izeddin, Lab. Kastler Brossel (France); Philippe Clemenceau, Imagine Optic Inc. (USA); Xavier Levecq, Imagine Optic SA (France); Xavier Darzacq, Ecole Normale Supérieure (France); Maxime Dahan, Lab. Kastler Brossel (France) . . . . . [8228-33]

From single-molecule chemistry to superresolution microscopy, Dirk-Peter Herten, Arina Rybina, Anne Seefeld, Jessica Balbo, Michael Schwering, Tanja Erhard, Konstantinos Lymperopoulos, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [8228-34]

Complementation activated light microscopy for nanometer accuracy single-molecule targeting and tracking in cells and living animals, Fabien Pinaud, Christian Stigloher, Ecole Normale Supérieure (France); Ingo Gregor, Jörg Ederlein, Georg-August Univ. (Germany); Maxime Dahan, Jean-Louis Bessereau, Ecole Normale Supérieure (France) . . . . . [8228-35]

Young Investigator Award . . . . . Sun. 5:35 to 5:45 pm

Session Chair: **Zygmunt Karol Gryczynski,** Univ. of North Texas Health Science Ctr. at Fort Worth (USA)

POSTERS - SUNDAY . . . . . Sun. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

A SPAD array detector for spectrally and lifetime resolved microscopy, Felix Koberling, Benedikt Kraemer, Rainer Erdmann, PicoQuant GmbH (Germany); Massimo Ghioni, Ivan Rech, Angelo Gulinatti, Politecnico di Milano (Italy); G.S. Buller, Aongus McCarthy, Andrew J. Waddie, Mohammad R. Taghizadeh, Heriot-Watt Univ. (United Kingdom); Ingo Gregor, Jörg Enderlein, Georg-August-Univ. Göttingen (Germany) . . . . . [8228-36]

Camera simulation engine enables efficient system optimization for superresolution imaging, Teruo Takahashi, Tadashi Maruno, Jiro Yamashita, Hamamatsu Photonics K.K. (Japan); Stephanie M. Fullerton, Hamamatsu Corp. (USA) . . . . . [8228-37]

Structured illumination confocal scanning microscope with enhanced optical resolution and acquisition speed, Young Duk Kim, MyoungKi Ahn, DaeGab Gweon, KAIST (Korea, Republic of) . . . . . [8228-38]

Accurate single-molecule localization of superresolution microscopy images using multiscale products, Viet Anh Ngo, Biopolis Shared Facilities, A*STAR (Singapore); Yan Nei Law, Bioinformatics Institute, A*STAR (Singapore); Hariharan Srivats, A*STAR Institute of Medical Biology (Singapore); Hwee Kuan Lee, Bioinformatics Institute, A*STAR (Singapore); Sohail Ahmed, A*STAR Institute of Medical Biology (Singapore) . . . . . [8228-39]

Two-fold enhancement of optical resolution in laser scanning microscopy, Harold Dehez, Yves DeKoninck, Michel Piché, Univ. Laval (Canada). . . [8228-40]

Optical extinction spectroscopy of a single gold nanorod by using a fast camera, Seung Bum Cho, Hoseong Song, Yoon-Sung Bae, Gwangju Institute of Science and Technology (Korea, Republic of); Chang-Soo Park, Gwanju Institute of Science and Technology (Korea, Republic of); Dug Young Kim, Yonsei Univ. (Korea, Republic of) . . . . . [8228-41]

Nano-aperture design and characterization for subdiffraction-limited fluorescence imaging, Wonju Lee, Kyujung Kim, Donghyun Kim, Yonsei Univ. (Korea, Republic of). . . . . [8228-42]

Diamond particles as nanoantennas for nitrogen-vacancy color centers: consequences in STED imaging of fluorescent nanodiamonds, Jean-Jacques GREFFET, Jean-Paul Hugonin, Mondher Besbes, Lab. Charles Fabry (France); Marie-Pierre Adam, Piernicola Spinicelli, Xuan Loc Le, Ngoc Diep Lai, François Treussart, Jean-François Roch, Ecole Normale Supérieure de Cachan (France) . . . . . [8228-43]

Visualization of neuron cells using surface plasmon enhanced randomly activated fluorescence microscopy, Youngjin Oh, Kyujung Kim, Wonju Lee, Nalae Han, Rimi Lee, Donghyun Kim, Yonsei Univ. (Korea, Republic of) [8228-44]

Stoichiometry quantification of DNA-dependent protein Kinase-catalytic subunit and Ku70/80 heterodimer using fluorescence correlation spectroscopy (FCS), Salim Abdisalaam, The Univ. of Texas at Arlington (USA) . . . . . [8228-45]

Dielectric and SM measurements in polymer PMA and PVAc above glass transition temperature, Subhasis Adhikari, Markus Selmke, Frank Cichos, Univ. Leipzig (Germany) . . . . . [8228-46]

Monitoring protein-protein interactions in vivo: FLIM and FIDSAM as powerful time-resolved fluorescence techniques for quantitative FRET analysis, Frank Schleifenbaum, Univ. of Tuebingen (Germany). . . . . [8228-47]

Temperature dependent single molecule rotational dynamics in PMA, Subhasis Adhikari, Univ. of Leipzig (Germany) . . . . . [8228-48]

Courses of Related Interest

SC1013 Choosing the Correct Optical Filter for Your Application (Reichel) Tuesday, 1:30 to 5:30 pm

SC1054 Bio-Interferometry (Nolte) Sunday, 8:30 am to 12:30 pm

SC868 Optical Design for Biomedical Imaging (Liang) Tuesday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8229A

Wednesday-Thursday 25-26 January 2012 • Part of Part of Proceedings of SPIE Vol. 8229

Optical Diagnostics and Sensing XII: Toward Point-of-Care Diagnostics

Conference Chair: **Gerard L. Coté,** Texas A&M Univ. (USA)

Program Committee: **Rafat R. Ansari,** NASA Glenn Research Ctr. (USA); **Werner Gellermann,** The Univ. of Utah (USA); **Yuri I. Gurfinkel,** Central Clinical Hospital (Russian Federation); **Jürgen M. Lademann,** Charité Universitätsmedizin Berlin (Germany); **Michael J. McShane,** Texas A&M Univ. (USA); **Kenith E. Meissner,** Texas A&M Univ. (USA); **Risto Myllylä,** Univ. of Oulu (Finland); **Gert E. Nilsson,** Univ. Hospital Linköping (Sweden); **Jeffery S. Reynolds,** Bayer Healthcare LLC (USA); **Kexin Xu,** Tianjin Univ. (China); **Shaoqun Zeng,** Britton Chance Ctr. for Biomedical Photonics (China); **Dmitry A. Zimnyakov,** N.G. Chernyshevsky Saratov State Univ. (Russian Federation)

Wednesday 25 January

POSTERS - WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the BiOS poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Determination of melamine of milk based on two-dimensional correlation infrared spectroscopy, Ren-jie Yang, Rong Liu, Kexin Xu, Tianjin Univ. (China) . . . . . [8229A-26]

Sensing cocaine in saliva with attenuated total reflection infrared (ATR-IR) spectroscopy combined with a one-step extraction method, Kerstin M. Hans, Susanne Müller, Michele E. Gianella, ETH Zürich (Switzerland); Markus W. Sigrist, ETH Zurich (Switzerland) . . . . . [8229A-27]

The wide-field Fourier spectroscopic-imaging of the radiation heat from the object itself in the middle infrared region for the health monitoring, Wei Qi, Takashi Takuma, Asuka Inui, Ryosuke Tsutsumi, Takehiko Yuzuriha, Hiroyasu Kagiyama, Daisuke Kojima, Akira Nishiyama, Ichirou Ishimaru, Kagawa Univ. (Japan) . . . . . [8229A-28]

Study of specificity for non-invasive glucose measurements based on two-dimensional correlation mid-infrared spectroscopy, Wen Zhang, Yuzhen Cao, Rong Liu, Kexin Xu, Tianjin Univ. (China) . . . . . [8229A-29]

A fluorescence polarization based assay for glucose sensing, Brian M. Cummins, Gerard Cote, Texas A&M Univ. (USA) . . . . . [8229A-30]

Raman spectroscopy of blood in vitro, Adrian E. Villanueva-Luna, Jorge Castro-Ramos, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Aaron Flores-Gil, Univ. Autonoma del Carmen (Mexico); Sergio Vazquez-Montiel, Carlos M. Ortiz-Lima, Jose A. Delgado-Atencio, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [8229A-31]

Snapshot hyperspectral imaging to measure oxygen saturation in the retina using fiber bundle and multislit spectrometer, Bahram Khoobehi, LSU Health Sciences Ctr. (USA); Aurash Khoobehi, LSU School of Medicine (USA) . . . . . [8229A-32]

Quantitative determination of the human breast milk macro-nutrients by near-infrared Raman spectroscopy, Edlene C. M. Motta, Landulfo Silveira, Jr., Renato A. Zângaro, Univ. Camilo Castelo Branco (Brazil) . . . . . [8229A-33]

An noncontact pulse oximeter with two-laser diode, Jong-Woon Choi, Honam Univ. (Korea, Republic of) . . . . . [8229A-34]

Effect on glucose monitoring of pressure exerted by fiber optic probe: skin model and simulation, Chenxi Li, Huijuan Zhao, Zhenzhi Shi, Kexin Xu, Tianjin Univ. (China) . . . . . [8229A-35]

SESSION 1 . . . . . Wed. 8:20 to 10:00 am

In Vivo Optical Perfusion and Oxygenation Monitoring

Session Chair: **Justin S. Baba,** Oak Ridge National Lab. (USA)

Fetal oxygenation measurement using wireless near-infrared spectroscopy, Babak Shadgan M.D., The Univ. of British Columbia (Canada) and Ctr. for International Collaboration on Repair Discoveries (Canada); Andrew J. Macnab, Patricia Janssen, Dan Rurak, Behnam Molavi, The Univ. of British Columbia (Canada) . . . . . [8229A-01]

Non-invasive gas monitoring in newborn infants using diode laser absorption spectroscopy: a case study, Patrik Lundin, Emilie Krite Svanberg M.D., Lorenzo Cocola, Stefan Andersson-Engels, John Jahr, Vineta Fellman, Katarina Svanberg M.D., Sune Svanberg, Lund Univ. (Sweden) . . . . . [8229A-02]

In vitro performance of a perfusion and oxygenation optical sensor using a unique liver phantom, Tony J. Akl, Travis J. King, Ruiqi Long, Texas A&M Univ. (USA); Milton N. Ericson, Oak Ridge National Lab. (USA); Mark A. Wilson, Univ. of Pittsburgh (USA) and U.S. Dept. of Veterans Affairs (USA); Michael J. McShane, Gerard L. Coté, Texas A&M Univ. (USA) . . . . . [8229A-03]

Measuring hemoglobin amount and oxygen saturation of skin with advancing age, Shumpei Watanabe, Chiba Univ. (Japan); Satoshi Yamamoto M.D., Keio Univ. (Japan); Midori Yamauchi, Norimichi Tsumura, Chiba Univ. (Japan); Tetsuo Akiba M.D., AKIBA Clinic of Traditional Medicine (Japan); Keiko Ogawa-Ochiai M.D., Kanazawa Univ. Hospital (Japan) . . . . . [8229A-04]

Determination of oxygen saturation of the optic nerve head and overlying artery and vein using a snapshot multispectral imaging system, Bahram Khoobehi, LSU Health Sciences Ctr. (USA) and LSU Health Sciences Ctr. (USA); Hussein Wafapoor, Alexander Eaton, LSU Health Sciences Ctr. (USA); Kim A. Firn, Tulane Univ. (USA) and LSU Health Sciences Ctr. (USA); Matt Peters, LSU Health Sciences Ctr. (USA); Ellie Rodebeck, Tulane Univ. (USA) and LSU Health Sciences Ctr. (USA); Brian Templet, Tulane Univ. (USA) . . . . . [8229A-05]

SESSION 2 . . . . . Wed. 10:30 to 11:50 am

Optical Imaging Systems for Cell and Lymph Analysis

Session Chair: **J. Brandon Dixon,**
Georgia Institute of Technology (USA)

MEMS-enabled hyperspectral imaging system for fast CTC screening, Youmin Wang, The Univ of Texas at Austin (USA); Sheldon Bish, Yu-Yen Huang, Gauri Bhave, James M. Tunnell, Xiaojing Zhang, The Univ. of Texas at Austin (USA) . . . . . [8229A-06]

Biophotonic tool for sensing the dynamics of H_2O_2 extracellular release in stressed cells, Guillaume Suarez, Christian Santschi, Shourya Dutta Gupta, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Lucienne Juillerat-Jeanneret, Ctr. Hospitalier Univ. Vaudois (Switzerland); Olivier J. F. Martin, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8229A-07]

An in vivo optical imaging system for measuring lipid uptake, vessel contraction, and lymph flow in small animal lymphatic vessels, Timothy Kassis, Michael Weiler, James B. Dixon, Georgia Institute of Technology (USA) and Parker H. Petit Institute for Bioengineering and Bioscience (USA) [8229A-08]

Sensitivity analysis of near-infrared functional lymphatic imaging, Michael J. Weiler, Timothy Kassis, James B. Dixon, Georgia Institute of Technology (USA) . . . . . [8229A-09]

Lunch/Exhibition Break . . . . . 11:50 am

SESSION 3 . . . . . Wed. 1:20 to 3:00 pm

Point-of-Use Optical Field Systems for Analyte Detection

Session Chair: **Gerard L. Coté,** Texas A&M Univ. (USA)

A miniaturized particle detection system, James Dou, Lu Chen, Univ. of Toronto (Canada); Rakesh Nayyar, Cytoquest Corp. (Canada); James S. Aitchison, Univ. of Toronto (Canada) . . . . . [8229A-10]

A study of a self diagnostic platform for the detection of A2 biomarker for Leishmania donovani, Phil J. Roche, Maurice Cheung, V. Chodavarapu, Brian Ward, Momar Ndao, Andrew Kirk, McGill Univ. (Canada) . . . . . [8229A-11]

Complete urinary tract infection (UTI) diagnosis and antibiogram using surface enhanced Raman spectroscopy (SERS), Katerina Hadjigeorgiou, Evdokia Kastanos, Alexandros Kyriakides, Costas Pitris, Univ. of Cyprus (Cyprus) . . . . . [8229A-12]

Silica suspended waveguide splitter-based biosensor, Mark C. Harrison, Univ. of Southern California (USA); Rasheeda M. Hawk, Univ.of Southern California (USA); Andrea M. Armani, Univ. of Southern California (USA) . . . . . [8229A-13]

Low-level detection of cryptosporidium parvum in water using optical microfluidic biosensors, Scott Angus, Hyuck-Jin Kwon, Jeong-Yeol Yoon, Univ. of Arizona (USA) . . . . . [8229A-14]

SESSION 4 . . . . . Wed. 3:30 to 5:10 pm

Optically-Based Diagnostic Devices for Low Resource Areas

Session Chair: **Kristen C. Maitland,** Texas A&M Univ. (USA)

A cellphone-based laser speckle imager, Itay Remer, Alberto Bilenca, Ben-Gurion Univ. of the Negev (Israel) . . . . . [8229A-15]

Spectral reflectance of the ocular fundus as a diagnostic marker for cerebral malaria, Xun Liu, David A. Rice, Tulane Univ. (USA); Bahram Khoobehi, LSUHSC School of Medicine (USA). . . . . [8229A-16]

Lensfree pixel superresolution microscopy using thin wetting films on a chip, Onur Mudanyali, Waheb Bishara, Aydogan Ozcan, Univ. of California, Los Angeles (USA) . . . . . [8229A-17]

Low-cost add-on microscope for cellphones for use in point-of-care diagnostics, Harsha Umesh Babu, Siegwart Bogatscher, Nico Heussner, Leilei Shinohara, Wilhelm Stork, Karlsruhe Institute of Technology (Germany) . . . . . [8229A-18]

Simple and affordable CD4 counting enabled by on-chip sample preparation and large-area image cytometry, Markus Beck, Niels van der Velde, Silvia Brockhuis, Univ. of Twente (Netherlands); Leon W. Terstappen, Univ.of Twente (Netherlands) . . . . . [8229A-19]

Thursday 26 January

SESSION 5 . . . . . Thurs. 8:00 to 10:00 am

Optical Glucose Monitoring Approaches

Session Chairs: **Brent D. Cameron,** The Univ. of Toledo (USA); **Michael J. McShane,** Texas A&M Univ. (USA)

A critical query into the basis of spectroscopic measurements in non-invasive blood glucose monitoring, Narahara Chari Dingari, Ishan Barman, Gajendra Pratap Singh, Jeon Woong Kang, Ramachandra R. Dasari, Michael S. Feld, Massachusetts Institute of Technology (USA) . . . . . [8229A-20]

Spectroscopic tomography of biological tissues with the near-infrared radiation for the non-invasive measurement of the biogenic-substances, Daisuke Kojima, Takashi Takuma, Asuka Inui, Wei Qi, Ryosuke Tsutsumi, Takehiko Yuzuriha, Hiroyasu Kagiyama, Akira Nishiyama, Ichirou Ishimaru, Kagawa Univ. (Japan) . . . . . [8229A-21]

A fiber loop ringdown glucose sensor, Chuji Wang, Malik Kaya, Mississippi State Univ. (USA); Charlotte Wang, Mississippi School for Mathematics and Science (USA) . . . . . [8229A-22]

Polarimetric glucose sensing in an artificial eye anterior chamber, Bilal H. Malik, Casey W. Pirnstill, Gerard L. Coté, Texas A&M Univ. (USA) . . . [8229A-23]

Fluorescence lifetime-based glucose sensor using NADH, Alexa von Ketteler, Kirchhoff Institute for Physics (Germany) and Roche Diagnostics GmbH (Germany); Dirk-Peter Herten, Heidelberg Univ. (Germany); Carina Horn, Roche Diagnostics GmbH (Germany); Wolfgang Petrich, Roche Diagnostics GmbH (Germany) and Kirchhoff Institute for Physics (Germany) . . . . . [8229A-24]

Loading of red blood cells with an analyte-sensitive dye for development of a long-term monitoring technique, Sarah Ritter, Kenith E. Meissner, Texas A&M Univ. (USA) . . . . . [8229A-25]

Courses of Related Interest

SC981	Biomedical Fiber Optic Sensors and Applications (Mendez, McLaughlin) Monday, 8:30 am to 12:30 pm
SC532	Micro- and Nanofluidics - Technology and Applications (Gärtner) Wednesday, 8:30 am to 12:30 pm
SC1013	Choosing the Correct Optical Filter for Your Application (Reichel) Tuesday, 1:30 to 5:30 pm
SC1054	Bio-Interferometry (Nolte) Sunday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Conference 8229B

Saturday-Sunday 21-22 January 2012 • Part of Proceedings of SPIE Vol. 8229

Design and Performance Validation of Phantoms Used in Conjunction with Optical Measurement of Tissue IV

Conference Chair: **Robert J. Nordstrom,** National Institutes of Health (USA)

Program Committee: **Anant Agrawal,** U.S. Food and Drug Administration (USA); **Jean-Pierre Bouchard,** INO (Canada); **Gerald T. Fraser,** National Institute of Standards and Technology (USA); **Rongguang Liang,** Carestream Health, Inc. (USA); **Ramesh Raghavachari,** U.S. Food and Drug Administration (USA); **Heidrun Wabnitz,** Physikalisch-Technische Bundesanstalt (Germany)

Saturday 21 January

SESSION 1 . . . . . Sat. 1:30 to 4:30 pm

Phantom Fabrication, Testing and Validation

Session Chair: **Jean-Pierre Bouchard,** INO (Canada)

Confocal reflectance microscopy to specify the scattering co-efficient and anisotropy of tissue phantoms *(Invited Paper)*, Steven L. Jacques, Oregon Health & Science Univ. (USA) . . . . . [8229B-37]

Low abundances of synthetics lipids in phantoms, Adrian E. Villanueva-Luna, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Agustin Santiago-Alvarado, Brenda Iris Guadalupe Licona-Moran, Univ. Technológica de la Mixteca (Mexico); Jorge Castro-Ramos, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Aaron Flores-Gil, Univ. Autónoma del Carmen (Mexico); Sergio Vazquez-Montiel, Jose Gabriel Aguilar-Soto, Jose Alberto Delgado-Atencio, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [8229B-38]

Possible diffusive reference standards for tissue phantoms based on fat emulsions, Paola Di Ninni, Univ. degli Studi di Firenze (Italy); Yves Bérubé-Lauzière, Univ. de Sherbrooke (Canada); Fabrizio Martelli, Univ. degli Studi di Firenze (Italy) . . . . . [8229B-39]

Characterization of an optical solid phantom for human skin fabricated by spin coating, Yunjin Bae, Jiho Lee, Youngwoo Bae, Eungjun Youn, Byungjo Jung, Yonsei Univ. (Korea, Republic of) . . . . . [8229B-40]

Fabrication and Characterization of a Multilayered Optical Phantom Using Buried Scattering Microspheres in Polymers *(Invited Paper)*, Robert C. Chang, Peter Johnson, Christopher Stafford, Jeeseong Hwang, National Institute of Standards and Technology (USA) . . . . . [8229B-41]

Phantoms for performance assessment of optical co-herence tomography systems, Mohammad Reza Nasiri Avanaki, Univ. of Kent (United Kingdom) . . . . . [8229B-42]

Absolute calibration of a steady-state trans-illumination breast spectroscopy device, Eleanor J. Walter, Univ. of Toronto (Canada) and Univ. Health Network (Canada); Lothar D. Lilge, Univ. Health Network (Canada) and Univ. of Toronto (Canada) . . . . . [8229B-43]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online http://spie.org/x7779.xml

Sunday 22 January

SESSION 2 . . . . . Sun. 8:20 to 10:30 am

Phantoms for Microscopy, Hyperspectral Imaging, and Other Optical Methods

Session Chair: **Robert J. Nordstrom,** National Institutes of Health (USA)

Design of calibration slide for quantitative microscopy imaging in absorbance *(Invited Paper)*, Calum MacAulay, The BC Cancer Agency Research Ctr. (Canada); Martial Guillaud, British Columbia Cancer Agency (Canada) . . . . . [8229B-044]

Validating the LASSO algorithm for unmixing spectral signatures with application to multicolor phantoms, Daniel V. Samarov, Matthew Clarke, Ji Youn Lee, David Allen, Maritoni Litorja, Jeeseong Hwang, National Institute of Standards and Technology (USA) . . . . . [8229B-45]

Hyperspectral imaging of ischemic wounds, Ronald X. Xu, James Melvin, Jiwei X. Huang, Haytham Elgharably M.D., Surya Gnyawali, Kun Huang, Valerie Bergdall, The Ohio State Univ. (USA); David Allen, Jeeseong Hwang, Maritoni Litorja, Eric Shirley, National Institute of Standards and Technology (USA); Chandan Sen, The Ohio State Univ. (USA) . . . . . [8229B-46]

Performance validation of EMCCD and ICCD based near-infrared fluorescence imaging systems on a fluorescence solid phantom, Banghe Zhu, Eva M. Sevick-Muraca, The Univ. of Texas Health Science Ctr. at Houston (USA) . . . . . [8229B-47]

Calibration phantoms for fluorescence imaging and spectroscopy, Pierre M. Lane, Sylvia F. Lam, The BC Cancer Agency Research Ctr. (Canada); Roderick Price, Drexel Univ. College of Medicine (USA); Jose-Miguel Yamal, The University of Texas School of Public Health (USA); Dennis D. Cox, E. N. Atkinson, Rice Univ. (USA); Michele Follen, Drexel Univ. College of Medicine (USA); Calum MacAulay, The BC Cancer Agency Research Ctr. (Canada) . . . . . [8229B-48]

Effects of physiological parameters in diffuse optical brain imaging, Ali Hasnain, Nanguang Chen, National Univ. of Singapore (Singapore) . . [8229B-49]

SESSION 3 . . . . . Sun. 11:00 am to 12:00 pm

Phantom for Optical Coherence Tomography

Session Chair: **Robert J. Nordstrom,** National Institutes of Health (USA)

New developments in eye models with retina tissue phantoms for ophthalmic optical coherence tomography, T. Scott Rowe, Rowe Technical Design (USA); Robert J. Zawadzki, UC Davis Medical Ctr. (USA) . . . . [8229B-50]

Three-dimensional calibration targets for optical coherence tomography, Michelle Gabriele Sandrian, Boris Považay, Aneesh Alex, Medizinische Univ. Wien (Austria); Pete Tomlins, Queen Mary, Univ. of London (United Kingdom); Peter Woolliams, National Physical Lab. (United Kingdom); Kate Sugden, Aston Univ. (United Kingdom); Wolfgang Drexler, Medizinische Univ. Wien (Austria) . . . . . [8229B-51]

Maximizing OCT image quality at depth using a 3D-structured phantom to optimize imaging parameters, Andrea Curatolo, Brendan Francis Kennedy, David Douglas Sampson, The Univ. of Western Australia (Australia) . . [8229B-52]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

Conference 8229B

SESSION JS1 . . . . . Sun. 1:30 to 3:30 pm

Joint Session with Conference 8215

Session Chairs: **Robert J. Nordstrom,** National Institutes of Health (USA); **Ramesh Raghavachari,** U.S. Food and Drug Administration (USA)

Calibration and validation of chemical imaging spectrometry for clinical use *(Invited Paper)*, Maritoni Litorja, National Institute of Standards and Technology (USA) . . . . . [8215-11]

Standard test methods for established medical imaging modalities and their implications for optical coherence tomography *(Invited Paper)*, Joshua Pfefer, Anant Agrawal, Alex Beylin, U.S. Food and Drug Administration (USA) . . . . . [8215-12]

Challenges in manufacturing optical tissue phantoms: an industrial perspective *(Invited Paper)*, Jean-Pierre Bouchard, Isabelle Noiseux, Ozzy Mermut, INO (Canada) . . . . . [8229B-53]

Report on a recent workshop: Standards for Phantoms for the Performance Evaluation and Validation of Optical Medical Imaging Devices *(Invited Paper)*, Jeeseong Hwang, National Institute of Standards and Technology (USA); Robert J. Nordstrom, National Cancer Institute (USA) . . . . . [8229B-54]

PANEL DISCUSSION. . . . . Sun. 4:00 to 5:00 pm

Session Chair: **Robert J. Nordstrom,** National Institutes of Health (USA)

POSTERS - SUNDAY. . . . . Sun. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Optical properties in simulated human skin at a wavelength of 633 nm, Beatriz Morales, José Alberto Delgado-Atencio, Sergio Vázquez y Montiel, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [8229B-55]

Influence of bubbles on the recovery of optical properties, Beatriz Morales, José Alberto Delgado Atencio, Sergio Vázquez y Montiel, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [8229B-56]

Courses of Related Interest

SC029 Tissue Optics (Jacques) Sunday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8230

Saturday-Monday 21-23 January 2012 • Proceedings of SPIE Vol. 8230

Biomedical Applications of Light Scattering VI

Conference Chairs: **Adam P. Wax,** Duke Univ. (USA); **Vadim Backman,** Northwestern Univ. (USA)

Program Committee: **Irving J. Bigio,** Boston Univ. (USA); **Stephen Allen Boppart,** Univ. of Illinois at Urbana-Champaign (USA); **Bernard Choi,** Beckman Laser Institute and Medical Clinic (USA); **Steven L. Jacques,** Oregon Health & Science Univ. (USA); **Lev T. Perelman,** Harvard Univ. (USA); **Brian W. Pogue,** Dartmouth College (USA); **Bruce J. Tromberg,** Beckman Laser Institute and Medical Clinic (USA)

Saturday 21 January

SESSION 1 . . . . . Sat. 8:00 to 10:10 am

Dynamic Light Scattering and Speckle

Session Chair: **Bernard Choi,**
Beckman Laser Institute and Medical Clinic (USA)

Measuring intracellular motion using dynamic light scattering with optical coherence tomography in a mouse tumor model, Golnaz Farhat, Univ. of Toronto (Canada); Adrian Mariampillai, Victor X. D. Yang, Ryerson Univ. (Canada); Gregory J. Czarnota, Sunnybrook Health Sciences Ctr. (Canada); Michael C. Kolios, Ryerson Univ. (Canada). . . . . [8230-01]

Biomechanical assessment of tissue using laser speckle rheology, Zeinab Hajjarian Kashany, Seemantini K. Nadkarni, Harvard Medical School (USA) . . . . . [8230-02]

Eliminating the effect of bulk scattering when measuring skin surface roughness using speckle contrast imaging: a skin phantom study, Lioudmila Tchvialeva, David I. McLean, Harvey Lui, The Univ. of British Columbia (Canada); Tim K. Lee, The BC Cancer Agency Research Ctr. (Canada) . . . . . [8230-03]

Optical histology of microvasculature in thick tissue sections, Austin J. Moy, Bernard Choi, Beckman Laser Institute and Medical Clinic (USA) . . . . . [8230-04]

Tissue dynamics spectroscopy to detect cellular mitosis inside tissue, Ran An, Kwan Jeong, John J. Turek, David D. Nolte, Purdue Univ. (USA) . . . . . [8230-05]

Development of coherent Spatial Frequency Domain Imaging (c-SFDI) for simultaneous determination of optical and dynamical properties of tissue *(Invited Paper)*, Tyler B. Rice, Soren D. Konecky, Amaan Mazhar, Alexander J. Lin, Anthony J. Durkin, Bernard Choi, Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA). . . . . [8230-06]

SESSION 2 . . . . . Sat. 10:40 am to 12:00 pm

Novel Techniques I

Session Chair: **Adam P. Wax,** Duke Univ. (USA)

Lasing modes in disordered media for single-nanoparticle quantitation: a new approach for biosensing, Seung Ho Choi, Young L. Kim, Purdue Univ. (USA) . . . . . [8230-07]

Time and wavelength resolved measurements of diffusive reflectance on electrically activated tissue phantom confirm depth selectivity of the method, Michal Kacprzak, Daniel Milej, Anna Gerega, Norbert Zolek, Institute of Biocybernetics and Biomedical Engineering (Poland); Jeremy C. Hebden, Salavat Magazov, Oliver White, Univ. College London (United Kingdom); Adam Liebert, Institute of Biocybernetics and Biomedical Engineering (Poland) . . . . . [8230-08]

Use of a radial angular filter array to estimate the position of an absorption target within in a turbid medium, Yan Zhang, Simon Fraser Univ. (Canada); Vasefi Fartash, Lawson Health Research Institute (Canada); Mohamadreza Najiminaini, Bozena Kaminska, Simon Fraser Univ. (Canada); Jeffrey J. L. Carson, Univ. Western Ontario (Canada) and Lawson Health Research Institute (Canada) . . . . . [8230-09]

High-precision wide-bandwidth spectroscopy of turbid media, Dmitry Khoptyar, Lund Univ. (Sweden); Muhammad Saleem, National Institute of Lasers and Optronics (Pakistan); Arman Ahamed Subash, Stefan Andersson-Engels, Lund Univ. (Sweden) . . . . . [8230-10]

Lunch/Exhibition Break . . . . . 12:00 to 1:20 pm

SESSION 3 . . . . . Sat. 1:20 to 3:00 pm

Novel Techniques II

Session Chair: **Adam P. Wax,** Duke Univ. (USA)

Experimental measurement of the optical properties of biological tissue using polarized enhanced backscattering (EBS) spectroscopy, Andrew J. Radosevich, Nikhil N. Mutyal, Jeremy D. Rogers, Vladimir M. Turzhitsky, Vadim Backman, Northwestern Univ. (USA) . . . . . [8230-11]

Optical phase measurements in red blood cells using low-coherence spectroscopy, Itay Shock, Uri Nevo, Natan T. Shaked, Tel Aviv Univ. (Israel) . . . . . [8230-12]

Characterization of the diffusion properties of light through scattering media with a femtosecond laser pulse, Nathan Curry, Ecole Supérieure de Physique et de Chimie Industrielles (France); Pierre Bondareff, Ecole Supérieure de Physique et de Chimie Industrielles (France) and Univ. Pierre et Marie Curie (France); Mathieu Leclerc, Ecole Supérieure de Physique et de Chimie Industrielles (France); Riccardo Sapienza, Niek F. van Hulst, ICFO - Institut de Ciències Fotòniques (Spain) and ICREA - Institució Catalana de Recerca i Estudis Avançats (Spain); Sylvain Gigan, Ecole Supérieure de Physique et de Chimie Industrielles (France); Samuel Gresillon, Univ. Pierre et Marie Curie (France) . . . . . [8230-13]

The study of influence of radiation therapy on experimental tumor's oxygenation using diffuse optical spectroscopy, Anna G. Orlova, Institute of Applied Physics (Russian Federation); Anna Maslennikova M.D., Nizhny Novgorod State Medical Academy (Russian Federation) and Institute of Applied Physics (Russian Federation) and N.I. Lobachevsky State Univ. of Nizhny Novgorod (Russian Federation); German Golubjatnikov, Institute of Applied Physics (Russian Federation); Tatiana Pryanikova, Institute of Applied Physics (Russian Federation) and N.I. Lobachevsky State Univ. of Nizhny Novgorod (Russian Federation); Vladislav A. Kamensky, Institute of Applied Physics (Russian Federation); Tatiana Smirnova, N.I. Lobachevsky State University of Nizhny Novgorod (Russian Federation); Natalia M. Shakhova M.D., Ilya V. Turchin, Institute of Applied Physics (Russian Federation) . . . . . [8230-14]

Hyperspectral stray light imaging of chromosomes: a novel concept for label-free karyotyping, Rudolf W. Kessler, Reutlingen Univ. (Germany); Karsten Rebner D.V.M., Reutlingen Research Institute, Reutlingen Univ. (Germany) and BASF SE (Germany); Dieter Oelkrug, Eberhard Karls Univ. Tübingen (Germany). . [8230-15]

SESSION 4 . . . . . Sat. 3:30 to 5:20 pm

Modeling and Theory

Session Chair: **Lev T. Perelman,** Harvard Univ. (USA)

Improved empirical models for extraction of tissue optical properties from reflectance spectra *(Invited Paper)*, Katherine Calabro, Evgeni Aizenberg, Irving J. Bigio, Boston Univ. (USA) . . . . . [8230-16]

Determination of the scattering coefficient, the reduced scattering coefficient, and the anisotropy factor of tissue with differential interference contrast microscopy, Bianca DeAngelo, Patrick Shanley, Grant Arzumanov, Fairfield Univ. (USA); Zhang Xu, Wenzhou Medical College (China); Min Xu, Fairfield Univ. (USA). . . . . [8230-17]

Superresolution imaging for spatial light interference microscopy, Kaiqin Chu, NSF Ctr. for Biophotonics Science and Technology (USA) . . . . . [8230-18]

Monte Carlo simulations of polarimetric response of healthy and cancerous human tissues, Maria Rosaria Antonelli, Angelo Pierangelo, Tatiana Novikova, Ecole Polytechnique (France); Pierre Validire, Abdelali Benali, Brice Gayet, Institut Mutualiste Montsouris (France); Antonello De Martino, Ecole Polytechnique (France) . . . . . [8230-19]

Numerical modelling and in vivo analysis of fluorescent and laser light backscattered from glial brain tumours, Tatiana A. Savelieva, Nina Kalyagina, Maria Kholodtsova, A. M. Prokhorov General Physics Institute (Russian Federation); Aleksandr Potapov, Sergey Goryainov, N.N. Burdenko Neurosurgical Institute (Russian Federation); Victor B. Loschenov, A. M. Prokhorov General Physics Institute (Russian Federation) . . . . . [8230-20]

BiOS Hot Topics
Sat. 7:00 to 9:00 pm
BiOS Hot Topics details see page 13 or online
http://spie.org/x7779.xml

Sunday 22 January

SESSION 5 . . . . . Sun. 8:20 to 10:20 am

In Vitro

Session Chair: **Vadim Backman,** Northwestern Univ. (USA)

Cellular morphology measurement using high-speed two-dimensional angle-resolved low-coherence interferometry *(Invited Paper)*, Michael G. Giacomelli, Adam P. Wax, Duke Univ. (USA) . . . . . [8230-21]

Determining the orientation of subsurface light scattering structures with spatial frequency domain imaging, Soren D. Konecky, Tyler B. Rice, Anthony J. Durkin, Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA) . . . . . [8230-22]

Direct and highly sensitive measurement of the spatial arrangement of microstructures within biological samples, Nada N. Boustany, Heidy Sierra, Robert M. Pasternack, Bryan Rabin, Rutgers, The State Univ. of New Jersey (USA) . . . . . [8230-23]

Correlating the light scattering pattern of a biological cell to its mitochondrial properties using a Gabor filter technique, Marina Moran, Xin-Hua Hu, Jun Q. Lu, East Carolina Univ. (USA) . . . . . [8230-24]

Light scattering based monitoring of leukemic cells in flowing in vitro blood samples *(Invited Paper)*, Irene Georgakoudi, Cherry A. Greiner, Martin Hunter, Tufts Univ. (USA) . . . . . [8230-25]

SESSION 6 . . . . . Sun. 10:40 am to 12:20 pm

Low Coherence Light Scattering

Session Chair: **Stephen A. Boppart,**
Univ. of Illinois at Urbana-Champaign (USA)

Digital Fourier holography for wide-field characterization of microstructures *(Invited Paper)*, David D. Sampson, The Univ. of Western Australia (Australia) . . . . . [8230-26]

Speckle reduction using wavefront modulation for multifunctional optical coherence tomography, Christian M. Oh, Univ. of California, Riverside (USA); Chenyu Feng, Stanford Univ. (USA); Yan Wang, B. Hyle Park, Univ. of California, Riverside (USA); Johannes F. de Boer, Vrije Univ. Amsterdam (Netherlands) . . . . . [8230-27]

Detecting nanoparticles and cells with optical coherence microscopy, Noelia L. Bocchio, Christophe Pache, Martin L. Villiger, Arno Bouwens, Corinne Berclaz, Christian Santschi, Anne Grapin-Botton, Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8230-28]

Probing biological tissue morphology and function with coherent light scattering imaging techniques *(Invited Paper)*, Yingtian Pan, Hugang Ren, Zhijia Yuan, Zhongchi Luo, Ki Park, Congwu Du, Stony Brook Univ. (USA) . . . . . [8230-29]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

SESSION 7 . . . . . Sun. 1:30 to 4:30 pm

Clinical and Pre-Clinical

Session Chair: **Irving J. Bigio,** Boston Univ. (USA)

Recent progress in angle-resolved low-coherence interferometry and its application for detecting intestinal dysplasia, Yizheng Zhu, Neil G. Terry, Julie Thacker, John Migaly, Cynthia Guy, Christopher R. Mantyh, Adam P. Wax, Duke Univ. (USA) . . . . . [8230-30]

Subdiffractional differences in macromolecular density distribution detected in the field of esophageal cancer, Lusik Cherkezyan, Northwestern Univ. (USA); Vani Konda, The Univ. of Chicago Medical Ctr. (USA); Hariharan Subramanian, Northwestern Univ. (USA); Kristen Wroblewski, The Univ. of Chicago Medical Ctr. (USA); Dhwanil Damania, Northwestern Univ. (USA); Leah Karl, The Univ. of Chicago Medical Ctr. (USA); Michael J. Goldberg, Northshore Univ. Health System (USA); Irving Waxman, The Univ. of Chicago Medical Ctr. (USA); Hemant K. Roy, Northshore Univ. Health System (USA); Vadim Backman, Northwestern Univ. (USA) . . . . . [8230-31]

Nanomorphology-based cancer diagnosis via spatial-domain low-coherence quantitative phase microscopy *(Invited Paper)*, Yang Liu, Rajan K. Bista, Pin Wang, Uttam Shikhar, Rohit Bhargava, Douglas J. Hartman, Staton Kevin, Randall E. Brand M.D., Univ. of Pittsburgh Medical Ctr. (USA) . . [8230-32]

In vivo risk stratification of colon carcinogenesis by measurement of optical properties with novel lens-free fiber optic probe using low-coherence enhanced backscattering spectroscopy (LEBS) *(Invited Paper)*, Nikhil N. Mutyal, Andrew J. Radosevich, Jeremy D. Rogers, Northwestern Univ. (USA); Michael J. Goldberg, Laura Bianchi, Nela Krosjnar, Boris Jancan, Hemant K. Roy, Northshore Univ. Healthsystems (USA); Vadim Backman, Northwestern Univ. (USA) . . . . . [8230-33]

Measuring nanoscale refractive-index alterations in the field of ovarian cancer using partial wave spectroscopic microscopy, Dhwanil Damania, Hariharan Subramanian, Lusik Cherkezyan, Yuanjia Zhu, Craig White, Prabhakar Pradhan, Hemant Roy, Vadim Backman, Northwestern Univ. (USA) . . . [8230-34]

Enhanced tumor contrast during breast lumpectomy provided by independent component analysis of localized reflectance measures, Alma Eguizabal, Univ. de Cantabria (Spain); Ashley M. Laughney, Thayer School of Engineering at Dartmouth (USA); Pilar Beatriz Garcia Allende, Helmholtz Zentrum München GmbH (Germany); Venkataramanan Krishnaswamy, Thayer School of Engineering at Dartmouth (USA); Wendy A. Wells, Dartmouth Hitchcock Medical Ctr. (USA); Keith D. Paulsen, Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA); Jose M. Lopez-Higuera, Olga M. Conde, Univ. de Cantabria (Spain). . . . . [8230-35]

Non-invasive detection of periodontal disease using diffuse reflectance spectroscopy: a clinical study, Chandra Sekhar Prasanth, Ctr. for Earth Science Studies (India); Joseph Betsy, Government Dental College, Thiruvananthapuram (India); Subhash Narayanan, Ctr. for Earth Science Studies (India); Janam Prasanthila, Government Dental College, Thiruvananthapuram (India). . . . . [8230-36]

POSTERS - SUNDAY . . . . . Sun. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Sunday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Polarized Monte Carlo simulation of blood vessel structure in colon tissue, Wendy Yip, Andrew Gomes, Alan V. Sahakian, Vadim Backman, Northwestern Univ. (USA) . . . . . [8230-37]

Optimal attenuation of the unscattered light for spatial light interference microscopy, Kaiqin Chu, Univ. of Rochester (USA). . . . . [8230-38]

Blind breast tissue diagnosis using independent component analysis of localized backscattering response, Alma Eguizabal, Univ. de Cantabria (Spain); Ashley M. Laughney, Thayer School of Engineering at Dartmouth (USA); Pilar Beatriz Garcia Allende, Helmholtz Zentrum München GmbH (Germany); Venkataramanan Krishnaswamy, Thayer School of Engineering at Dartmouth (USA); Wendy A. Wells, Dartmouth Hitchcock Medical Ctr. (USA); Keith D. Paulsen, Brian W. Pogue, Thayer School of Engineering at Dartmouth (USA); Jose M. Lopez-Higuera, Olga M. Conde, Univ. de Cantabria (Spain). . . [8230-39]

Development of a next-generation fully integrated hybrid FMT/XCT system, Maximilian Koch, Angelique B. F. Ale, Pouyan Mohajerani, Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany). . . . . [8230-40]

Courses of Related Interest

SC1013 Choosing the Correct Optical Filter for Your Application (Reichel) Tuesday, 1:30 to 5:30 pm

SC1054 Bio-Interferometry (Nolte) Sunday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Conference 8231

Wednesday-Thursday 25-26 January 2012 • Proceedings of SPIE Vol. 8231

Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications VIII

Conference Chairs: **Alexander N. Cartwright,** Univ. at Buffalo (USA); **Dan V. Nicolau,** Univ. of Liverpool (United Kingdom)

Program Committee: **Igal Brener,** Sandia National Labs. (USA); **Vamsy P. Chodavarapu,** McGill Univ. (Canada); **Philippe M. Fauchet,** Univ. of Rochester (USA); **Piotr Grodzinski,** National Cancer Institute (USA); **Brian D. MacCraith,** Dublin City Univ. (Ireland); **Ammasi Periasamy,** Univ. of Virginia (USA); **Paras N. Prasad,** Univ. at Buffalo (USA); **Weihong Tan,** Univ. of Florida (USA)

Wednesday 25 January

SESSION 1 . . . . . Wed. 10:30 to 11:50 am

Imaging I

Session Chair: **Dan V. Nicolau,** Univ. of Liverpool (United Kingdom)

Imaging caveolae-mediated transport of nanoparticles using superresolution microscopy, Zhenjia Wang, Chinnaswamy Tiruppathi, Richard Minshall, Asrar B. Malik, Univ. of Illinois at Chicago (USA) . . . . [8231-01]

Tunable near-infrared dispersive quantitative phase microscopy, Nelson Cardenas, Samarendra K. Mohanty, The Univ. of Texas at Arlington (USA) . . . . . [8231-02]

Multiprobe AFM bio-imaging: the next evolution in SPM, Aaron Lewis, Hebrew Univ. of Jerusalem (Israel); Rimma Dekhter, Galina Fish, Sofia Kokotov, Michael Kokotov, Hesham Taha, David Lewis, Nanonics Imaging Ltd. (Israel) . . . . . [8231-03]

Development of photonic force microscopy with chemical mapping function, Seungjin Heo, Kipom Kim, Yong-Hoon Cho, KAIST (Korea, Republic of) . . . . . [8231-04]

Lunch/Exhibition Break . . . . . 11:50 am to 1:30 pm

SESSION 2 . . . . . Wed. 1:30 to 3:10 pm

Imaging II

Session Chair: **Dan V. Nicolau,** Univ. of Liverpool (United Kingdom)

Multimodal spatially resolved near-field scattering and absorption spectroscopy, Edwin Ostertag, Tobias Merz, Rudolf W. Kessler, Reutlingen Univ. (Germany) . . . . . [8231-05]

Near-field coherent anti-Stokes Raman scattering microscopy using radially polarized light, Kenneth Er, Jian Lin, Zhiwei Huang, National Univ. of Singapore (Singapore) . . . . . [8231-06]

Investigation of nanostructure scattering and absorption for combined optical diagnostic and therapeutic applications, Myria Angelidou, Costas Pitris, Univ. of Cyprus (Cyprus) . . . . . [8231-07]

Tracking of optically trapped particle in three dimensions by off-axis digital holographic microscopy, Yoon-Sung Bae, Seung Bum Cho, Jong-In Song, Gwangju Institute of Science and Technology (Korea, Republic of); Dug Young Kim, Yonsei Univ. (Korea, Republic of) . . . . . [8231-08]

In vivo visualization of abnormal microvascular features in oral precancerous lesions by two-photon luminescence of gold nanorods, Gracie Vargas, Saam Motamedi, Kristopher Trahan, Tuya Shilagard, Kert Edward, Suimin Qiu M.D., The Univ. of Texas Medical Branch (USA) . . [8231-09]

SESSION 3 . . . . . Wed. 3:30 to 5:30 pm

Nanoparticles for Imaging and Sensing

Session Chair: **Alexander N. Cartwright,** Univ. at Buffalo (USA)

Double resonance light scattering from gold nanoparticles on interferometric surfaces, Karen Hayrapetyan, David D. Nolte, Cagri A. Savran, Khalid M. Arif, Purdue Univ. (USA) . . . . . [8231-10]

Diffraction-based nanoparticle biosensors, Hao Sun, Karen Hayrapetyan, David D. Nolte, Cagri A. Savran, Purdue Univ. (USA) . . . . . [8231-11]

Utilizing nonlinear optical properties of nanoparticles for imaging and sensing, Brian G. Yust, Neema Razavi, Francisco Pedraza, Dhiraj K. Sardar, The Univ. of Texas at San Antonio (USA) . . . . . [8231-12]

Toward the use of two-color emission control in upconverting $NaYF_4$:Er^{3+}, Yb^{3+} nanoparticles for biomedical imaging, Christian F. Gainer, Gihan S. Joshua, Marek Romanowski, The Univ. of Arizona (USA) . . . . . [8231-13]

Study on translating the nanoparticle-protein corona into microbubble contrast agents, Wen-Kai Chuang, Walter H. Chang, Tzu-Yun Huang, Ching-ta Chen, Chung Yuan Christian Univ. (Taiwan); Wen-Fu T. Lai, Taipei Medical Univ. Graduate Institute of Clinical Medicine (Taiwan); Cheng-An J. Lin, Chung Yuan Christian Univ. (Taiwan) . . . . . [8231-14]

Concentration and detection of bacteria in virtual environmental samples based on non-immunomagnetic separation and quantum dots by using a laboratory-made system, Zhi Cheng, Taihu Wu, Feng Chen, Yaohua Du, Biao Gu, Zijian Yang, Institute of Medical Equipment (China) . . . . . [8231-15]

Thursday 26 January

SESSION 4 . . . . . Thurs. 8:00 to 10:10 am

Nanostructures for Biomedical Applications I

Session Chair: **Natalia M. Litchinitser,** Univ. at Buffalo (USA)

Optical mapping by low-cost instrumentation and disposable chemically induced nanochannels *(Invited Paper)*, Philip J. R. Roche, Maurice C. Cheung, McGill Univ. (Canada); Lenore Beitel, Mark A. Trifiro M.D., Lady Davis Institute/ Jewish General Hospital (Canada); Andrew G. Kirk, Vamsy P. Chodavarapu, McGill Univ. (Canada) . . . . . [8231-16]

Surface-enhanced biodetection on a CMOS biosensor chip, Federico Belloni, Falko Pippig, Sylvain Contie, Florence Vicaire, PixinBio SA (France); Róisín M. Owens, Ecole Nationale Supérieure des Mines de Saint-Étienne (France); Hervé Rigneault, Institut Fresnel (France) . . . . . [8231-17]

Porous polymer-based optically selective nanostructures, Alexander N. Cartwright, Univ. at Buffalo (USA) . . . . . [8231-18]

Bragg-grating air-slot optical waveguide for label-free sensing, Aju S. Jugessur, James J. Dou, Mariya Yagnyukova, J. Stewart Aitchison, Univ. of Toronto (Canada) . . . . . [8231-19]

A nanorod polymer micro-array formed by microcontact printing, Philip J. R. Roche, Songzhe Wang, Maurice Cheung, Vamsy Chodavarapu, Andrew G. Kirk, McGill Univ. (Canada) . . . . . [8231-20]

Silicon cell culture templates with nanotopography: periodic nanostructures and random nanoporous topologies generated by high repetition-rate sub-15-femtosecond pulsed near-infrared laser light, Martin H. Straub, Aisada Uchugonova, Karsten König, Univ. des Saarlandes (Germany) . . . . . [8231-21]

SESSION 5 . . . . . Thurs. 10:50 am to 12:20 pm

Nanostructures for Biomedical Applications II

Session Chair: **Alexander N. Cartwright,** Univ. at Buffalo (USA)

Novel micro, nano, and meta structures for sensing *(Invited Paper)*, Natalia M. Litchinitser, Apra Pandey, Univ. at Buffalo (USA); Roshni Biswas, The Univ. of Southern California (USA); Tania Moein, Jinwei Zeng, Edward Furlani, Alexander N. Cartwright, Univ. at Buffalo (USA) . . . . . [8231-22]

Studying split mesa photonic crystal gratings for self-referencing in microfluidic optical biosensing, Ryan Schilling, Univ. of Toronto (Canada) . . . . . [8231-23]

Transmission characteristics of SWCNT-deposited microtapered long-period fiber gratings with the variation in O_2 gas, Young-Geun Han, Naram Jun, Whikun Yi, Hanyang Univ. (Korea, Republic of) . . . . . [8231-24]

Multifunctional cell therapeutics with plasmonic nanobubbles, Dmitri Lapotko, Rice Univ. (USA) . . . . . [8231-25]

Lunch/Exhibition Break . . . . . 12:20 to 1:50 pm

SESSION 6 . . . . . Thurs. 1:50 to 3:30 pm

Nanostructures for Biomedical Applications III

Session Chair: **Vamsy P. Chodavarapu,** McGill Univ. (Canada)

Periodic two-dimensional nanobottle structures for SERS applications, Haiping M. Chen, Lin Pang, Univ. of California, San Diego (USA); Grace M. Hwang, The MITRE Corp. (USA); Yeshaiahu Fainman, Univ. of California, San Diego (USA); Lee Cambrea, Naval Air Warfare Ctr. Weapons Div. (USA)[8231-26]

Raman spectroscopy hyperspectral imager based on volume Bragg gratings, Sébastien Blais-Ouellette, Marc Verhaegen, Stephane Marcet, Photon etc. Inc. (Canada); Richard Martel, Univ. de Montréal (Canada) . . . . . [8231-27]

Computer simulation of lipid bilayer detection using ion-sensitive field-effect transistors, Shigeyasu Uno, Ritsumeikan Univ. (Japan) . . . . . [8231-28]

Selective surface functionalization of zero-mode waveguides to study membrane dynamics in living cells, Chia-Fen Hsieh, Chih-Ting Chen, Shui-Chin Lai, Academia Sinica (Taiwan); Yii-Lih Lin, National Taiwan Univ. (Taiwan); Kuo-Tang Liao, Shengqin Wang, Po-Chieh Chiang, Chia-Fu Chou, Academia Sinica (Taiwan) . . . . . [8231-29]

FDTD simulation on refractive index sensitivity of bow-tie metallic nanostructure, Tingjun Luo, Weiping Zhang, Guangxi Univ. (China) . . . [8231-30]

Courses of Related Interest

SC463 Biophotonics (Prasad) Sunday, 8:30 am to 5:30 pm
SC1013 Choosing the Correct Optical Filter for Your Application (Reichel) Tuesday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8232

Saturday-Sunday 21-22 January 2012 • Proceedings of SPIE Vol. 8232

Colloidal Nanocrystals for Biomedical Applications VII

Conference Chairs: **Wolfgang J. Parak,** Philipps-Univ. Marburg (Germany); **Kenji Yamamoto,** National Ctr. for Global Health and Medicine (Japan); **Marek Osinski,** The Univ. of New Mexico (USA)

Program Committee: **Antigoni Alexandrou,** Ecole Polytechnique (France); **Maxime Dahan,** Lab. Kastler Brossel (France); **Jesus Martinez de la Fuente,** Univ. de Zaragoza (Spain); **Niko Hildebrandt,** Institut d'Électronique Fondamentale (France); **Jennifer Hollingsworth,** Los Alamos National Lab. (USA); **Thomas M. Jovin,** Max-Planck-Institut für biophysikalische Chemie (Germany); **Hedi Mattoussi,** The Florida State Univ. (USA); **Igor L. Medintz,** U.S. Naval Research Lab. (USA); **Paul Mulvaney,** The Univ. of Melbourne (Australia); **Jay L. Nadeau,** McGill Univ. (Canada); **Geoffrey F. Strouse,** The Florida State Univ. (USA); **Subramanian Tamil Selvan,** A*STAR Institute of Materials Research and Engineering (Singapore); **Claudia Tortiglione,** Istituto di Cibernetica Eduardo Caianiello (Italy); **Tania Q. Vu,** Oregon Health & Science Univ. (USA); **Horst Weller,** Univ. Hamburg (Germany)

Saturday 21 January

Welcome Remarks . . . . . Sat. 8:00 am

Session Chair: **Wolfgang J. Parak,** Philipps-Univ. Marburg (Germany)

SESSION 1 . . . . . Sat. 8:05 to 10:35 am

Targeting of Cellular Structures and Sensing

Session Chair: **Marek Osinski,** The Univ. of New Mexico (USA)

Interactions of gold nanoparticles and biological systems *(Invited Paper)*, Antonios G. Kanaras, Dorota Bartczak, Otto L. Muskens, Tilman Sanchez-Elsner, Timothy M. Millar, Univ. of Southampton (United Kingdom). . . . [8232-01]

Fluorescent diamond nanoparticle: a stable marker for the functional study of dendritic spines of mouse cortical neurons in culture *(Invited Paper)*, Loc Le Xuan, Ecole Normale Supérieure de Cachan (France); Aude-Marie Lepagnol-Bestel, Ctr. de Psychiatrie et Neurosciences (France) and Ctr. National de Génotypage (France); Marie-Pierre Adam, Ecole Normale Supérieure de Cachan (France); Géraldine Dantelle, Ecole Polytechnique (France); Huan-Cheng Chang, Institute of Atomic and Molecular Sciences (Taiwan); Michel Simonneau, Univ. Paris Descartes (France); François Treussart, Ecole Normale Supérieure de Cachan (France) . . . . . [8232-02]

Quantum-dots (QD) nanobiosensors for simultaneous dynamic measurements of multiple intracellular ions' concentrations, Lid B. Wong, Hua Mao, Yuchi Wang, Cytoptics Corp. (USA) . . . . . [8232-03]

Differences in reactive oxygen species generation by quantum dots: core material and ligand comparisons, Andrea Steinbrück, Amber Nagy, Yagnaseni Ghosh, Allison M. Dennis, Rashi S. Iyer, Jennifer A. Hollingsworth, Los Alamos National Lab. (USA) . . . . . [8232-04]

Aquatic organisms as new high-throughput systems for bio-non bio interactions *(Invited Paper)*, Alfredo Ambrosone, Valentina Marchesano, Lucia Mattera, Angela Tino, Claudia Tortiglione, Istituto di Cibernetica Eduardo Caianiello (Italy) . . . . . [8232-05]

Optical sensing of small ions with colloidal nanoparticles, Wolfgang J. Parak, Philipps-Univ. Marburg (Germany). . . . . [8232-06]

Biodegradable polymer nanocarriers for therapeutic sense and antisense microRNA delivery in living animals *(Invited Paper)*, Ramasamy Paulmurugan, Narayana M. Sekar, Thillai V. Sekar, Stanford Univ. School of Medicine (USA) . . . . . [8232-07]

SESSION 2 . . . . . Sat. 10:55 am to 1:15 pm

Loading of Cells with Nanoparticles and Toxic Effects

Session Chair: **Claudia Tortiglione,**
Istituto di Cibernetica Eduardo Caianiello (Italy)

Photothermal microscopy of metallic and magnetic nanoparticles in cells *(Invited Paper)*, Lara K. Bogart, Yann Cesbron, Umbreen Shaheen, Arthur W. Taylor, Raphael Levy, Univ. of Liverpool (United Kingdom) . . . . . [8232-08]

Synaptosomes as a platform for loading nanoparticles into synaptic vesicles, Daniel Chiu, University of Washington (USA) . . . . . [8232-09]

Peptide-mediated cellular delivery of quantum dots, Kelly Boeneman, James Delehanty, Michael Stewart, Kimihiro Susumu, U.S. Naval Research Lab. (USA); Juan B. Blanco-Canosa, Philip Dawson, The Scripps Research Institute (USA); Alan Huston, Igor Medintz, U.S. Naval Research Lab. (USA) . . . . . [8232-10]

Characterization and bioactivity study of nanohydroxyapatite on superhydrophilic vertically aligned carbon nanotubes using optical techniques, Anderson O. Lobo, Fernanda R. Marciano, Univ. do Vale do Paraíba (Brazil); Ana Maria E. Santo, Univ. Federal de São Paulo (Brazil); Joao L. Rangel, Univ. do Vale do Paraíba (Brazil); Ursula A. Mengui, Instituto Nacional de Pesquisas Espaciais (Brazil); Airton A. Martin, Univ. do Vale do Paraíba (Brazil); Evaldo J. Corat, Instituto Nacional de Pesquisas Espaciais (Brazil) . . . . . [8232-11]

Effective silencing of a proto-oncogene through nanoparticle mediated RNA interference in hydra-vulgaris, Claudia Tortiglione, Alfredo Ambrosone, Valentina Marchesano, Istituto di Cibernetica Eduardo Caianiello (Italy); Jesus M. de la Fuente, Instituto de Nanociencia de Aragon (Spain) . . . [8232-12]

CdTe/CdS-AMP quantum dots as fluorescent probes to label yeast cells: synthesis, characterization, and conjugation with Concanavalin A, Caetano P. Sabino, Camila Campos Santos, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Denise Azevedo, Univ. Federal de Pernambuco (Brazil); Ilka T. Kato, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Paulo E. Cabral Filho, Univ. Federal de Pernambuco (Brazil); Renato A. Prates, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Adriana Fontes, Beate S. Santos, Univ. Federal de Pernambuco (Brazil); Martha Simões Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil) . . . . . [8232-13]

Impact of nanomaterials on in vitro and in vivo systems: role of nanoscale features in nanotoxicology *(Invited Paper)*, Pier P. Pompa, Istituto Italiano di Tecnologia (Italy) . . . . . [8232-14]

Lunch/Exhibition Break . . . . . 1:15 to 2:15 pm

SESSION 3 . . . . . Sat. 2:15 to 3:05 pm

Selective Distruction and Delivery to Cells I

Session Chair: **Dorleta Jimenez de Aberasturi,**
Univ. del País Vasco (Spain)

Engineered nanoparticles for improved vasoactive intestinal peptide (VIP) applications in immune modulation *(Invited Paper)*, David Pozo Perez, Rebecca Klippstein, Ctr. Andaluz de Biologia Molecular y Medicina Regenerativa (Spain) . . . . . [8232-15]

Quantum dots: aluminium phthalocyanine conjugates perform the photodynamic therapy to kill cancer cells by FRET, Ji Yao Chen, Fudan Univ. (China) . . . . . [8232-16]

Courses of Related Interest

SC463 Biophotonics (Prasad) Sunday, 8:30 am to 5:30 pm
SC1013 Choosing the Correct Optical Filter for Your Application (Reichel) Tuesday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

SESSION 4 . . . . . Sat. 3:25 to 5:05 pm

Selective Distruction and Delivery to Cells II

Session Chair: **David Pozo Perez,** Ctr. Andaluz de Biologia Molecular y Medicina Regenerativa (Spain)

Small NIR-to-VIS upconverting nanoparticles for photodynamic therapy, Yong Zhang, Niagara Muhammad Idris, National Univ. of Singapore (Singapore) . . . . . [8232-17]

Photosensitization of InP/ZnS quantum dots for anti-cancer and anti-microbial applications, Jay L. Nadeau, Hicham Chibli, Lina Carlini, McGill Univ. (Canada) . . . . . [8232-18]

Cells as factories for humanized encapsulation, Dayang Wang, Univ. of South Australia (Australia) . . . . . [8232-19]

Antimicrobial properties of sub-nanometer silver clusters: a key to understand the biocide properties of silver? *(Invited Paper)*, M. Arturo Lopez Quintela, Univ. de Santiago de Compostela (Spain); Javier Calvo, Nanogap (Spain); Fernando Dominguez, Jose Neissa, Univ. de Santiago de Compostela (Spain); Jose Maria Leal, Begoña Garcia, Natalia Busto, Univ. de Burgos (Spain); Giampaolo Barone, Univ. degli Studi di Palermo (Italy) . . . . . [8232-20]

SESSION 5 . . . . . Sat. 5:05 to 6:15 pm

Nanoparticles for Imaging

Session Chair: **M. Arturo Lopez-Quintela,** Univ. de Santiago de Compostela (Spain)

Synthesis and characterization of fluorescent dyes: magnetic nanoparticles for bioimaging applications, Swee Kuan Yen, D. Janczewski, Surani Bin Dolmanan, Sudhiranjan Tripathy, Subramanian T. Selvan, A*STAR Institute of Materials Research and Engineering (Singapore) . . . . . [8232-21]

Multifunctional superparamagnetic nanocrystals for imaging and targeted drug delivery to the lung, Leisha M. Armijo, Yekaterina Brandt, The Univ. of New Mexico (USA); Dale L. Huber, Sandia National Labs. (USA); Nathan J. Withers, John B. Plumley, Nathaniel C. Cook, Antonio C. Rivera, Gennady A. Smolyakov, Surabhi Yadav, The Univ. of New Mexico (USA); Hugh D. C. Smyth, University of Texas Austin (USA); Marek Osinski, The Univ. of New Mexico (USA) . . . . . [8232-22]

Nanoparticles: present and future towards molecular imaging *(Invited Paper)*, Parasuraman Padmanabhan, Abma Asad, PWG Genetics Pte Ltd (Singapore) . . . . . [8232-23]

BiOS Hot Topics

Sat. 7:00 to 9:00 pm

BiOS Hot Topics details see page 13 or online http://spie.org/x7779.xml

Sunday 22 January

SESSION 6 . . . . . Sun. 8:00 to 10:10 am

Surface Modification and Bioconjugation of Nanoparticles I

Session Chair: **Jesus M. de la Fuente,** Univ. de Zaragoza (Spain)

Interaction of functionalized metallic nanoparticles with synthetic lipid membranes *(Invited Paper)*, Kislon Voitchovsky, Maria Ricci, Randy P. Carney, Francesco Stellacci, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8232-24]

Stable gold nanocolloids with controllable surface modification and functionalization, Wei Qian, Makoto Murakami, Yuki Ichikawa, Yong Che, IMRA America, Inc. (USA) . . . . . [8232-25]

Polymer coating of colloidal nanoparticles as a universal tool for tailoring properties toward biologically motivated experiments *(Invited Paper)*, Feng Zhang, Inner Mongolia Agricultual Univ. (China) . . . . . [8232-26]

Effects of LaF3:Ce nanoparticles capped with polyethylene glycol on human astrocytoma cells in vitro, Nathan J. Withers, Yekaterina Brandt, Antonio C. Rivera, Nathaniel C. Cook, Leisha M. Armijo, Marek Osiński, The Univ. of New Mexico (USA) . . . . . [8232-27]

Framing the nano-biointeractions by proteomics *(Invited Paper)*, Stefania Sabella, Istituto Italiano di Tecnologia (Italy) . . . . . [8232-28]

SESSION 7 . . . . . Sun. 10:30 am to 12:00 pm

Surface Modification and Bioconjugation of Nanoparticles II

Session Chair: **Jay L. Nadeau,** McGill Univ. (Canada)

Oriented conjugates of monoclonal and single-domain antibodies with quantum dots for flow cytometry and immunohistochemistry diagnostic applications *(Invited Paper)*, Alyona Sukhanova M.D., Univ. de Reims Champagne-Ardenne (France); Klervi Even-Desrumeaux, INSERM U624 (France); Jean-Marc Millot, Univ. de Reims Champagne-Ardenne (France); Patrick Chames, Daniel Baty, INSERM U624 (France); Mikhail Artemyev, Belarusian State Univ. (Belarus); Vladimir A. Oleinikov, Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry RAS (Russian Federation); Jacques H. Cohen M.D., Igor Nabiev, Univ. de Reims Champagne-Ardenne (France). . . . . [8232-29]

Functionalized nanoparticles for binding ions from biological fluids, Dorleta Jimenez de Aberasturi, Idoia Ruiz de Larramendi, Teófilo Rojo, Univ. del País Vasco (Spain); Jose Maria Montenegro Martos, Wolfgang J. Parak, Philipps-Univ. Marburg (Germany) . . . . . [8232-30]

Intracellular delivery of water dispersed CdTe/CdS quantum dots by fusogenic liposomes, Rafael Lira, Maria Seabra, Jessica Vasconcelos, Darlene Bezerra, Univ. Federal de Pernambuco (Brazil); Renato Grillo, Univ. Estadual de Campinas (Brazil); Nereide Magalhães, Oleg Krasilnikov, Univ. Federal de Pernambuco (Brazil); Eneida de Paula, Univ. Estadual de Campinas (Brazil); Beate Santos, Adriana Fontes, Univ. Federal de Pernambuco (Brazil). . [8232-31]

Multifunctional gold nanoparticles for gene silencing *(Invited Paper)*, Vanesa Sanz Beltran, Univ. de Zaragoza (Spain); Joao Conde, Univ. de Zaragoza (Spain) and Univ. Nova Lisboa (Portugal); Yulan Hernandez, M. Ricardo Ibarra, Pedro V. Baptista, Jesus Martinez de la Fuente, Univ. de Zaragoza (Spain) . . . . . [8232-32]

Lunch/Exhibition Break . . . . . 12:00 to 1:00 pm

BiOS

SESSION 8 . . . . . Sun. 1:00 to 3:20 pm

Magnetic Nanoparticles

Session Chair: **Subramanian Tamil Selvan,** A*STAR Institute of Materials Research and Engineering (Singapore)

Fighting cancer with magnetic nanoparticles and immunotherapy *(Invited Paper)*, Lucía Gutiérrez, Instituto de Ciencia de Materiales de Madrid (Spain); Raquel Mejias, Domingo F. Barber, Consejo Superior de Investigaciones Científicas (Spain); Sabino Veintemillas-Verdaguer, Carlos J. Serna, Instituto de Ciencia de Materiales de Madrid (Spain); Francisco J. Lázaro, Univ. de Zaragoza (Spain); Maria del Puerto Morales, Instituto de Ciencia de Materiales de Madrid (Spain) . . . . . [8232-33]

Magnetic properties of functionalized PdFe-based nanoparticles: specific absorption rate (SAR) measurements, Izaskun Gil de Muro, Idoia Castellanos, Luis Lezama, Maite Insausti, Fernando Plazaola, Teofilo Rojo, Univ. del País Vasco (Spain). . . . . [8232-34]

Photosensitizer-loaded magnetic vesicles as a new MRI-trackable biogenic nanoplatform for multimodal targeted cancer theranostics *(Invited Paper)*, Amanda Andriola Brun, Univ. Paris 7-Denis Diderot (France); Stephanie Bonneau, Univ. Pierre et Marie Curie (France); Nathalie Luciani, Florence Gazeau, Claire Wilhelm, Univ. Paris 7-Denis Diderot (France) . . . . . [8232-35]

Stability of iron oxide nanoparticles in aqueous dispersions after laser irradiation in starch environment, Alexander I. Omelchenko, Emil N. Sobol, Institute on Laser and Information Technologies (Russian Federation) . [8232-36]

Tailoring biocompatible Fe_3O_4 nanoparticles for applications to magnetic hyperthermia *(Invited Paper)*, Maite Insausti, Javier Salado, Idoia Castellanos, Luis Lezama, Izaskun Gil de Muro, Teófilo Rojo, Eneko Garaio, Fernando Plazaola, Univ. del País Vasco (Spain) . . . . . [8232-37]

Multifunctional fluorescent and magnetic nanoparticles for biomedical applications (Invited) *(Invited Paper)*, Subramanian T. Selvan, A*STAR Institute of Materials Research and Engineering (Singapore) . . . . . [8232-38]

SESSION 9 . . . . . Sun. 3:40 to 5:50 pm

Metal Nanoparticles

Session Chair: **Maite Insausti,** Univ. del País Vasco (Spain)

Chirality sensing by metal nanoparticles *(Invited Paper)*, Andres Guerrero-Martinez, Luis M. Liz-Marzan, Univ. de Vigo (Spain). . . . . [8232-39]

Optical properties and SERS enhancement of gold-silver alloy nanoparticles *(Invited Paper)*, David Rioux, Simon Vallières, Ecole Polytechnique de Montréal (Canada); Philip A. Munoz, Paul Peng, Eric Mazur, Harvard Univ. (USA); Michel Meunier, Ecole Polytechnique de Montréal (Canada) . . . . . [8232-40]

Increased nucleic acid density on gold nanoparticles, Timothy A. Larson, Denny Nguyen, Konstantin Sokolov, The Univ. of Texas at Austin (USA) . . . . . [8232-41]

Optically dense colloidal nanoparticles as discrete platforms for bio-SERS, Ramon A. Alvarez-Puebla, Univ. de Vigo (Spain) . . . . . [8232-42]

Highly organized complex plasmonic structures for biodiagnosis *(Invited Paper)*, Nicolas Pazos Perez, Andreas Fery, Univ. Bayreuth (Germany). [8232-43]

Inorganic capsules for drug delivery: biocompatible open nanoboxes, Victor F. Puntes, Institut Català de Nanotecnologia (Spain) . . . . . [8232-44]

Monday 23 January

SESSION 10 . . . . . Mon. 8:00 to 10:05 am

Optical Probes I

Session Chair: **Alf Mews,** Univ. Hamburg (Germany)

Are upcoverting Ln^{3+} based nanoparticles any good for deep tissue imaging with retention of optical sectioning? *(Invited Paper)*, Frank C. J. M. van Veggel, Univ. of Victoria (Canada) . . . . . [8232-45]

Glycine-coated photoluminescent silver nanoclusters, Vira V. Kravets, Kyle Culhane, Anatoliy O. Pinchuk, Univ. of Colorado at Colorado Springs (USA) . . . . . [8232-46]

Rare earth-doped $NaYF_4$ upconverting nanophosphors for tracking biological processes *(Invited Paper)*, Delia J. Milliron, Emory Chan, Alexis D. Ostrowski, Bruce E. Cohen, Daniel J. Gargas, P. James Schuck, Lawrence Berkeley National Lab. (USA) . . . . . [8232-47]

New synthetic route of CdTe/CdS quantum dot performed by electroreduction of Te0, Rogerio T. Ribeiro, Jessica Dias, Denilson Freitas, Mariana Monteiro, Adriana Fontes, Beate S. Santos, Marcelo Navarro, Giovannia A. Pereira, Univ. Federal de Pernambuco (Brazil) . . . . . [8232-48]

Colloidal upconverting Ln^{3+} doped nanoparticles: bio-imaging, cell tracking, and diagnostic medicine, John A. Capobianco, Concordia Univ. (Canada) . . . . . [8232-49]

Bandgap engineering of InP nanocrystal quantum dots through shell thickness and composition *(Invited Paper)*, Allison M. Dennis, Young-Shin Park, Benjamin D. Mangum, Han Htoon, Jennifer A. Hollingsworth, Los Alamos National Lab. (USA). . . . . [8232-50]

SESSION 11 . . . . . Mon. 10:20 am to 12:40 pm

Optical Probes II

Session Chair: **Kenji Yamamoto,** National Ctr. for Global Health and Medicine (Japan)

Quantum dot barcode labels for high-throughput screening assays using droplet microfluidics *(Invited Paper)*, Ralph A. Sperling, Adam R. Abate, Pascaline Mary, Tony Hung, David A. Weitz, Harvard Univ. (USA). . . . . [8232-51]

Understanding "giant" II-VI nanocrystal quantum dots by synthetic manipulations, and spectroscopic and electrochemical methods, Yagnaseni Ghosh, Benjamin D. Mangum, Han Htoon, Jennifer A. Hollingsworth, Los Alamos National Lab. (USA) . . . . . [8232-52]

Design and study of activatable ("OFF/ON") quantum dots (Qdots) for potential biomedical applications: Ligand selection for Qdot surface modification for controlling Qdot fluorescence quenching and restoration *(Invited Paper)*, Swadeshmukul Santra, Srijita Basumallick, Rajendra N. Mitra, Subhash Banerjee, Rikhav Shah, UCF NanoScience Technology Ctr. (USA) . . . . . [8232-53]

Optical spectroscopy of single semiconductor nanocrystals close to gold nanoparticles *(Invited Paper)*, Alf Mews, Xuedan Ma, Tobias Kipp, Univ. Hamburg (Germany); Luis M. Liz-Marzán, Univ. de Vigo (Spain) . . . . . [8232-54]

Facile synthesis of highly fluorescent metal nanoclusters and application in cellular imaging *(Invited Paper)*, Li Shang, René M. Dörlich, Stefan Brandholt, Naghmeh Azadfar, Karlsruher Institut für Technologie (Germany); Gerd Ulrich Nienhaus, Karlsruher Institut für Technologie (Germany) and University of Illinois at Urbana-Champaign (USA). . . . . [8232-55]

Conference 8233

Sunday-Tuesday 23-25 January 2011 • Proceedings of SPIE Vol. 8233

Reporters, Markers, Dyes, Nanoparticles, and Molecular Probes for Biomedical Applications

Conference Chairs: **Samuel Achilefu,** Washington Univ. in St. Louis (USA); **Ramesh Raghavachari,** U.S. Food and Drug Administration (USA)

Program Committee: **Ashok Kumar Mishra,** Indian Institute of Technology Madras (India); **Bohumil Bednar,** Merck & Co., Inc. (USA); **Mikhail Berezin,** Washington Univ. in St. Louis (USA); **Richard B. Dorshow,** Covidien (USA); **Paul M. W. French,** Imperial College London (United Kingdom); **Yueqing Gu,** China Pharmaceutical Univ. (China); **Hisataka Kobayashi,** National Institutes of Health (USA); **D. Michael Olive,** LI-COR Biosciences (USA); **Gabor Patonay,** Georgia State Univ. (USA); **Attila Tarnok,** Univ. Leipzig (Germany); **Yasuteru Urano,** The Univ. of Tokyo (Japan)

Monday 23 January

SESSION 1 . . . . . Mon. 8:05 to 10:00 am

Molecular Probes for Targeted Imaging and Therapy

Session Chair: **Samuel Achilefu,**
Washington Univ. School of Medicine in St. Louis (USA)

SESSION 2 . . . . . Mon. 10:30 to 11:55 am

NIR Probes for Molecular Imaging

Session Chair: **Ashok Kumar Mishra,**
Indian Institute of Technology Madras (India)

Lunch/Exhibition Break . . . . . 11:55 am to 1:30 pm

SESSION 3 . . . . . Mon. 1:30 to 3:00 pm

Nonbleaching and Ultrasmall Fluorescent Tags I

Joint Session with Conference 8272

Session Chairs: **Ramesh Raghavachari,** U.S. Food and Drug Administration (USA); **Philip R. Hemmer,** Texas A&M Univ. (USA)

SESSION 4 . . . . . Mon. 3:30 to 5:00 pm

Nonbleaching and Ultrasmall Fluorescent Tags II

Joint Session with Conference 8272

Session Chairs: **Ramesh Raghavachari,** U.S. Food and Drug Administration (USA); **Philip R. Hemmer,** Texas A&M Univ. (USA)

POSTERS-MONDAY . . . . . Mon. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Interaction of 7-hydroxyquinoline with human serum albumin: revealing the mode of molecular recognition, Najla Al-Lawatia, Thomas Steinbrecher, Osama K. Abou-Zied, Sultan Qaboos Univ. (Oman) . . . . . [8233-03]

Strain-hardening effect of graphene on a chain of the chitosan for the tissue engineering, Olga E. Glukhova, Irina V. Kirillova, N.G. Chernyshevsky Saratov State Univ. (Russian Federation); Vladimir V. Nechaev, Saratov State Technology Univ. (Russian Federation); Anna S. Kolesnikova, N.G. Chernyshevsky Saratov State Univ. (Russian Federation) . . . . . [8233-09]

The observation research of the differences in cell death and reactive oxygen species in the process of infecting Arabidopsis with avirulent strains, Wen Li Chen D.D.S., Hua Bing Liu, South China Normal Univ. (China) . . . . . [8233-15]

The observation of mitochondrial movement and ATG5 position in Arabidopsis during the process of infection with virulent and avirulent P. syringae strains, Wen Li Chen D.D.S., Liu Yang, South China Normal Univ. (China) . . . . . [8233-16]

Fluorescent nanodiamonds as highly stable biomarker for endotoxin verification, Thorsten Bergmann, Jan Michael Burg, Maria Lilholt, Ulf Maeder, Sebastian Beer, Denise Salzig, Mehrdad Ebrahimi, Martin Fiebich, Peter Czermak, Technische Hochschule Mittelhessen (Germany) . . . . . [8233-40]

Real-time point-of-care measurement of impaired renal function in a rat acute injury model employing exogenous fluorescent tracer agents, Richard B. Dorshow, Richard M. Fitch, Jolette K. Wojdyla, Amruta R. Poreddy, John N. Freskos, Raghaven Rajagopalan, Covidien (USA) . . . . . [8233-45]

Tuesday 24 January

SESSION 5 . . . . . Tues. 8:00 to 10:00 am

Imaging Molecular Processes with Fluorescent Reporters

Session Chair: **Gabor Patonay,** Georgia State Univ. (USA)

Pharmacokinetics of bioconjugated ICG-micellar nanocapsules for optical molecular imaging: preclinical and toxic studies, Yong-Ping Chen, Toufic Jabour, Xingde Li, The Johns Hopkins Univ. (USA) . . . . . [8233-17]

Effect of capsid protein and ICG mass ratio on fluorescent quantum yield of plant virus-resembling optical nanomaterials, Sharad Gupta, Gerardo Ico, Paul Matsumura, Yadir Guerrero, Ayala L. N. Rao, Valentine I. Vullev, Bahman Anvari, Univ. of California, Riverside (USA) . . . . . [8233-26]

Selective detection of peritoneal ovarian cancer micrometastases by microendoscopic imaging of a photoimmunoconjugate, Bryan Q. Spring, Xiang Zheng, Adnan O. Abu-Yousif, Tayyaba Hasan, Massachusetts General Hospital (USA) . . . . . [8233-55]

Imaging B. anthracis heme catabolism in living mouse using the IFP1.4 gene reporter, Banghe Zhu, Holly Robinson, Nathaniel Wilganowski, The Univ. of Texas Health Science Ctr. at Houston (USA); Christopher L. Nobles, Baylor College of Medicine (USA); Eva M. Sevick-Muraca, The Univ. of Texas Health Science Ctr. at Houston (USA); Anthony Maresso, Baylor College of Medicine (USA) . . . . . [8233-36]

Development of anti-HER2 conjugated ICG-loaded polymeric nanoparticles for targeted optical imaging of ovarian cancer, Baharak Bahmani, Jack Tang, Jason Crovisier, Valentine I. Vullev, Bahman Anvari, Univ. of California, Riverside (USA) . . . . . [8233-50]

Variants of monomeric red fluorescent protein at residue 66: spectral and individual photophysical properties, Alexandr A. Banishev, Institute on Laser and Information Technologies (Russian Federation); Evgeny P. Vrzheshch, Nazim Usmanov, Alexander M. Saletsky, Lomonosov Moscow State Univ. (Russian Federation) . . . . . [8233-13]

SESSION 6 . . . . . Tues. 10:30 am to 12:25 pm

Fluorescence: Lifetime Imaging and Spectroscopy

Session Chair: **Mikhail Y. Berezin,** Washington Univ. School of Medicine in St. Louis (USA)

Targeted probes for fluorescence intensity and lifetime imaging exploiting a series of new nir dyes and ph-sensitive fluorophores *(Invited Paper)*, Jutta Pauli, Bundesanstalt für Materialforschung und -prüfung (Germany); Julia Mathejczyk, Max-Planck-Institut für experimentelle Medizin (Germany); Markus Grabolle, Bundesanstalt für Materialforschung und -prüfung (Germany); Janis Berkemeyer, Freie Univ. Berlin (Germany); Frauke Alves, Max-Planck-Institut für experimentelle Medizin (Germany); Kai Licha, mivenion GmbH (Germany); Ute Resch-Genger, Bundesanstalt für Materialforschung und -prüfung (USA) . . . . . [8233-60]

Measuring calpain activity in vivo using lifetime imaging of a far red biosensor, Daniel W. Stuckey, James McGinty, Romain Laine, Imperial College London (United Kingdom); Vadim Y. Soloviev, Univ. College London (United Kingdom); Dominic J. Wells, The Royal Veterinary College (United Kingdom); Simon R. Arridge, Univ. College London (United Kingdom); Joseph V. Hajnal, Paul M. W. French, Imperial College London (United Kingdom); Alessandro Sardini, MRC Clinical Sciences Ctr. (United Kingdom) . . . . . [8233-07]

Monitoring tunable, pH responsive nanoprobes using Raster-scan image correlation spectroscopy, Salim Abdisalaam, The Univ. of Texas at Arlington (USA) . . . . . [8233-46]

Amyloid diagnostics: probing protein aggregation and conformation with ultrasensitive fluorescence detection *(Invited Paper)*, Rajiv Abhyankar, Niraj K. Singh, Bidyut Sarkar, Suman Nag, Tata Institute of Fundamental Research (India); Chandrakesan Muralidharan, Seth G. S. Medical College (India); Debanjan Bhowmik, Banakanidhi Sahoo, Tata Institute of Fundamental Research (India); Sucheta Dandekar, Seth G. S. Medical College (India); Sudipta Maiti, Tata Institute of Fundamental Research (India) . . . . . [8233-47]

Time-domain Imaging with Quench-based Fluorescent Contrast Agents *(Invited Paper)*, Walter J. Akers, Metasebya Solomon, Gail P. Sudlow, Samuel Achilefu, Mikhail Y. Berezin, Washington Univ. School of Medicine in St. Louis (USA) . . . . . [8233-64]

Lunch/Exhibition Break . . . . . 12:25 to 1:30 pm

NANO/BIOPHOTONICS PLENARY SESSION . . . . . Tues. 1:30 pm

Single-molecule active control microscopy for nanoscale 3D cell images

W. E. Moerner, Stanford Univ.

SESSION 7 . . . . . Tues. 2:30 to 4:20 pm

Fluorescence Foundations for Probing and Imaging

Session Chair: **Ramesh Raghavachari,** U.S. Food and Drug Administration (USA)

Excited-state prototropism-based fluorescent molecular probes for lipid bilayer membranes, Ashok Kumar Mishra, Monalisa Mohapatra, Indian Institute of Technology Madras (India) . . . . . [8233-54]

Iridium complex probes for monitoring of cellular oxygen levels and imaging of hypoxic tissues *(Invited Paper)*, Seiji Tobita, Toshitada Yoshihara, Atsushi Kobayashi, Kazuki Ichikawa, Gunma Univ. (Japan); Masahiro Hosaka, Akita Prefectural Univ. (Japan); Toshiyuki Takeuchi, Gunma Univ. (Japan) . . . . . [8233-52]

Strategic research for enhancement of drug solubilization and drug desorption *(Invited Paper)*, Nitin Chattopadhyay, Jadavpur Univ. (India) . . . . . [8233-53]

SESSION 8 . . . . . Tues. 4:20 to 5:45 pm

Multiphoton Imaging Probes

Session Chair: **Hisataka Kobayashi,** National Institutes of Health (USA)

One-photon and two-photon fluorescence folate receptor bioimaging with an aggregation-enhanced emission silica nanoprobe *(Invited Paper)*, Kevin D. Belfield, Xuhua Wang, Alma R. Morales, Univ. of Central Florida (USA); Takeo Urakami, Masanobu Komatsu, Sanford-Burnham Medical Research Institute (USA); Lifu Zhang, Univ. of Central Florida (USA) . . . . . [8233-06]

In vivo track the development of melanoma with the intrinsic third harmonic generation and two-photon fluorescence contrasts of melanin, Pei-chun Wu, Tzu-Ming Liu, Yu-Shing Chen, Yuan Tsung Hsieh, Han-wen Liu, Wen-li Lin, National Taiwan Univ. (Taiwan) . . . . . [8233-08]

Multiphoton fluorescence spectra and lifetimes of biliverdins and their protein-associated complex, Chin-Jie Huang, Cheng-Ham Wu, Tzu-Ming Liu, National Taiwan Univ. (Taiwan) . . . . . [8233-24]

Detection of neurotransmitters by surface enhanced Raman scattering (SERS) within hollow-core photonic crystal fiber, Vidhu S. Tiwari, Altaf Khetani, Ali Momenpour, Hanan Anis, Vance Trudeau, Univ. of Ottawa (Canada) . . . . . [8233-27]

Wednesday 25 January

SESSION 9 . . . . . Wed. 8:15 to 10:00 am

Organic Nano Particles for Biomedical Imaging

Session Chair: **Yasuteru Urano,** The Univ. of Tokyo (Japan)

Design of peptide-conjugated glycol chitosan nanoparticles for near-infrared fluorescent (NIRF) in vivo imaging of bladder tumors *(Invited Paper)*, Jaehong Key, Deepika Dhawan, Deborah K. Knapp, Purdue Univ. (USA); Kwangmeyung Kim, Ick Chan Kwon, Kuiwon Choi, Korean Institute of Science and Technology (Korea, Republic of); James F. Leary, Purdue Univ. (USA) . . . . . [8233-33]

Plant virus-resembling optical nanoparticles conjugated with anti-EGFR for targeted cancer imaging, Sharad Gupta, Hailey Wilder, Ayala L. N. Rao, Bahman Anvari, Univ. of California, Riverside (USA). . . . . [8233-25]

Active Brain Targeting of Hydrophilic Substances Using Polymeric Magnetic Nanoparticles, El Mostafa Sadoqi, Bharat Kirthivasan, Murali Mohan Bommana, St. John's Univ. (USA); Sangram Raut, Univ. of North Texas Health Science Ctr. at Fort Worth (USA); Dhirender Singh, Univ. of Nebraska Medical Ctr. (USA); Emilio Squillante III, St. John's Univ. (USA). . . . . [8233-61]

Synthesis and characterization of a novel folate-conjugated themoresponsive micelles, Jing Jin, Yueqing Gu, Jianpeng Xue, Sisi Cui, Jie Cao, Dongyin Zhang, China Parmaceutical Univ. (China). . . . . [8233-29]

Multi-modal in cellulo evaluation of NPR-C targeted C-ANF-peptide and C-ANF-comb nanoparticles, Monica Shokeen, Washington Univ. School of Medicine in St. Louis (USA); Eric Pressly, Univ. of California, Santa Barbara (USA); Michael J. Welch, Washington Univ. School of Medicine in Saint Louis (USA); Craig J. Hawker, Univ. of California, Santa Barbara (USA); Pamela K. Woodard, Washington Univ. School of Medicine in Saint Louis (USA); Samuel Achilefu, Washington Univ. School of Medicine in St. Louis (USA) . . . . [8233-62]

SESSION 10 . . . . . Wed. 10:30 am to 12:10 pm

Gold Nanoparticles for Molecular Imaging

Session Chair: **Richard B. Dorshow,** Covidien (USA)

Plasmonic nanosensors for molecular photoacoustic imaging of regional micrometastasis, Aristarchos Papagiannaros, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); Geoffrey P. Luke, Justina O. Tam, The Univ. of Texas at Austin (USA); Stanislav Emelianov, Konstantin Sokolov, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA) . . . . . [8233-38]

Calibrating the imaging and therapy performance of magneto-fluorescent gold nanoshells for breast cancer, Adam E. Dowell, Nrusingh C. Biswal, Baylor College of Medicine (USA); Ciceron Ayala-Orozco, Rice Univ. (USA); Mario Giuliano, Wenxue Chen, Rachel Schiff, Baylor College of Medicine (USA); Naomi J. Halas, Rice Univ. (USA); Amit Joshi, Baylor College of Medicine (USA) . . . . . [8233-37]

Characterization of Matriptase sensitive gold nanoparticle for early tumor detection in vivo, Dongyin Zhang, Jianpeng Xue, Jie Cao, Sisi Cui, Jing Jin, Yueqing Gu, China Pharmaceutical Univ. (China). . . . . [8233-28]

Gold nanoparticles heated by x-rays for applications to cancer therapies, Renat R. Letfullin, Rose-Hulman Institute of Technology (USA); Brent Murphy, Radiological Technologies Univ. -VT (USA); Colin W. Rice, Rose-Hulman Institute of Technology (USA) . . . . . [8233-32]

Silica-coated gold nanorods optimized for 1064-nm photoacoustic molecular imaging, Yun-Sheng Chen, David Xu, Wolfgang Frey, Stanislav Y. Emelianov, The Univ. of Texas at Austin (USA). . . . . [8233-42]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 11 . . . . . Wed. 1:30 to 3:30 pm

Inorganic Nanoparticles for Biological Applications

Session Chair: **Yueqing Gu,** China Pharmaceutical Univ. (China)

Self-illuminating nanoprobe for in vivo imaging of cancers over-expressing the folate receptor, Steve C. Miller, Zymera, Inc. (USA); Lucia Beviglia, Pete Yeung, Oncomed Pharmaceuticals (USA); Sukanta Bhattacharyya, Daniel Sobek, Zymera, Inc. (USA) . . . . . [8233-41]

Receptor-targeted synergistic nanocarriers for multimodality imaging, Michael A. McDonald, Johns Hopkins Nuclear Medicine (USA). . . . . [8233-48]

Dual modality photothermal OCT and magnetic resonance imaging with carbon nanotubes, Jason M. Tucker-Schwartz, Tu Hong, Daniel C. Colvin, Yaqiong Xu, Melissa C. Skala, Vanderbilt Univ. (USA) . . . . . [8233-59]

Super-strong nanoindentors for biomedical applications based on the bamboo-like nanotubes, Olga E. Glukhova, Anna S. Kolesnikova, Roman Zhnichkov, N.G. Chernyshevsky Saratov State Univ. (Russian Federation) . . . . . [8233-10]

Highly efficient phosphors in cancer sensing and PDT, Brian G. Yust, Lawrence C. Mimun, Dhiraj K. Sardar, Gangadharan Ajith Kumar, The Univ. of Texas at San Antonio (USA); Peter J. Hornsby, Jason Rocha, The Univ. of Texas Health Science Ctr. at San Antonio (USA). . . . . [8233-34]

Magnetomotive optical coherence elastography for monitoring tissue stiffness changes induced by magnetic hyperthermia, Jongsick Kim, Adeel Ahmad, Vasilica Crecea, Boris M. Odintsov, Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign (USA). . . . . [8233-39]

SESSION 12 . . . . . Wed. 4:00 to 6:05 pm

Fluorescent Biosensors and Methods

Session Chair: **D. Michael Olive,** LI-COR Biosciences (USA)

Metal-enhanced fluorescence improves the detection of reactive oxygen species in vivo *(Invited Paper)*, Niren Murthy, Georgia Tech Research Institute (USA) . . . . . [8233-18]

Autophagy plays a role in chloroplast degradation (chloropahgy) in Arabidopsis during the process of avirulent Pst DC3000(avrRps4) strain infection, Wen Li Chen D.D.S., JunJian Dong, South China Normal Univ. (China) . . . . . [8233-14]

Beta-galactosidase fluorescence probe with improved cellular accumulation based on spirocyclized rhodol scaffold, Mako Kamiya, Daisuke Asanuma, The Univ. of Tokyo (Japan); Erina Kuranaga, RIKEN (Japan); Masayo Sakabe, The Univ. of Tokyo (Japan); Masayuki Miura, The Univ of Tokyo (Japan); Tetsuo Nagano, Yasuteru Urano, The Univ. of Tokyo (Japan). . . . . [8233-30]

Tracking single cells in live animals using a photoconvertible near-infrared cell membrane label, Alicia L. Carlson, Joji Fujisaki, Massachusetts General Hospital (USA); Cristina Lo Celso, Imperial College London (United Kingdom); Juwell Wu, Joel A. Spencer, David T. Scadden, Massachusetts General Hospital (USA); Terry B. Strom, Beth Israel Deaconess Medical Ctr. (USA); Charles P. Lin, Massachusetts General Hospital (USA) . . . . . [8233-35]

Cellular preferential uptake of NIR fluorophore in tumor for lesion malignancy screening, Kuo-Chih Liao, National Chung Hsing Univ. (Taiwan) . . . . . [8233-51]

Raman microscopy of ex vivo tissue culture reveals circadian rhythms in bone mineralization, John-David P. McElderry, Guisheng Zhao, Renny T. Franceschi, Michael D. Morris, Univ. of Michigan (USA). . . . . [8233-44]

Courses of Related Interest

SC463 Biophotonics (Prasad) Sunday, 8:30 am to 5:30 pm
SC1013 Choosing the Correct Optical Filter for Your Application (Reichel) Tuesday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8234

Sunday-Tuesday 22-24 January 2012 • Proceedings of SPIE Vol. 8234

Plasmonics in Biology and Medicine IX

Conference Chairs: **Tuan Vo-Dinh,** Duke Univ. (USA); **Joseph R. Lakowicz,** Univ. of Maryland School of Medicine (USA)

Program Committee: **Albert Claude Boccara,** Ecole Supérieure de Physique et de Chimie Industrielles (France); **Michael T. Canva,** Lab. Charles Fabry (France); **Volker Deckert,** Institut für Photonische Technologien e.V. (Germany); **Bruce S. Dunn,** Univ. of California, Los Angeles (USA); **Christopher D. Geddes,** Univ. of Maryland, Baltimore (USA); **Zygmunt Karol Gryczynski,** Univ. of North Texas Health Science Ctr. at Fort Worth (USA); **Naomi J. Halas,** Rice Univ. (USA); **Jiri Homola,** Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic); **Aaron Ho-Pui,** The Chinese Univ. of Hong Kong (); **Laura Maria Lechuga,** Ctr. d'Investigacions en Nanociència i Nanotecnologia (Spain); **Boris Mizaikoff,** Univ. Ulm (Germany); **Shuming Nie,** Emory Univ. (USA); **Weihong Tan,** Univ. of Florida (USA); **Andrew Taton,** Univ. of Minnesota, Twin Cities (USA); **Richard P. Van Duyne,** Northwestern Univ. (USA); **Jeffrey I. Zink,** Univ. of California, Los Angeles (USA)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:00 to 10:10 am

Plasmonics and SERS I

Session Chair: **Tuan Vo-Dinh,** Duke Univ. (USA)

TBD *(Invited Paper)*, , ... [8234-01]

Gold nanoparticle tags for SERS-based imaging of human glioblastoma cells, Laura Fabris, Bryan J. Paladini, Prabhas V. Moghe, Dominik J. Naczynski, Rutgers, The State Univ. of New Jersey (USA) . . . . . [8234-02]

SERS nanoprobes based on gold-silver alloy nanoparticles produced by femtosecond laser processing, David Rioux, Sam Osseiran, Sébastien Besner, Ecole Polytechnique de Montréal (Canada); Natalie Tam, Alexandre Albanese, Anna Lee, Christina M. MacLaughlin, Gilbert C. Walker, Eugenia Kumacheva, Gang Zheng, Warren C. W. Chan, Univ. of Toronto (Canada); Michel Meunier, Ecole Polytechnique de Montréal (Canada) . . . . . [8234-03]

SERS enhancement of Ag nanoparticle patterns embedded in glass by two-step ion exchange, Ya Chen, Lasse Karvonen, Aalto Univ. (Finland); Antti Säynätjoki, Aalto Univ. School of Science and Technology (Finland); Ari Tervonen, Seppo K. Honkanen, Aalto Univ. School of Electrical Engineering (Finland) . . . . . [8234-04]

Plasmonic nanostructures on the basis of Ag covered PMMA gratings, Matthias Zeisberger, Institut für Photonische Technologien e.V. (Germany); Karina Weber, Institut für Photonische Technologien e.V. (Germany) and Friedrich-Schiller-Univ. Jena (Germany); Uwe Hübner, Henrik Schneidewind, Roland Mattheis, Institut für Photonische Technologien e.V. (Germany); Dana Cialla, Jürgen Popp, Institut für Photonische Technologien e.V. (Germany) and Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8234-05]

Optimization of SERS enhancement from nanostructured metallic substrate based on arrays of inverted pyramids, and investigation of effect of lattice non-symmetry, Swe Z. Oo, Martin D.B. Charlton, Univ. of Southampton (United Kingdom); David Eustice, Renishaw plc (United Kingdom) . . . . . [8234-06]

SESSION 2 . . . . . Sun. 10:40 am to 12:00 pm

Plasmonics and SERS II

Session Chair: **Tuan Vo-Dinh,** Duke Univ. (USA)

Surface-enhanced Raman scattering for label-free protein detection and identification, Mustafa Culha, Sercan Keskin, Yeditepe Univ. (Turkey) [8234-07]

Deep-UV surface-enhanced resonance Raman scattering for ultrasensitive detection of biomolecules, Shankar Kumar Jha, ETH Zurich (Switzerland); Yasin Ekinci, ETH Zurich (Switzerland) and Paul Scherrer Institut (Switzerland); Mario Agio, Jörg Löffler, ETH Zurich (Switzerland) . . . . . [8234-08]

Controllable cavity rim opening of up-right nanocrescents leading to repeatable SERS measurements, Haiping M. Chen, Lin Pang, Univ. of California, San Diego (USA); Grace M. Hwang, The MITRE Corp. (USA); Andrew King, Renishaw Inc. (USA); Yeshaiahu Fainman, Univ. of California, San Diego (USA) . . . . . [8234-09]

Surface-enhanced Raman scattering and microwave absorption in silver nanoparticle inks, Manuel A. Figueroa, Drexel Univ. (USA); Stephen A. Schraer, Villanova Univ. (USA); Kambiz Pourrezaei, Somdev D. Tyagi, Drexel Univ. (USA) . . . . . [8234-10]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Sun. 1:30 to 3:10 pm

Plasmonics Detection and Imaging

Session Chair: **Tuan Vo-Dinh,** Duke Univ. (USA)

EGF conjugated nanoparticles for imaging EGFR over-expressing cells using surface enhanced Raman spectroscopy, Leanne Lucas, Kevin Hewitt, Dalhousie Univ. (Canada) . . . . . [8234-11]

Intravital confocal Raman microscopy with multiplexed SERS contrast agents, Patrick McVeigh, Univ. of Toronto (Canada); Brian Wilson, Univ. of Toronto (Canada) and Univ. Health Network (Canada) . . . . . [8234-12]

Molecular imaging with surface-enhanced CARS on nanostructures, Sumeet Mahajan, Jeremy J. Baumberg, Christian Steuwe, Univ. of Cambridge (United Kingdom) . . . . . [8234-13]

Intracellular multiplex detection and imaging of stable chemisorbed labels by SERS, Narayana M. Sirimuthu, Christopher D. Syme, Jonathan M. Cooper, Univ. of Glasgow (United Kingdom) . . . . . [8234-14]

Plasmonic nanobubbles for cell theranostics, Dmitri Lapotko, Rice Univ. (USA) . . . . . [8234-15]

SESSION 4 . . . . . Sun. 3:40 to 5:20 pm

Plasmonic Biosensing

Session Chair: **Joseph R. Lakowicz,** Univ. of Maryland School of Medicine (USA)

Plasmonic gold nanorods as nanorheology probes in diffusion-sensitive optical coherence tomography, Raghav K. Chhetri, The Univ. of North Carolina at Chapel Hill (USA); Krystian A. Kozek, Aaron C. Johnston-Peck, Joseph B. Tracy, North Carolina State Univ. (USA); Amy L. Oldenburg, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [8234-16]

A magnetic-field enriched surface-enhanced resonance Raman spectroscopy strategy towards the early diagnosis of malaria, Yuen Clement, Quan Liu, Nanyang Technological Univ. (Singapore) . . . . . [8234-17]

Characterisation of individual microdroplets by multiplex SERRS spectroscopy, Christopher D. Syme, Narayana M.S. Sirimuthu, Chiara Martino, Rama Yusvana, Jonathan M. Cooper, Univ. of Glasgow (United Kingdom) . . . . . [8234-18]

Experimental investigation of droplet biosensing by multiwavelength plasmonic, Caroline Desfours, Serge Habraken, Juriy Hastanin, Cedric Lenaerts, Karl Fleury-Frenette, Univ. de Liège (Belgium) . . . . . [8234-19]

Ultrasensitive system for the real-time detection of H_2O_2 based on strong coupling in a bioplasmonic system, Shourya Dutta Gupta, Guillaume Suarez, Christian Santschi, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Lucienne Juillerat-Jeanneret, Ctr. Hospitalier Univ. Vaudois (Switzerland); Olivier J. F. Martin, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8234-20]

Monday 23 January

SESSION 5 . . . . . Mon. 8:00 to 10:10 am

Plasmonic Nanostructures

Session Chair: **Joseph R. Lakowicz,**
Univ. of Maryland School of Medicine (USA)

TBD *(Invited Paper)*, , ... [8234-21]

Surface plasmon resonance detection enhancement using colocalization of near-fields and target molecules, Yonghwi Kim, Youngjin Oh, Wonju Lee, Donghyun Kim, Yonsei Univ. (Korea, Republic of) . . . . . [8234-22]

Localized surface plasmonic resonant based on bow-tie type metallic nanostructure, Tingjun Luo, Lin Pang, Weiping Zhang, Guangxi Univ. (China) . . . . . [8234-23]

Hybrid nanoparticle and thin film SPR biosensor with a high figure of merit, Arash Farhang, Olivier J. F. Martin, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8234-24]

Label-free biosensing based on multilayer plasmonic nanocomposites and a cationic polymeric transducer, Danny Brouard, Félix-Antoine Lavoie, Olivier Ratelle, Denis Boudreau, Univ. Laval (Canada). . . . . [8234-25]

Radiative-SPR platform for the detection of small proteins, Beniamino Sciacca, Alexandre Francois, Peter Hoffmann, Julie Brazzatti, Manuela Klingler-Hoffmann, Tanya Monro, The Univ. of Adelaide (Australia) . . . . . [8234-26]

SESSION 6 . . . . . Mon. 10:40 am to 12:00 pm

Plasmonics and Fluorescence I

Session Chair: **Joseph R. Lakowicz,**
Univ. of Maryland School of Medicine (USA)

Controlled fluorescence emission via surface modes on dielectric and metallo-dielectric multistack, Emiliano Descrovi, Politecnico di Torino (Italy) . . . . . [8234-27]

Green CdTe/CdS quantum dots fluorescence enhancement by core-shell silver nanoparticles, Luciana S.A. de Melo, Claudilene R. Chaves, Univ. Federal de Pernambuco (Brazil); Sybele Saska, Karina Nigoghossian, Sidney J. L. Ribeiro, Younes Messaddeq, Univ. Estadual Paulista (Brazil); Anderson S. L. Gomes, Beate S. Santos, Renato E. de Araujo, Adriana Fontes, Univ. Federal de Pernambuco (Brazil). . . . . [8234-28]

Non-centrosymmetric metallic nanoparticles as new efficient nonlinear nanoemitters, Sophie Brasselet, Institut Fresnel (France); Hong Shen, Ngoc Nguyen, Univ. de Technologie Troyes (France); Vincent Maillard, David Gachet, Institut Fresnel (France); Timothée Toury, Univ. de Technologie Troyes (France) . . . . . [8234-29]

Surface plasmon enhanced-field fluorescence biosensor for point-of-care testing using fluorescent nanoparticles, Kazuyoshi Horii, Toshihito Kimura, Hisashi Ohtsuka, Noriyuki Kasagi, Tomoya Oohara, Tadahiro Matsuno, Masashi Hakamata, Akihiro Komatsu, Tomonari Sendai, FUJIFILM Corp. (Japan). . . . . [8234-30]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 7 . . . . . Mon. 1:30 to 3:10 pm

Plasmonics and Fluorescence II

Session Chair: **Joseph R. Lakowicz,**
Univ. of Maryland School of Medicine (USA)

Fluorescence enhancements and spectral modifications near the cut-off frequency of plasmonic structure, Kareem Elsayad, Research Institute of Molecular Pathology (Austria); Alexander Urich, Technische Univ. Wien (Austria); Maria Nemethova, John V. Small, Institute of Molecular Biotechnology GmbH (Austria); Karl Unterrainer, Technische Univ. Wien (Austria); Katrin Heinze, Research Institute of Molecular Pathology (Austria) and Univ. of Würzburg (Germany) . . . . . [8234-31]

Superresolution axial sensitivity in plasmonic fluorescence cellular assays of protein internalisation, Nicholas I. Cade, Gilbert O. Fruhwirth, Tony C. Ng, David R. Richards, King's College London (United Kingdom) . . . . . [8234-32]

Optical transmission study of fractal iterate nano-apertures made by direct-focused ion beam milling of metallic thin films, Yin Yuen, Lambertus Hesselink, Stanford Univ. (USA) . . . . . [8234-33]

Multifunctional gold nanorods for detection and photothermal therapy of cancer, Clement Barriere, Pilar Beatriz Garcia Allende, Ji Qi, Daniel S. Elson, Imperial College London (United Kingdom) . . . . . [8234-34]

Plasmonic sensing in crude biofluids with microhole arrays, Jean-François Masson, Ludovic S. Live, Julien Breault-Turcot, Damien Y. Colin, Joelle N. Pelletier, Univ. de Montréal (Canada); Michael Canva, Institut d'Optique Graduate School (France); Anuj Dhawan, Tuan Vo-Dinh, Duke Univ. (USA) . . . . . [8234-35]

SESSION 8 . . . . . Mon. 3:40 to 4:40 pm

Plasmonic Applications I

Session Chair: **Joseph R. Lakowicz,**
Univ. of Maryland School of Medicine (USA)

Fabrication method for controlling surface plasmon resonance wavelength and improving bio-conjugation yield of Au nanoring, Hung-Yu Tseng, Yu-Lung Jung, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan) . . . . . [8234-36]

Surface-enhanced Raman spectroscopy of pterins, Ciarán Smyth, Inam Mirza, James G. Lunney, Eithne M. McCabe, Trinity College Dublin (Ireland) . . . . . [8234-37]

Properties and commercial applications of mass-produced LSPR films, Daniele Gerion, LamdaGen Corp. (USA). . . . . [8234-38]

POSTERS-MONDAY . . . . . Mon. 5:30 to 7:30 pm

Conference attendees are invited to attend the BiOS poster session on Monday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Integrated waveguide sensor platform utilizing organic photodiodes, Bernhard Lamprecht, Elke Kraker, Paul Hartmann, Georg Jakopic, Martin Sagmeister, Stefan Köstler, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria); Tobias Abel, Torsten Mayr, Technische Univ. Graz (Austria); Harald Ditlbacher, Nicole Galler, Karl-Franzens-Univ. Graz (Austria) . . . [8234-50]

Nucleic acid sequencing with tip-enhanced Raman spectroscopy: toward single-base resolution, Noah J. Kolodziejski, Rajan Gurjar, Radiation Monitoring Devices, Inc. (USA); Jeeseong Hwang, National Institute of Standards and Technology (USA). . . . . [8234-51]

Single-cell targeting using plasmon resonant gold-coated liposomes, Sarah J. Leung, Marek Romanowski, The Univ. of Arizona (USA) . . . . . [8234-52]

Visual detection of cancer biomarkers with naked eye using plasmonic Fano resonances, Ahmet A. Yanik, Arif Engin Çetin, Min Huang, Alp Artar, Boston Univ. (USA); S. Hossein Mousavi, Alexander Khanikev, The Univ. of Texas at Austin (USA); John H. Connor, Boston Univ. (USA); Gennady B. Shvets, The Univ. of Texas at Austin (USA); Hatice Altug, Boston Univ. (USA). . [8234-53]

Tuesday 24 January

SESSION 9 . . . . . Tues. 8:00 am to 12:20 pm

Plasmonic Applications II

Session Chair: **Tuan Vo-Dinh,** Duke Univ. (USA)

Courses of Related Interest

SC727 Nanoplasmonics (Stockman) Wednesday, 8:30 am to 5:30 pm
SC1013 Choosing the Correct Optical Filter for Your Application (Reichel) Tuesday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

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Symposium Chairs

Friedhelm Dorsch
TRUMPF Werkzeugmaschinen GmbH + Co. KG (Germany)

Alberto Piqué
U.S. Naval Research Lab. (USA)

Symposium Co-chairs

Bo Gu
IPG Photonics Corp. (China)

Andreas Tünnermann,
Friedrich-Schiller-Univ. Jena (Germany)

Laser Source Engineering

Program Chair: **Gregory J. Quarles,** B.E. Meyers & Co., Inc. (USA)

Nonlinear Optics

Semiconductor Lasers and LEDs

Program Chair: **Klaus P. Streubel,** OSRAM GmbH (Germany)

Laser Micro-/Nanoengineering

Program Chairs: **Henry Helvajian,** The Aerospace Corp. (USA) and **James S. Horwitz,** U.S. Dept. of Energy (USA)

Laser Applications

Executive Organizing Committee

LASE Daily Conference Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday

Laser Source Engineering

Program Chair: **Gregory J. Quarles,** B. E. Meyers & Co., Inc. (USA)

8235 **Solid State Lasers XXI: Technology and Devices** *(Clarkson, Shori)* p. 138

8236 **Laser Resonators, Microresonators, and Beam Control XIV** *(Kudryashov, Paxton, Ilchenko)* p. 142

8237 **Fiber Lasers IX: Technology, Systems, and Applications** *(Honea)* p. 146

8238A **High Energy/ Average Power Lasers and Intense Beam Applications VII** *(Davis, Heaven, Schriempf)* p. 152

8238B **Atmospheric and Oceanic Propagation of electromagnetic Waves VI** *(Korotkova)* p. 153

8239 **High Power Laser Materials Processing: Lasers, Beam Delivery, Diagnostics, and Applications** *(Beyer, Morris)* p. 154

Nonlinear Optics

8240 **Nonlinear Frequency Generation and Conversion: Materials, Devices, and Applications XI** *(Vodopyanov)* p. 156

8258 **Organic Photonic Materials and Devices XIV** *(Tabor, Kajzar, Kaino, Koike)* p. 207

8260 **Ultrafast Phenomena and Nanophotonics XVI** *(Betz, Elezzabi, Song, Tsen)* p. 21

Semiconductor Lasers and LEDs

Program Chair: **Klaus P. Streubel,** OSRAM GmbH (Germany)

8241 **High-Power Diode Laser Technology and Applications X** *(Zediker)* p. 159

8276 **Vertical-Cavity Surface-Emitting Lasers XVI** *(Lei, Choquette)* p. 255

8242 **Vertical External Cavity Surface Emitting Lasers (VECSELs) II** *(Tropper)* p. 161

8255 **Physics and Simulation of Optoelectronic Devices XX** *(Witzigmann, Osiński, Henneberger, Arakawa)* p. 197

8262 **Gallium Nitride Materials and Devices VII** *(Chyi, Nanishi, Morkoç)* p. 217

8277 **Novel In-Plane Semiconductor Lasers XI** *(Belyanin, Smowton)* p. 257

8278 **Light-Emitting Diodes: Materials, Devices, and Applications for Solid State Lighting XVI** *(Streubel, Jeon, Tu)* p. 261

This program is current as of 12 September 2011 Online Info

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Laser Micro-/Nanoengineering

Program Chairs: **Henry Helvajian,** The Aerospace Corp. (USA) and **James S. Horwitz,** U.S. Dept. of Energy (USA)

8243 **Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XVII** *(Hennig, Xu, Gu, Nakata)* p. 163

8244 **Laser-based Micro- and Nanopackaging and Assembly VI** *(Bachmann, Pfleging, Washio)* p. 166

8245 **Synthesis and Photonics of Nanoscale Materials IX** *(Träger, Dubowski, Geohegan)* p. 168

8248 **Micromachining and Microfabrication Process Technology XVII** *(Maher, Resnick)* p. 178

8249 **Advanced Fabrication Technologies for Micro/Nano Optics and Photonics V** *(Schoenfeld, Rumpf, von Freymann)* p. 179

8250 **Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS and Nanodevices XI** *(García-Blanco, Ramesham)* p. 182

Laser Applications

8246 **Free-Space Laser Communication Technologies XXIV** *(Hemmati, Boroson)* p. 170

8238B **Atmospheric and Oceanic Propagation of Electromagnetic Waves VI** *(Korotkova)* p. 153

8274 **Complex Light and Optical Forces VI** *(Galvez, Andrews, Glückstad)* p. 252

8243 **Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XVII** *(Hennig, Xu, Gu, Nakata)* p. 163

8247 **Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XII** *(Heisterkamp, Meunier, Nolte)* p. 172

8275 **Laser Refrigeration of Solids V** *(Epstein, Sheik-Bahae)* p. 254

Conference 8235

Sunday-Wednesday 22-25 January 2012 • Proceedings of SPIE Vol. 8235

Solid State Lasers XXI: Technology and Devices

Conference Chairs: **W. Andrew Clarkson,** Univ. of Southampton (United Kingdom); **Ramesh K. Shori,** Naval Air Warfare Ctr. Weapons Div. (USA)

Program Committee: **Santanu Basu,** Sparkle Optics Corp. (USA); **Marc Eichhorn,** Institut Franco-Allemand de Recherches de Saint-Louis (France); **Adolf Giesen,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Norman Hodgson,** Coherent, Inc. (USA); **Hans-Dieter Hoffmann,** Fraunhofer-Institut für Lasertechnik (Germany); **Helena Jelinková,** Czech Technical Univ. in Prague (Czech Republic); **Ursula Keller,** ETH Zurich (Switzerland); **Jacob I. Mackenzie,** Univ. of Southampton (United Kingdom); **Narasimha S. Prasad,** NASA Langley Research Ctr. (USA); **Martin C. Richardson,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Wolf R. Seelert,** Coherent Lubeck GmbH (Germany); **Akira Shirakawa,** The Univ. of Electro-Communications (Japan); **David E. Spence,** Spectra-Physics®, a Newport Corp. Brand (USA); **David H. Titterton,** Defence Science and Technology Lab. (United Kingdom)

Sunday 22 January

SESSION 1 . . . . . Sun. 1:30 to 3:20 pm

Mid-IR Lasers I

Session Chair: **Ramesh Shori,**
Naval Air Warfare Ctr. Weapons Div. (USA)

To be announced *(Invited Paper)*, Mark Dubinskii, U.S. Army Research Lab. (USA) . . . . . [8235-01]

Refractive indices and thermo-optic coefficients of Erbium doped Yttria, David E. Zelmon, Nicholas Haynes, Air Force Research Lab. (USA); Ramesh Shori, Naval Air Warfare Ctr. Weapons Div. (USA) . . . . . [8235-02]

To be announced, Saurabh Sharma, Univ. of California, Los Angeles (USA) and Naval Air Warfare Ctr. (USA) . . . . . [8235-03]

High-efficiency diode pumped Er:YLF laser with multi-wavelength generation, Mikhail V. Inochkin, Valery Y. Khramov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Gregory B. Altshuler, Andrey V. Erofeev, Stewart W. Wilson, Palomar Medical Technologies, Inc. (USA); Felix I. Feldchein, Dental Photonics, Inc. (USA) . . . . . [8235-04]

To be announced, James A. Harrington, Rutgers, The State Univ. of New Jersey (USA) . . . . . [8235-05]

SESSION 2 . . . . . Sun. 3:50 to 4:50 pm

Mid-IR Lasers II

Session Chair: **Ramesh Shori,**
Naval Air Warfare Ctr. Weapons Div. (USA)

Mid-IR Laser oscillation via energy transfer in the Co:Fe:ZnS/Se co-doped crystals, Jeremy M. Peppers, The Univ. of Alabama at Birmingham (USA); NoSoung Myoung, The Univ. of Alabama at Birmingham (USA) and Samsung SMD (Korea, Republic of); Vladimir V. Fedorov, Sergey B. Mirov, The Univ. of Alabama at Birmingham (USA) . . . . . [8235-06]

3-µm wavelength-tunable compact light source with 805/1064-nm differential frequency generation using intracavity photon-reuse and spectrum shaping techniques, Naokatsu Yamamoto, Kouichi Akahane, Tetsuya Kawanishi, National Institute of Information and Communications Technology (Japan); Hideyuki Sotobayashi, Aoyama Gakuin Univ. (Japan) . . . . . [8235-07]

Efficient, high energy 2-micron solid state laser transmitter for NASA's space-based CO_2 measurements, Upendra N. Singh, Jirong Yu, Mulugeta Petros, NASA Langley Research Ctr. (USA); Yingxin Bai, Science Systems and Applications, Inc. (USA) . . . . . [8235-08]

Monday 23 January

SESSION 3 . . . . . Mon. 8:00 to 10:00 pm

Pulsed Lasers I

Session Chair: **Helena Jelinková,** Czech Technical Univ. in Prague (Czech Republic)

1-kHz rep rate, mode-controlled, and passively Q-switched Nd:YLF laser operating at 1053 nm, Alessandro M. Deana, Univ. Nove de Julho (Brazil); Niklaus U. Wetter, Instituto de Pesquisas Energéticas e Nucleares (Brazil) . . . . . [8235-09]

High-energy, high-repetition rate, diode-pumped Yb:YAG Q-switched laser working at room temperature, Wei Lu, Andromeda Huffman, Fran Fitzpatrick, Ralph L. Burnham, Brian K. Mathason, Fibertek, Inc. (USA) . . . . . [8235-10]

High gain and high power Nd:YVO_4 single pass amplifier, Xavier Délen, François Balembois, Patrick Georges, Lab. Charles Fabry (France) . . . [8235-11]

1.34-µm Nd:YVO_4 laser mode-locked by a single-walled carbon nanotube saturable absorber, Hristo L. Iliev, Ivan Buchvarov, Sofia Univ. St. Kliment Ohridski (Bulgaria); Sun Young Choi, Kihong Kim, Fabian Rotermund, Ajou Univ. (Korea, Republic of); Valentin P. Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) . . . . . [8235-12]

Performance of 100-J cryogenically cooled multi-slab amplifier with respect to pump beam parameters and geometry, Martin Divoký, Magdalena Sawicka, Jakub Novak, Bedrich Rus, Tomas Mocek, Institute of Physics of the ASCR, v.v.i. (Czech Republic) . . . . . [8235-13]

Comparative design study of 100-J cryogenically cooled Yb:YAG multi-slab amplifiers operating at 10 Hz, Pawel Sikocinski, Martin Divoký, Magdalena Sawicka, Bedrich Rus, Tomas Mocek, Institute of Physics of the ASCR, v.v.i. (Czech Republic) . . . . . [8235-14]

SESSION 4 . . . . . Mon. 10:30 am to 12:10 pm

Pulsed Lasers II

Session Chair: **Helena Jelinková,**
Czech Technical Univ. in Prague (Czech Republic)

3.5-ps pulses from a compressed passively Q-switched microchip laser employing nonlinear temporal cleaning, Alexander Steinmetz, Andreas Martin, Dirk Nodop, Reinhold Lehneis, Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8235-15]

High-power VCSEL array pumped Q-switched Nd:YAG lasers, Robert Van Leeuwen, Yihan Xiong, Laurence S. Watkins, Jean-Francois Seurin, Guoyang Xu, Alexander Miglo, Qing Wang, Chuni L. Ghosh, Princeton Optronics, Inc. (USA) . . . . . [8235-16]

24-picosecond pulses from a spectrally filtered passively Q-switched microchip laser, Reinhold Lehneis, Alexander Steinmetz, Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8235-17]

Compact VCSEL pumped Q-switched Nd:YAG lasers, Brian J. Cole, Chris McIntosh, Alan D. Hays, John E. Nettleton, Lew Goldberg, U.S. Army RDECOM CERDEC NVESD (USA) . . . . . [8235-18]

Laser amplifiers for high-energy pulse train applications, George J. Doster, Northrop Grumman Cutting Edge Optronics (USA) . . . . . [8235-19]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 5 . . . . . Mon. 1:30 to 3:10 pm

Disk Lasers

Session Chair: **Santanu Basu,** Sparkle Optics Corp. (USA)

Yb:CaGdAlO$_4$ thin disk, Sandrine Ricaud, Lab. Charles Fabry de l'Institut d'Optique (France); Anael Jaffres, Pascal Loiseau, Bruno Viana, Ecole Nationale Supérieure de Chimie de Paris (France); Birgit Weichelt, Marwan Abdou-Ahmed, Andreas Voss, Thomas Graf, Univ. Stuttgart (Germany); Daniel Ritz, FEE GmbH (Germany); Martin Delaigue, Eric P. Mottay, Amplitude Systemes (France); Patrick Georges, Frédéric Druon, Lab. Charles Fabry de l'Institut d'Optique (France) . . . . . [8235-20]

Numerical modeling of a joule level thin-disk laser system, Martin Smrž, Tomas Mocek, Patricie Severova, Institute of Physics of the ASCR, v.v.i. (Czech Republic) . . . . . [8235-21]

Resonator modeling of thin-disk lasers and side-pumped bulk lasers beyond the paraxial approximation, Matthias Wohlmuth, Barbara Wohlmuth, Technische Univ. München (Germany) . . . . . [8235-22]

Initial testing of edge-pumped Yb:YAG disk laser with multi-passed extraction, John Vetrovec, Drew A. Copeland, Amardeep S. Litt, Aqwest, LLC (USA); Detao Du, General Atomics Aeronautical Systems, Inc. (USA) . . [8235-23]

Gain tailoring model and improved optical extraction in CW edge-pumped disk amplifiers, Drew A. Copeland, John Vetrovec, Aqwest, LLC (USA) . . . . . [8235-24]

SESSION 6 . . . . . Mon. 3:40 to 6:10 pm

High-Power Fiber and Disk Lasers

Joint Session with Conference 8237

Session Chairs: **Norman Hodgson,** Coherent, Inc. (USA); **Dahv A. Kliner,** JDSU (USA)

High-power disk and fiber lasers: a performance comparison *(Invited Paper)*, Stefan Ruppik, Frank Becker, Frank-Peter Grundmann, Wolfram Rath, Ulrich Hefter, ROFIN-SINAR Laser GmbH (Germany). . . . . [8235-25]

Multi-kW single fiber laser based on an extra large mode area fiber design, Andreas Langner, Mario Such, Gerhard Schötz, Heraeus Quarzglas GmbH & Co. KG (Germany); Florian Just, Martin Leich, Christian Mühlig, Jens Kobelke, Anka Schwuchow, Stephan Grimm, Institut für Photonische Technologien e.V. (Germany); Olaf Strauch, Björn Wedel, HIGHYAG Lasertechnologie GmbH (Germany); Georg Rehmann, Charley Bachert, Volker Krause, Laserline GmbH (Germany) . . . . . [8237-44]

High-power disk lasers: advances and applications, David L. Havrilla, Tracey S. Ryba, TRUMPF Inc. (USA); Marco Holzer, TRUMPF Laser- und Systemtechnik GmbH (Germany) . . . . . [8235-26]

1.2-kW single-mode fiber laser based on 100-W high-brightness pump diodes, Dahv A. Kliner, Hongbo Yu, Johnny Luu, Kai-Hsiu Liao, Jeff Segall, Martin H. Muendel, Jane Shen, Matthew K. Kutsuris, Donald K. Holdener, Justin Franke, Kelvin Nguyen, Dave L. Woods, David Meng, David L. Vecht, Richard Duesterberg, Lei Xu, Jay A. Skidmore, James Guo, Jane Cheng, Jihua Du, Brad Johnson, Nicolas Guerin, Benlih Huang, Peter Cheng, Reddy Raju, Kong Weng Lee, Jason Cai, Victor V. Rossin, Erik P. Zucker, JDSU (USA) . . . . . [8237-45]

Ultrafast disk lasers and amplifiers, Dirk H. Sutter, Jochen D. Kleinbauer, Dominik Bauer, Martin Wolf, Chuong Tan, Raphael Gebs, Aleksander Budnicki, Philipp Wagenblast, TRUMPF Laser GmbH & Co. KG (Germany); Sascha Weiler, TRUMPF Inc. (USA). . . . . [8235-27]

65 W of average power and 6-MW peak power generation from a mode-locked fiber oscillator, Martin Baumgartl, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany); Caroline Lecaplain, Ammar Hideur, Univ. de Rouen (France); Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8237-46]

800-W CW near diffraction limited beam delivery through a 100-m long multi-mode fiber, Armin Austerschulte, Moritz M. Vogel, Thomas Rataj, Jan P. Negel, Andreas Voss, Marwan Abdou Ahmed, Thomas Graf, Univ. Stuttgart (Germany) . . . . . [8237-47]

Tuesday 24 January

SESSION 7 . . . . . Tues. 8:00 to 10:00 am

Ultrafast Lasers

A multi-wavelength variable-pulsewidth diode-pumped laser system for laser temporal diagnostics testing, Andrey V. Okishev, Christophe Dorrer, Univ. of Rochester (USA); Yoram Fisher, Michael J. Pavia, Sydor Instruments LLC (USA) . . . . . [8235-28]

Power scaling of an Yb:LuScO$_3$ thin disk laser to 23 W and 235 fs, Clara J. Saraceno, Oliver H. Heckl, Cyrill R. E. Baer, Matthias C. Golling, Thomas Südmeyer, ETH Zurich (Switzerland); Kolja Beil, Christian Kränkel, Klaus Petermann, Günter Huber, Univ. Hamburg (Germany); Ursula Keller, ETH Zurich (Switzerland) . . . . . [8235-29]

Pulse-on demand regenerative amplifier, Christian Holtz, Joachim Meier, Juerg Aus-der-Au, High Q Laser Innovation GmbH (Austria); Max J. Lederer, European XFEL GmbH (Germany). . . . . [8235-30]

Sub-100-fs pulses with 12.5 W from Yb:CALGO based oscillators, Annalisa Guandalini, High Q Laser Innovation GmbH (Austria); Alessandro Greborio, Univ. degli Studi di Pavia (Italy); Juerg Aus-der-Au, High Q Laser Innovation GmbH (Austria) . . . . . [8235-31]

Cryo-Yb:YAG lasers for next-generation photoinjector applications, Kevin F. Wall, Q-Peak, Inc. (USA); Daniel Miller, T. Y. Fan, MIT Lincoln Lab. (USA) . . . . . [8235-32]

High-energy 1-Hz titanium sapphire amplifier for PetaWatt class lasers, François Lureau, Sébastien Laux, Olivier Casagrande, Christophe Radier, Olivier J. Chalus, Frédéric Caradec, Christophe Simon-Boisson, Thales Optronique S.A. (France) . . . . . [8235-33]

SESSION 8 . . . . . Tues. 10:30 am to 12:30 pm

Eye Safe Lasers

Er-doped Tellurite glasses for planar waveguide power amplifier with extended gain bandwidth, Jacob I. Mackenzie, S. Murugan Ganapathy, Univ. of Southampton (United Kingdom); Takenobu Suzuki, Yasutake Ohishi, Toyota Technological Institute (Japan); Anthony W. Yu, James B. Abshire, NASA Goddard Space Flight Ctr. (USA) . . . . . [8235-34]

Optimized heat extraction geometry for resonantly diode pumped Er^{3+}:YAG lasers, Lukasz Galecki, Institut Franco-Allemand de Recherches de Saint-Louis (France); Waldemar Zendzian, Military Univ. of Technology (Poland); Marc Eichhorn, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [8235-35]

Resonant diode-pumping of Er:YAG single crystal fiber operating at 1617 nm, Adrien Aubourg, Igor Martial, Lab. Charles Fabry de l'Institut d'Optique (France) and Fibercryst SAS (France); Julien Didierjean, Fibercryst SAS (France); François Balembois, Patrick Georges, Lab. Charles Fabry de l'Institut d'Optique (France). . . . . [8235-36]

Ho:KRE(WO$_4$)$_2$, RE=(Y, Gd, Lu), CW laser performance near 2.1 micron under resonant pumping by a Tm:KLu(WO$_4$)$_2$ laser, Venkatesan Jambunathan, Xavier Mateos, Maria Cinta Pujol, Joan Josep Carvajal, Francesc Diaz, Univ. Rovira i Virgili (Spain); Magdalena Aguiló, Univ. Rovira i Virgili (Slovenia); Uwe Griebner, Valentin P. Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany). . . . . [8235-37]

Crystalline fiber Ho^{3+}:YAG laser resonantly pumped by high-spectral-brightness laser diodes, Antoine Berrou, Thierry Ibach, Martin Schellhorn, Institut Franco-Allemand de Recherches de Saint-Louis (France); Wentao Hu, Robert M. Lammert, Laurent Vaissie, Jeffrey E. Ungar, Laser Operations LLC / QPC Lasers (USA); Marc Eichhorn, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [8235-38]

A coherent laser Doppler wind profiler for active control of wind turbine, Leilei Shinohara, Siegwart Bogatscher, Nico Heussner, Harsha Umesh Babu, Wilhelm Stork, Karlsruher Institut für Technologie (Germany) . . . . . [8235-39]

Lunch/Exhibition Break . . . . . 12:30 to 1:50 pm

SESSION 9 . . . . . Tues. 1:50 to 3:30 pm

Visible and UV Lasers I

Potential of the Eu:LYB crystal as a laser material for DPSS lasers emitting at 613 nm, Romain Cattoor, Inka B. Manek-Hönninger, Jean-Christophe Delagnes, Bruno Bousquet, Univ. Bordeaux 1 (France); Yannick Petit, Véronique Jubera, Alexandre Fargues, Philippe Veber, Matias Velazquez, Alain Garcia, Institut de Chimie de la Matière Condensée de Bordeaux (France); Patrick Mounaix, Lionel S. Canioni, Univ. Bordeaux 1 (France) . . . . . [8235-40]

Progress in the development of a pulsed UV laser system for an LDMS instrument on Mars, Christian Kolleck, Alexander Buettner, Mathias Ernst, Michael Hunnekuhl, Thomas Huelsenbusch, Marc Priehs, Dietmar Kracht, Joerg Neumann, Laser Zentrum Hannover e.V. (Germany) . . . . . [8235-41]

High average power sub-picosecond pulse generation at 515 nm by extracavity frequency doubling of a mode-locked Innoslab MOPA, Bastian Gronloh, Peter Russbueldt, Fraunhofer-Institut für Lasertechnik (Germany); Waldemar Schneider, Max-Planck-Institut für Quantenoptik (Germany); Bernd Jungbluth, Hans-Dieter Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [8235-42]

Development and optimization of single-mode green solid state microchip laser, Jaroslaw Z. Sotor, Arkadiusz J. Antonczak, Grzegorz Dudzik, Krzysztof M. Abramski, Wroclaw Univ. of Technology (Poland) . . . . . [8235-43]

Stability enhanced high average power green lasers for precision semiconductor processing, Nick Hay, Ian Baker, Stuart Bashford, Young Kwon, Powerlase Photonics Ltd. (United Kingdom) . . . . . [8235-44]

SESSION 10 . . . . . Tues. 4:00 to 6:00 pm

Visible and UV Lasers II

Joint Session with Conference 8240

Session Chair: **W. Andrew Clarkson,**
Univ. of Southampton (United Kingdom)

Coherent quasi-CW 153-nm light source at high repetition rate *(Invited Paper)*, Yutaka Nomura, Institute for Molecular Science (Japan) and Japan Science and Technology Agency (Japan); Yoshiaki Ito, The Univ. of Tokyo (Japan); Akira Ozawa, The Univ. of Tokyo (Japan) and Japan Science and Technology Agency (Japan); Xiaoyang Wang, Chuangtian Chen, Technical Institute of Physics and Chemistry (China); Shik Shin, The Univ. of Tokyo (Japan) and Japan Science and Technology Agency (Japan); Shuntaro Watanabe, Tokyo Univ. of Science (Japan) and Japan Science and Technology Agency (Japan); Yohei Kobayashi, The Univ. of Tokyo (Japan) and Japan Science and Technology Agency (Japan) . . . . . [8240-16]

Frequency-doubled diode laser for direct pumping of ultrashort Ti:sapphire lasers, André Müller, Ole B. Jensen, Technical Univ. of Denmark (Denmark); Angelika Unterhuber, Tuan Le, Andreas Stingl, FEMTOLASERS Produktions GmbH (Austria); Karl-Heiz Hasler, Bernd Sumpf, Götz Erbert, Ferdinand-Braun-Institut (Germany); Peter E. Andersen, Paul M. Petersen, Technical Univ. of Denmark (Denmark). . . . . [8235-45]

Mode hop free tunable blue laser, Kang Li, Univ. of Glamorgan (United Kingdom); Hongying Wang, Xi'an Univ. of Arts and Science (China); Jungang Huang, Ray Chaney, Nigel J. Copner, Univ. of Glamorgan (United Kingdom) . . . . . [8235-46]

High-power compact green laser source based on wavelength-stabilized pump laser diodes, Kendra Gallup, Xiaodong Yang, Wentao Hu, Charles Wang, Jeffrey E. Ungar, Laurent Vaissie, Laser Operations LLC / QPC Lasers | (USA) . . . . . [8235-47]

Designable nonlinear optical device: QPM quartz for VUV spectrum *(Invited Paper)*, Sunao Kurimura, National Institute for Materials Science (Japan); Masaki Harada, National Institute for Materials Science (Japan) and Nikon Corp. (Japan); Ken-ichi Muramatsu, Motoi Ueda, Nikon Corp. (Japan); Muneyuki Adachi, National Institute for Materials Science (Japan) and NIDEK Co., Ltd. (Japan); Tsuyoshi Yamada, Tokio Ueno, NIDEK Co., Ltd. (Japan) . . . . . [8240-17]

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Temperature effects on the operation and input/output wavelengths of a high power fiber-coupled diode end pumped Nd:YVO_4 laser, Ashraf F. El-Sherif, Military Technical College (Egypt) . . . . . [8235-54]

Comparison between two active media Nd:YAG and Nd:YVO_4 rods inside a cavity for producing a high power 808-nm diode end-pumping laser system, Ashraf F. El-Sherif, Arab Academy for Science, Technology & Maritime Transport (Egypt) and Military Technical College (Egypt) . . . . . [8235-55]

Amplified spontaneous emission in disk lasers, XiaoJun Wang, Hua Su, Institute of Applied Physics and Computational Mathematics (China) . . [8235-56]

Influence of Ce^{3+}-ions in Pr,Ce:$YAlO_3$ crystal on spectroscopic and laser characteristics, Martin Fibrich, Helena Jelinková, Jan Sulc, Czech Technical Univ. in Prague (Czech Republic); Karel Nejezchleb, Václav Skoda, Crytur Ltd. (Czech Republic) . . . . . [8235-57]

Theoretical and experimental results for using phosphate glass solar laser in the focus of powerful solar concentrator, Abdukhakim Fazilov, Riskiev Tohtapulat, Abdurahmanov Abdujabbar, Radjapov Lutfulla, Payziev Shermahamat, Institute of Materials Science UAS (Uzbekistan); Joris Lousteau, Daniel Milaneze, Davide Negro, Emanuele Mura, Nadia Boetti, Politecnico di Torino (Italy) . . . . . [8235-58]

10-km dynamic laser oscillation with a coupled cavity assisted by four wave mixing, Frank F. Wu, Anatoliy I. Khizhnyak, Stephen A. Kupiec, Vladimir B. Markov, Amit Lal, MetroLaser, Inc. (USA). . . . . [8235-59]

Passive Q-switching of a diode-pumped (Tm,Yb):$KLu(WO_4)_2$ laser near 2 µm with a Cr^{2+}:ZnS saturable absorber, Martha Segura, Xavier Mateos, Univ. Rovira i Virgili (Spain); Aleksey Tyazhev, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Maria Cinta Pujol, Joan Josep Carvajal, Magdalena Aguiló, Francesco Diaz, Univ. Rovira i Virgili (Spain); Uwe Griebner, Valentin P. Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) . . . . . [8235-60]

Continuous wave Yb:KGW laser with polarization-independent pump absorption, Haitao Zhao, Arkady Major, Univ. of Manitoba (Canada) . . [8235-61]

High-energy picosecond regenerative thin disk amplifier at 1 kHz, Michal Chyla, Martin Smrž, Tomas Mocek, Institute of Physics of the ASCR, v.v.i. (Czech Republic) . . . . . [8235-62]

Tuning possibility of dysprosium-doped lead thiogallate laser, Maxim E. Doroshenko, A. M. Prokhorov General Physics Institute (Russian Federation); Helena Jelinková, Michal Jelínek, Jan Sulc, Michal Nemec, Czech Technical Univ. in Prague (Czech Republic); Tasoltan T. Basiev, A. M. Prokhorov General Physics Institute (Russian Federation); Valerii V. Badikov, Dmitrii V. Badikov, Kuban State Univ. (Russian Federation) . . . . . [8235-63]

Compact pulsed high-energy Er:glass laser, Peng Wan, Jian Liu, PolarOnyx, Inc. (USA). . . . . [8235-64]

Influence of undoped YAG cup on diode pumped composite YAG/Er:Yb:glass laser, Jan Šulc, Helena Jelinková, Czech Technical Univ. in Prague (Czech Republic); Karel Nejezchleb, Václav Skoda, Crytur Ltd. (Czech Republic) . . . . . [8235-65]

Spectroscopic characterization of Ti^{3+}:AgGaS2 and Fe^{2+}:$MgAl2O_4$ crystals for mid-IR laser applications, Rose K. Sackuvich, The Univ. of Alabama at Birmingham (USA) and The Univ. of Kansas (USA); Jeremy M. Peppers, The Univ. of Alabama at Birmingham (USA); NoSoung Myoung, The Univ. of Alabama at Birmingham (USA) and Samsung SMD (Korea, Republic of); Valery V. Badikov, Kuban State Univ. (Russian Federation); Vladimir V. Fedorov, Sergey B. Mirov, The Univ. of Alabama at Birmingham (USA) . . . . . [8235-66]

Mid-IR volumetric Bragg grating based on LiF color center crystals, Anitha Arumugam, Anton V. Fedorov, Dmitry V. Martyshkin, Vladimir V. Fedorov, David J. Hilton, Sergey B. Mirov, The Univ. of Alabama at Birmingham (USA). [8235-67]

Yb:YAG/Cr:YAG composite crystal with external and microchip resonator, Jan Šulc, Tomás Koutný, Helena Jelinkova, Czech Technical Univ. in Prague (Czech Republic); Karel Nejezchleb, Vaclav Skoda, Crytur Ltd. (Czech Republic) . . . . . [8235-68]

A highly efficient DPSS mode-locked Nd:YLF single-mode laser, Frank F. Wu, MetroLaser, Inc. (USA). . . . . [8235-69]

DPSS laser beam quality optimization through pump current tuning, Sydney Sukuta, Thuy-Lan Le, Robert A. Omohundro, Mehran J. Ejlali, San Jose City College (USA) . . . . . [8235-70]

Wednesday 25 January

SESSION 11 . . . . . Wed. 8:00 to 10:00 am

Novel Concepts for SSL

Passive alignment and soldering technique for optical components, Heinrich Faidel, Michael Leers, Bastian Gronloh, Valentin Morasch, Hans-Dieter Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany). . . . . [8235-48]

High-power continuous wave Nd:YAG single crystal fiber laser emitting at 946 nm, Xavier Délen, Lab. Charles Fabry de l'Institut d'Optique (France); Igor Martial, Lab. Charles Fabry de l'Institut d'Optique (France) and Fibercryst SAS (France); Julien Didierjean, Nicolas Aubry, Fibercryst SAS (France); François Balembois, Patrick Georges, Lab. Charles Fabry de l'Institut d'Optique (France) . . . . . [8235-49]

Yb^{3+}:LuAG single crystal grown by micro-PD: spectroscopy and laser experiments, Mauro Tonelli, Y. Z. Zhang, Stefano Veronesi, Univ. di Pisa (Italy); Antonio Agnesi, Federico Pirzio, Alessandro Greborio, Giancarlo C. Reali, Univ. degli Studi di Pavia (Italy) . . . . . [8235-50]

Rare-earth doped photo-thermo-refractive glass for monolithic solid state lasers, Apurva Jain, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Larissa Glebova, OptiGrate Corp. (USA); Julien Lumeau, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Vadim Smirnov, OptiGrate Corp. (USA); Alexandra Rapaport, Michael A. Bass, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Christine P. Spiegelberg, OptiGrate Corp. (USA); Michael A. Krainak, NASA Goddard Space Flight Ctr. (USA); Leonid B. Glebov, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA). . . . . [8235-51]

Generating multiple wavelengths, simultaneously, in a Ti:sapphire ring laser with a ramp-hold-fire seeding technique, Thomas Moore, F. Scott Anderson, Southwest Research Institute (USA) . . . . . [8235-52]

Voltage tunable polymer laser device, Sebastian Döring, Fraunhofer-Institut für Angewandte Polymerforschung (Germany); Matthias Kollosche, Univ. Potsdam (Germany); Torsten Rabe, Technische Univ. Braunschweig (Germany); Guggi Kofod, Univ. Potsdam (Germany); Joachim Stumpe, Fraunhofer-Institut für Angewandte Polymerforschung (Germany) . . . . . [8235-53]

LASE Plenary Session

Wed. 10:20 am to 12:30 pm

Session Chairs: **Friedhelm Dorsch,** TRUMPF GmbH & Co. KG (Germany); **Alberto Piqué,** U.S. Naval Research Lab. (USA)

10:20 am: **Welcome and Opening Remarks,** Friedhelm Dorsch, TRUMPF GmbH & Co. KG (Germany); Alberto Piqué, U.S. Naval Research Lab. (USA)

10:25 am: **Announcement of the Green Photonics Award**, Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

10:30 am: **Plasmonics for Beam Shaping and Wavefront Engineering,** Federico Capasso, Harvard Univ. (USA)

11:10 am: **The National Ignition Facility and Progress Towards Inertial Fusion Ignition,** Edward I. Moses, Lawrence Livermore National Lab. (USA)

11:50 am: **Successful Technology Approach for Lasers in Manufacturing,** Peter Leibinger, TRUMPF GmbH & Co. KG (Germany)

See p. 16 for details.

Courses of Related Interest

SC752	Solid State Laser Technology (Hodgson) Saturday, 8:30 am to 5:30 pm
SC860	Resonator Design for Solid State Lasers (Paschotta) Wednesday, 8:30 am to 5:30 pm
SC1053	Ultrafast Laser Pulse Shaping and Adaptive Pulse Compression (Dantus) Tuesday, 1:30 to 5:30 pm
SC1012	Coherent Mid-Infrared Sources and Applications (Vodopyanov) Sunday, 1:30 to 5:30 pm
SC746	Introduction to Ultrafast Technology (Trebino) Tuesday, 1:30 to 5:30 pm
SC744	Ultrafast Fiber Lasers (Fermann) Sunday, 1:30 to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm
SC1060	Fundamentals of Nonlinear Optics (Powers) Sunday, 8:30 am to 12:30 pm
SC931	Applied Nonlinear Frequency Conversion (Paschotta) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8236

Sunday-Wednesday 22-25 January 2012 • Proceedings of SPIE Vol. 8236

Laser Resonators, Microresonators, and Beam Control XIV

Conference Chairs: **Alexis V. Kudryashov,** Moscow State Open Univ. (Russian Federation); **Alan H. Paxton,** Air Force Research Lab. (USA); **Vladimir S. Ilchenko,** OEwaves, Inc. (USA)

Conference Co-Chairs: **Lutz Aschke,** LIMO Lissotschenko Mikrooptik GmbH (Germany); **Kunihiko Washio,** Paradigm Laser Research Ltd. (Japan)

Program Committee: **Yanne K. Chembo,** FEMTO-ST (France); **Jean-Claude M. Diels,** The Univ. of New Mexico (USA); **Hans Joachim Eichler,** Technische Univ. Berlin (Germany); **Andrew Forbes,** Council for Scientific and Industrial Research (South Africa); **Pierre Galarneau,** INO (Canada); **Thomas Graf,** Univ. Stuttgart (Germany); **Tobias J. Kippenberg,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **James R. Leger,** Univ. of Minnesota, Twin Cities (USA); **Andrey B. Matsko,** OEwaves, Inc. (USA); **Shayan Mookherjea,** Univ. of California, San Diego (USA); **Steve A. Pappert,** Booz Allen Hamilton Inc. (USA); **Andrew W. Poon,** Hong Kong Univ. of Science and Technology (Hong Kong, China); **Michelle L. Povinelli,** The Univ. of Southern California (USA); **Michael Scaggs,** Neoteric Concepts, LLC (USA); **Lan Yang,** Washington Univ. in St. Louis (USA)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:30 to 11:25 am

Resonators

Session Chair: **Alexis V. Kudryashov,**
Moscow State Open Univ. (Russian Federation)

Fine control of ultrashort pulse trains with a Fabry-Perot intracavity resonator *(Invited Paper)*, Ladan Arissian, Koji Masuda, Jean-Claude M. Diels, The Univ. of New Mexico (USA) . . . . . [8236-01]

Experimental verification of path length sensitivity to coherent beam combining by spatial filtering, Chenhao Wan, James R. Leger, Univ. of Minnesota, Twin Cities (USA) . . . . . [8236-02]

Beam control of nonplanar ring resonators based on the analysis of optical-axis perturbation, Jie Yuan, Xingwu Long, Meixiong Chen, Fei Wang, Yu Wang, Pengfei Zhang, National Univ. of Defense Technology (China) . . . . . [8236-03]

1121-nm resonator properties and impact on the design of a 1178-nm sodium guidestar laser, Leanne J. Henry, Jacob Grosek, Gerald T. Moore, Thomas Shay, Air Force Research Lab. (USA) . . . . . [8236-04]

Comprehensive analysis of thermal lensing effects on the a coaxial resonator on a high power RF excited CO_2 laser, Viktor Granson, Jochen Deile, Jesus F. Monjardin, Shadi S. Sumrain, Francisco J. Villarreal-Saucedo, TRUMPF Inc. (USA) . . . . . [8236-05]

Unstable resonator with high magnification and low output coupling, Carsten Pargmann, Thomas Hall, Frank Duschek, Karin M. Grünewald, Jürgen Handke, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . [8236-06]

Spatial and spectral mode control in broad stripe lasers with integrated phase and amplitude diffractive structures, Viktor O. Smolski, Oleg V. Smolski, Eric G. Johnson, The Univ. of North Carolina at Charlotte (USA) . . . . . [8236-07]

SESSION 2 . . . . . Sun. 11:25 am to 12:05 pm

Beam Shaping I

Session Chair: **Lutz Aschke,**
LIMO Lissotschenko Mikrooptik GmbH (Germany)

Effect of ring width on ring generated Bessel beam, Islam Abdo, Naguib Ashry, Mohamed Sadek, Ain Shams Univ. (Egypt); Mohamed Abd El Hakim, Diaa Khalil, Si-Ware Systems (Egypt) and Ain Shams Univ. (Egypt) . . . . [8236-08]

Efficient beam splitting with diffractive kinoforms and microlens arrays, Aliaksei Krasnaberski, Yuri V. Miklyaev, Denis Pikhulya, Lisa Kleinschmidt, Waleri Imgrunt, Mikhail Ivanenko, Vitalij N. Lissotschenko, LIMO Lissotschenko Mikrooptik GmbH (Germany) . . . . . [8236-09]

Lunch Break . . . . . 12:05 to 1:05 pm

SESSION 3 . . . . . Sun. 1:05 to 2:45 pm

Beam Shaping II

Session Chair: **Lutz Aschke,**
LIMO Lissotschenko Mikrooptik GmbH (Germany)

Gaussian-to-top-hat beam shaping: an overview of parameters, methods, and applications, Oliver Homburg, Thomas Mitra, LIMO Lissotschenko Mikrooptik GmbH (Germany) . . . . . [8236-10]

Parametric optimization of refractive beam shaping systems considering diffraction and interference effects, Hagen Schweitzer, Michael Kuhn, Christian Hellmann, LightTrans GmbH (Germany); Frank Wyrowski, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8236-11]

Wave front reconstruction using computer-generated holograms, Christian Schulze, Daniel Flamm, Michael Duparré, Friedrich-Schiller-Univ. Jena (Germany); Oliver A. Schmidt, Max Planck Institute for the Science of Light (Germany) . . . . . [8236-12]

Variable beam shaping with using the same field mapping refractive beam shaper, Alexander V. Laskin, Vadim Laskin, AdlOptica Optical Systems GmbH (Germany) . . . . . [8236-13]

Propagating aberrated light, Andrew Forbes, Cosmas Mafusire, CSIR National Laser Ctr. (South Africa) . . . . . [8236-14]

SESSION 4 . . . . . Sun. 2:45 to 4:45 pm

Beam or Mode Dignostics

Session Chair: **Kunihiko Washio,**
Paradigm Laser Research Ltd. (Japan)

Continuous single pulse resolved measurement of beam diameters at 200 kHz using optical transmission filters *(Invited Paper)*, Johannes Fruechtenicht, Andreas Letsch, Marwan Abdou Ahmed, Andreas Voss, Thomas Graf, Univ. Stuttgart (Germany) . . . . . [8236-15]

Discerning comb and Fourier mean frequency from an fs laser based on the principle of non-interaction of waves, Chandrasekhar Roychoudhuri, Univ. of Connecticut (USA) . . . . . [8236-16]

Real-time monitoring of thermal lensing of a multikilowatt fiber laser optical system *(Invited Paper)*, Michael Scaggs, Gilbert J. Haas, Haas Laser Technologies, Inc. (USA) . . . . . [8236-17]

Comparison of two modal decomposition techniques, Robert Brüning, Daniel Flamm, Christian Schulze, Friedrich-Schiller-Univ. Jena (Germany); Oliver A. Schmidt, Max Planck Institute for the Science of Light (Germany); Michael Duparré, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8236-18]

SESSION 5 . . . . . Sun. 4:45 to 5:25 pm

Adaptive Optics

Session Chair: **Alan H. Paxton,** Air Force Research Lab. (USA)

Active mirrors for intra-cavity compensation of the aspherical thermal lens in thin-disk lasers, Stefan Piehler, Birgit Weichelt, Andreas Voss, Marwan Abdou Ahmed, Thomas Graf, Univ. Stuttgart (Germany) . . . . . [8236-19]

New deformable mirror technology and associated control strategies for ultrahigh intensity laser beam corrections and optimizations, Nicolas Lefaudeux, Imagine Optic SA (France); Jérôme Ballesta, Imagine Optic Inc. (USA) . . . . . [8236-20]

Monday 23 January

SESSION 6 . . . . . Mon. 8:00 to 10:05 am

Microcavity Lasers and Applications I

Session Chair: **Vladimir S. Ilchenko,** OEwaves, Inc. (USA)

Unidirectional-emission, single-mode, whispering-gallery-mode microlasers *(Invited Paper)*, Yong-Zhen Huang, Jian-Dong Lin, Yue-De Yang, Qi-Feng Yao, Xiao-Meng Lv, Jin-Long Xiao, Yun Du, Institute of Semiconductors (China) . . . . . [8236-21]

Miniaturized optical microwave source based on simultaneous single-mode laser oscillations in Er:ZBLALiP whispering-gallery-mode resonator *(Invited Paper)*, Patrice Féron, Elodie Le Cren, Alphonse Rasoloniaina, Yann G. Boucher, Yannick Dumeige, Ecole Nationale Supérieure des Sciences Appliquées et de Technologie (France); Michel S. Mortier, Ecole Nationale Supérieure de Chimie de Paris (France) . . . . . [8236-22]

Progress in miniature sub-kilohertz microresonator based self-injection locked semiconductor laser systems *(Invited Paper)*, Elijah B. Dale, Danny Eliyahu, Vladimir S. Ilchenko, Wei Liang, Jerry Byrd, David Seidel, Lute Maleki, OEwaves, Inc. (USA) . . . . . [8236-23]

Whispering-gallery-mode resonators for compact optical clocks *(Invited Paper)*, Nan Yu, Lukas M. Baumgartel, Yanne Chembo, Ivan S. Grudinin, Dmitry V. Strekalov, Robert J. Thompson, Jet Propulsion Lab. (USA) . . [8236-24]

Exploring the frequency stability limits of whispering gallery mode resonators for metrological applications *(Invited Paper)*, Yanne K. Chembo, FEMTO-ST (France); Lukas M. Baumgartel, Ivan S. Grudinin, Dmitry V. Strekalov, Robert J. Thompson, Nan Yu, Jet Propulsion Lab. (USA) . . . [8236-25]

SESSION 7 . . . . . Mon. 10:30 am to 12:05 pm

Parametric Processes in Microresonators

Session Chair: **Andrey B. Matsko,** OEwaves, Inc. (USA)

Whispering-gallery-modes for nonlinear light generation from a low number of molecules *(Invited Paper)*, Jordi Martorell, ICFO - Institut de Ciències Fotòniques (Spain) and Univ. Politecnica de Catalunya (Spain); Gregory Kozyreff, Univ. Libre de Bruxelles (Belgium); Jorge Luis Dominguez-Juarez, ICFO - Institut de Ciències Fotòniques (Spain) . . . . . [8236-26]

Monolithic optical parametric oscillators *(Invited Paper)*, Ingo Breunig, Albert-Ludwigs-Univ. Freiburg (Germany). . . . . [8236-27]

Photonic microwave receivers based on high-Q optical resonance *(Invited Paper)*, Mani Hossein-Zadeh, Ctr. for High Technology Materials (USA) . . . . . [8236-28]

Theory of anisotropic whispering-gallery resonators, Marco Ornigotti, Max Planck Institute for the Science of Light (Germany); Andrea Aiello, Max Planck Institute for the Science of Light (Germany) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [8236-29]

Lunch Break . . . . . 12:05 to 1:20 pm

SESSION 8 . . . . . Mon. 1:20 to 3:00 pm

Integration of Microresonators and Photonic Circuits

Session Chair: **Andrew W. Poon,** Hong Kong Univ. of Science and Technology (Hong Kong, China)

High-Q resonators and ultralow-loss delay lines *(Invited Paper)*, Kerry J. Vahala, Hansuek Lee, Tong Chen, Jiang Li, California Institute of Technology (USA) . . . . . [8236-30]

Coupling approaches and new geometries in whispering-gallery-mode resonators *(Invited Paper)*, Gualtiero Nunzi Conti, Simone Berneschi, Massimo Brenci, Franco Cosi, Daniele Farnesi, Stefano Pelli, Giancarlo C. Righini, Silvia Soria, Istituto di Fisica Applicata Nello Carrara (Italy). . . . [8236-31]

Novel resonance-based CMOS-compatible reconfigurable nanophotonic structures *(Invited Paper)*, Amir H. Atabaki, Qing Li, Payam Alipour, Ali Asghar Eftekhar, Zhixuan Xia, Ali Adibi, Georgia Institute of Technology (USA) . . . . . [8236-32]

Integrated terahertz microcavities, filters, and waveguides *(Invited Paper)*, Farhan Rana, Paul A. George, Christina Manolatou, Cornell Univ. (USA) . . . . . [8236-33]

SESSION 9 . . . . . Mon. 3:25 to 5:05 pm

Novel Microresonators

Session Chair: **Vladimir S. Ilchenko,** OEwaves, Inc. (USA)

Localization of light and photonic microresonators in an optical fiber with nanoscale radius variation *(Invited Paper)*, Misha Sumetsky, OFS (USA) . . . . . [8236-34]

Neutron whispering-gallery and its application to fundamental and surface physics *(Invited Paper)*, Valery V. Nesvizhevsky, Institut Laue-Langevin (France) . . . . . [8236-35]

Guided resonances for light-assisted self assembly and structural-absorption engineering *(Invited Paper)*, Michelle L. Povinelli, Camilo Mejia Prada, Chenxi Lin, Eric Jaquay, Luis J. Martinez Rodriguez, The Univ. of Southern California (USA); Avik Dutt, Indian Institute of Technology Kharagpur (India). . . . . [8236-36]

Time-reversed lasing and coherent control of absorption in resonators *(Invited Paper)*, A. Douglas Stone, Hui Cao, Yidong Chong, Yale Univ. (USA); Li Ge, Princeton Univ. (USA); Heeso Noh, Yale Univ. (USA); Wenjie Wan, Shanghai Jiaotong Univ. (China) . . . . . [8236-37]

SESSION 10 . . . . . Mon. 5:05 to 6:05 pm

Microcavity Lasers and Applications II

Session Chair: **Vladimir S. Ilchenko,** OEwaves, Inc. (USA)

Dynamic multi-mode analysis of passive Q-switched lasers, Christoph Pflaum, Zhabiz Rahimi, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [8236-38]

Improvements in monoblock performance using external reflector, Alan D. Hays, John E. Nettleton, Nick Barr, Nathaniel Hough, Lew Goldberg, U.S. Army Night Vision & Electronic Sensors Directorate (USA). . . . . [8236-39]

Characterization of the longitudinal Gouy phase branches in cascaded optical systems, Sudha K. Nirmala, Surya Prakash Tewari, Univ. of Hyderabad (India). . . . . [8236-40]

Tuesday 24 January

SESSION 11 . . . . . Tues. 8:00 to 10:30 am

Microresonator-Based Sensors I

Session Chair: **Michelle L. Povinelli,** The Univ. of Southern California (USA)

Nonlinear modes of plasmonic microcavities: theoretical analysis and device applications *(Invited Paper)*, Nicolae C. Panoiu, Claudiu G. Biris, Univ. College London (United Kingdom) . . . . . [8236-41]

Developing horizontal slot disk resonators for optical biosensing and more *(Invited Paper)*, Jung H. Shin, Shinyoung Lee, Seok Chan Eom, KAIST (Korea, Republic of) . . . . . [8236-42]

Silicon microring sensors *(Invited Paper)*, Zhiping Zhou, Huaxiang Yi, Peking Univ. (China) . . . . . [8236-43]

Silicon nitride microresonators for optical manipulation of microparticles and biosensing *(Invited Paper)*, Andrew W. Poon, Hong Cai, Ting Lei, Hong Kong Univ. of Science and Technology (Hong Kong, China) . . . . . [8236-44]

Giant sensitivity of coupled optofluidic active ring sensors *(Invited Paper)*, Lei Xu, Fudan Univ. (China) . . . . . [8236-45]

Optical microcavities: taking detection to the limit *(Invited Paper)*, Frank Vollmer, Max Planck Institute for the Science of Light (Germany) [8236-46]

SESSION 12 . . . . . Tues. 10:50 am to 12:30 pm

Microresonator-Based Sensors II

Session Chair: **Jean-Claude M. Diels,** The Univ. of New Mexico (USA)

On-chip whispering-gallery-mode lasers for sensing applications *(Invited Paper)*, Lina He, Sahin K. Ozdemir, Jiangang Zhu, Woosung Kim, Lan Yang, Washington Univ. in St. Louis (USA). . . . . [8236-47]

Integrated whispering-gallery mode resonators for fundamental physics and sensing applications *(Invited Paper)*, Rico Henze, Humboldt-Univ. zu Berlin (Germany); Jonathan M. Ward, Humboldt-Univ. zu Berlin (Germany) and Cork Institute of Technology (Ireland); Markus Gregor, Humboldt-Univ. zu Berlin (Germany); Christoph Pyrlik, Andreas Wicht, Ferdinand-Braun-Institut (Germany); Achim Peters, Ferdinand-Braun-Institut (Germany) and Humboldt-Univ. zu Berlin (Germany); Oliver Benson, Humboldt-Univ. zu Berlin (Germany) . . . . . [8236-48]

High-sensitivity and wide-directivity ultrasound detection using high-Q polymer micro-ring resonators *(Invited Paper)*, Tao Ling, Sung-Liang Chen, L. Jay Guo, Univ. of Michigan (USA). . . . . [8236-49]

Physical and chemical sensing with fiber optic resonators based on comb synthesizers *(Invited Paper)*, Gianluca Gagliardi, Istituto Nazionale di Ottica (Italy) . . . . . [8236-50]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 13 . . . . . Tues. 1:30 to 3:20 pm

Microresonator-Based Sensors III

Session Chair: **Lan Yang,** Washington Univ. in St. Louis (USA)

Hybrid optoplasmonic elements for ultrasensitive detection and information processing on the nanoscale *(Invited Paper)*, Svetlana V. Boriskina, Wonmi Ahn, Yan Hong, Bjoern M. Reinhard, Boston Univ. (USA) . . . . . [8236-51]

Plasmon lasers and circuits *(Invited Paper)*, Renmin Ma, Univ. of California, Berkeley (USA); Xiang Zhang, Univ. of California, Berkeley (USA) and Lawrence Berkeley National Lab. (USA) . . . . . [8236-52]

Fabrication of hybrid optoplasmonic microresonators for high-efficiency photonic-plasmonic mode coupling, Wonmi Ahn, Svetlana V. Boriskina, Yan Hong, Björn M. Reinhard, Boston Univ. (USA) . . . . . [8236-53]

Porous-wall hollow-glass microsphere as an optical microresonator for chemical vapor detection, Hanzheng Wang, Lei Yuan, Edward Pienkowski, Missouri Univ. of Science and Technology (USA); Cheol-Woon Kim, MO-SCI Corp. (USA); Hai Xiao, Missouri Univ. of Science and Technology (USA) . . . . . [8236-54]

ICLAS-based detection of low vapor pressure compounds using external cavity QCL and Fabry-Perot interferometer, Gautam Medhi, Univ. of Central Florida (USA); Andrey V. Muravjov, Zyberwear, Inc. (USA); Chris J. Fredricksen, Robert E. Peale, Univ. of Central Florida (USA); Oliver Edwards, Zyberwear, Inc. (USA) . . . . . [8236-55]

SESSION 14 . . . . . Tues. 3:45 to 6:00 pm

Resonant Opto-Mechanics

Session Chair: **Tobias J. Kippenberg,**
Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Whispering-gallery-mode resonators for optomechanical effects and optical trapping *(Invited Paper)*, Síle G. Nic Chormaic, Univ. College Cork (Ireland) and Tyndall National Institute (Ireland) and Okinawa Institute of Science and Technology (Japan); Jonathan M. Ward, Univ. College Cork (Ireland) and Humboldt Univ. zu Berlin (Germany); Amy Watkins, Yuqiang Wu, Univ. College Cork (Ireland). . . . . [8236-56]

Brillouin optomechanics *(Invited Paper)*, Tal E. Carmon, Univ. of Michigan (USA) . . . . . [8236-57]

Surface acoustic wave frequency comb, Andrey B. Matsko, Anatoliy A. Savchenkov, Vladimir S. Ilchenko, David J. Seidel, Lute Maleki, OEwaves, Inc. (USA) . . . . . [8236-58]

Micro-opto-mechanical damping and amplification in a waveguide-DBR microcavity *(Invited Paper)*, Marcel W. Pruessner, Todd H. Stievater, William S. Rabinovich, U.S. Naval Research Lab. (USA); Jacob B. Khurgin, The Johns Hopkins Univ. (USA) . . . . . [8236-59]

Effects of spatial confinement of electromagnetic field on optical forces due to whispering-gallery modes, Joel T. Rubin, Lev I. Deych, Queen's College (USA) . . . . . [8236-60]

Evanescent light fields coupling effects and optical propelling of microspheres in water immersed fiber couplers, Yangcheng Li, Oleksiy Svitelskiy, Dongning Sun, The Univ. of North Carolina at Charlotte (USA); David J. Carnegie, Edik U. Rafailov, Univ. of Dundee (United Kingdom); Vasily N. Astratov, The Univ. of North Carolina at Charlotte (USA) . . . . . [8236-61]

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Generalized model for beam-path variation in ring resonator and its applications in backscattering coupling effect, Meixiong Chen, Jie Yuan, Xingwu Long, Zhenglong Kang, Yingying Li, National Univ. of Defense Technology (China) . . . . . [8236-74]

Performance of the smoothing of small target spots in frequency-tripled high-power laser, Xiujuan Jiang, Yang Li, Yingna Zheng, Guangdong Univ. of Technology (China) . . . . . [8236-75]

FDTD analysis of light storage in coupled micro-ring resonators, Dan T. Nguyen, NP Photonics, Inc. (USA) and College of Optical Sciences, The Univ. of Arizona (USA); Robert A. Norwood, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [8236-76]

About some possibilities of influencing the energetic relief of metals in order to favor micro-joining processes, Corina Bokor, Sorin Itu, Ilie V. Isarie, Claudiu I. Isarie, Anca M. Voineag, Florin Ciofu, Sorin Tarnoveanu, Cosmin Colceriu, Univ. Lucian Blaga din Sibiu (Romania). . . . . [8236-77]

Model for a partially coherent pump beam for an alkali laser, Alan H. Paxton, Air Force Research Lab. (USA) . . . . . [8236-78]

Wednesday 25 January

SESSION 15 . . . . . Wed. 8:00 to 9:50 am

Resonant Four-Wave Mixing and Applications

Session Chair: **Pierre Galarneau,** INO (Canada)

Nonlinearities in silicon photonics: something to exploit or to counteract? *(Invited Paper)*, Andrea Melloni, Francesco Morichetti, Carlo Ferrari, Antonio Canciamilla, Politecnico di Milano (Italy); Marc Sorel, Univ. of Glasgow (United Kingdom). . . . . [8236-62]

Linear and nonlinear effects of electron paramagnetic resonance in high-Q cryogenic sapphire microwave resonators *(Invited Paper)*, Michael E. Tobar, The Univ. of Western Australia (Australia). . . . . [8236-63]

Hybrid microspheres for nonlinear Kerr switching devices, Silvia Soria, Simone Berneschi, Gualtiero Nunzi Conti, Franco Cosi, Giancarlo C. Righini, Istituto di Fisica Applicata Nello Carrara (Italy); Ilya E. Razdolski, Tatyana V. Murzina, Lomonosov Moscow State Univ. (Russian Federation) . . . . . [8236-64]

The beam quality of self-phase modulated Gaussian beams, Sergiy Mokhov, Boris Zeldovich, Leonid B. Glebov, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8236-65]

Ab initio theory of nonlinear effects in individual and coupled microdisk resonators, Lev I. Deych, Queens College (USA) . . . . . [8236-66]

LASE Plenary Session

Wed. 10:20 am to 12:30 pm

Session Chairs: **Friedhelm Dorsch,** TRUMPF GmbH & Co. KG (Germany); **Alberto Piqué,** U.S. Naval Research Lab. (USA)

10:20 am: **Welcome and Opening Remarks,** Friedhelm Dorsch, TRUMPF GmbH & Co. KG (Germany); Alberto Piqué, U.S. Naval Research Lab. (USA)

10:25 am: **Announcement of the Green Photonics Award**, Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

10:30 am: **Plasmonics for Beam Shaping and Wavefront Engineering,** Federico Capasso, Harvard Univ. (USA)

11:10 am: **The National Ignition Facility and Progress Towards Inertial Fusion Ignition,** Edward I. Moses, Lawrence Livermore National Lab. (USA)

11:50 am: **Successful Technology Approach for Lasers in Manufacturing,** Peter Leibinger, TRUMPF GmbH & Co. KG (Germany)

See p. 16 for details.

SESSION 16 . . . . . Wed. 2:00 to 3:10 pm

Doped Microresonators

Session Chair: **Thomas Graf,** Univ. Stuttgart (Germany)

SESSION 17 . . . . . Wed. 3:30 to 5:20 pm

Coupled Microresonators and Sensing

Session Chair: **Vladimir S. Ilchenko,** OEwaves, Inc. (USA)

Courses of Related Interest

SC860 Resonator Design for Solid State Lasers (Paschotta) Wednesday, 8:30 am to 5:30 pm

SC818 Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm

SC977 Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Fiber Lasers IX: Technology, Systems, and Applications

Conference Chair: **Eric C. Honea,** Lockheed Martin Aculight (USA)

Conference Co-Chair: **Sami T. Hendow,** Multiwave Photonics (USA)

Program Committee: **John Ballato,** Clemson Univ. (USA); **Jes Broeng,** NKT Photonics A/S (Denmark); **Adrian L. G. Carter,** Nufern (USA); **John R. Clowes,** Fianium Ltd. (United Kingdom); **Jay W. Dawson,** Lawrence Livermore National Lab. (USA); **Fabio Di Teodoro,** Northrop Grumman Aerospace Systems (USA); **Mark Dubinskii,** U.S. Army Research Lab. (USA); **Jean-Philippe M. Fève,** Directed Energy Solutions (USA); **Almantas Galvanauskas,** Univ. of Michigan (USA); **Denis V. Gapontsev,** Consultant (Russian Federation); **Clifford Headley III,** OFS Labs. (USA); **Yoonchan Jeong,** Seoul National Univ. (Korea, Republic of); **Dahv A. Kliner,** JDSU (USA); **John D. Minelly,** Coherent, Inc. (USA); **Peter F. Moulton,** Q-Peak, Inc. (USA); **Siddharth Ramachandran,** The Boston Univ. Photonics Ctr. (USA); **Craig A. Robin,** Air Force Research Lab. (USA); **L. Brandon Shaw,** U.S. Naval Research Lab. (USA); **Daniel B. Soh,** Sandia National Labs., California (USA); **James R. Taylor,** Imperial College London (United Kingdom); **Andreas Tünnermann,** Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); **Robert G. Waarts,** Robert Waarts Consulting (USA); **Ji Wang,** Corning Incorporated (USA); **Frank W. Wise,** Cornell Univ. (USA); **David E. Zelmon,** Air Force Research Lab. (USA); **Mikhail N. Zervas,** Univ. of Southhampton (United Kingdom)

Conference Cosponsors:

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Monday 23 January

Welcome and Introduction . . . . . Mon. 8:10 to 8:20 am

Eric C. Honea, Lockheed Martin Aculight

SESSION 1 . . . . . Mon. 8:20 to 10:10 am

Beam Combining I

Session Chair: **Eric C. Honea,** Lockheed Martin Aculight (USA)

Beam combination of kilowatt fiber amplifiers *(Invited Paper)*, Joshua E. Rothenberg, Gregory D. Goodno, Northrop Grumman Aerospace Systems (USA) . . . . . [8237-01]

Phase-locked multi-core photonic crystal fiber laser by end-sealing, Akira Shirakawa, Hidenori Yamada, Michio Matsumoto, Masaki Tokurakawa, Ken-ichi Ueda, The Univ. of Electro-Communications (Japan) . . . . . [8237-02]

Coherent and spectral beam combining of fiber lasers, Steven J. Augst, Shawn M. Redmond, Charles X. Yu, Daniel J. Ripin, T. Y. Fan, MIT Lincoln Lab. (USA); Greg D. Goodno, Peter A. Thielen, Joshua E. Rothenberg, Northrop Grumman Aerospace Systems (USA); Antonio Sanchez-Rubio, MIT Lincoln Lab. (USA) . . . . . [8237-03]

Multiplexed volume Bragg gratings for spectral beam combining, Ivan B. Divliansky, Derrek Drachenberg, Vasile Rotar, George Venus, Leonid B. Glebov, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8237-04]

Spatial chirp-precompensated high density spectral beam combining, Eric C. Cheung, James Ho, Timothy S. McComb, Stephen Palese, Northrop Grumman Aerospace Systems (USA) . . . . . [8237-05]

Courses of Related Interest

SC1053	Ultrafast Laser Pulse Shaping and Adaptive Pulse Compression (Dantus) Tuesday, 1:30 to 5:30 pm
SC744	Ultrafast Fiber Lasers (Fermann) Sunday, 1:30 to 5:30 pm
SC748	High-Power Fiber Sources (Nilsson) Sunday, 8:30 am to 5:30 pm
SC1020	Splicing of Specialty Fibers and Glass Processing of Fused Fiber Components for Fiber Lasers (Wang) Sunday, 8:30 am to 12:30 pm
SC974	Interconnection and Splicing of High-Power Optical Fibers (Yablon) Monday, 8:30 am to 12:30 pm
SC746	Introduction to Ultrafast Technology (Trebino) Tuesday, 1:30 to 5:30 pm
SC1012	Coherent Mid-Infrared Sources and Applications (Vodopyanov) Sunday, 1:30 to 5:30 pm
SC931	Applied Nonlinear Frequency Conversion (Paschotta) Monday, 8:30 am to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm
SC1060	Fundamentals of Nonlinear Optics (Powers) Sunday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

SESSION 2 . . . . . Mon. 10:40 am to 12:00 pm

Beam Combining II

Session Chair: **Jay W. Dawson,** Lawrence Livermore National Lab. (USA)

Coherently phase locked high pulse energy fiber amplifiers, Stephen Palese, Eric C. Cheung, Fabio Di Teodoro, Timothy S. McComb, C. C. Shih, Mark Weber, Mike Hemmat, Northrop Grumman Aerospace Systems (USA) . [8237-36]

Coherently combined fiber CPA system delivering 3-mJ femtosecond pulses, Arno Klenke, Enrico Seise, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany); Sven Breitkopf, Stefan Demmler, Friedrich-Schiller-Univ. Jena (Germany); Jan Rothhardt, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany); Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer Institute for Applied Optics and Precision Engineering (Germany) and Helmholtz-Institute Jena (Germany) . . . . . [8237-37]

Passive coherent beam combining of two femtosecond fiber chirped-pulse amplifiers in a Sagnac geometry, Louis Daniault, Marc Hanna, Lab. Charles Fabry de l'Institut d'Optique (France); Dimitris Papadopoulos, Ecole Nationale Supérieure de Techniques Avancées (France); Yoann Zaouter, Eric Mottay, Amplitude Systemes (France); Frederic Druon, Patrick Georges, Lab. Charles Fabry de l'Institut d'Optique (France) . . . . . [8237-38]

Active coherent combining of multiple parallel femtosecond-pulse CPA channels, Leo A. Siiman, Tong Zhou, Wei-Zung Chang, Almantas Galvanauskas, Univ. of Michigan (USA) . . . . . [8237-39]

Lunch Break . . . . . 12:00 to 1:40 pm

SESSION 3 . . . . . Mon. 1:40 to 3:10 pm

High Power I

Session Chair: **Mikhail N. Zervas,** SPI Lasers (United Kingdom)

Thermally induced mode instability in high power fiber amplifiers *(Invited Paper)*, Arlee V. Smith, Jesse J. Smith, AS-Photonics, LLC (USA) . . . . . [8237-40]

Temporal dynamics of mode instabilities in high power fiber amplifiers, Hans-Jürgen Otto, Fabian Stutzki, Florian Jansen, Friedrich-Schiller-Univ. Jena (Germany); Tino Eidam, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany); Cesar Jauregui, Friedrich-Schiller-Univ. Jena (Germany); Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany); Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8237-41]

On the thermal origin of mode instabilities in high power fiber lasers, Cesar Jauregui-Misas, Tino Eidam, Hans-Jürgen Otto, Florian Jansen, Fabian Stutzki, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8237-42]

High power extraction from very large mode area fibers approaching MFDs of 100 µm, Florian Jansen, Fabian Stutzki, Cesar Jauregui, Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany). . . . . [8237-43]

SESSION 4 . . . . . Mon. 3:40 to 6:10 pm

High-Power Fiber and Disk Lasers

Joint Session with Conference 8235

Session Chairs: **Norman Hodgson,** Coherent, Inc. (USA); **Dahv A. Kliner,** JDSU (USA)

High-power disk and fiber lasers: a performance comparison *(Invited Paper)*, Stefan Ruppik, Frank Becker, Frank-Peter Grundmann, Wolfram Rath, Ulrich Hefter, ROFIN-SINAR Laser GmbH (Germany). . . [8235-25]

Multi-kW single fiber laser based on an extra large mode area fiber design, Andreas Langner, Mario Such, Gerhard Schötz, Heraeus Quarzglas GmbH & Co. KG (Germany); Florian Just, Martin Leich, Christian Mühlig, Jens Kobelke, Anka Schwuchow, Stephan Grimm, Institut für Photonische Technologien e.V. (Germany); Olaf Strauch, Björn Wedel, HIGHYAG Lasertechnologie GmbH (Germany); Georg Rehmann, Charley Bachert, Volker Krause, Laserline GmbH (Germany) . . . . . [8237-44]

High-power disk lasers: advances and applications, David L. Havrilla, Tracey S. Ryba, TRUMPF Inc. (USA); Marco Holzer, TRUMPF Laser- und Systemtechnik GmbH (Germany) . . . . . [8235-26]

1.2-kW single-mode fiber laser based on 100-W high-brightness pump diodes, Dahv A. Kliner, Hongbo Yu, Johnny Luu, Kai-Hsiu Liao, Jeff Segall, Martin H. Muendel, Jane Shen, Matthew K. Kutsuris, Donald K. Holdener, Justin Franke, Kelvin Nguyen, Dave L. Woods, David Meng, David L. Vecht, Richard Duesterberg, Lei Xu, Jay A. Skidmore, James Guo, Jane Cheng, Jihua Du, Brad Johnson, Nicolas Guerin, Benlih Huang, Peter Cheng, Reddy Raju, Kong Weng Lee, Jason Cai, Victor V. Rossin, Erik P. Zucker, JDSU (USA) . . . . . [8237-45]

Ultrafast disk lasers and amplifiers, Dirk H. Sutter, Jochen D. Kleinbauer, Dominik Bauer, Martin Wolf, Chuong Tan, Raphael Gebs, Aleksander Budnicki, Philipp Wagenblast, TRUMPF Laser GmbH & Co. KG (Germany); Sascha Weiler, TRUMPF Inc. (USA) . . . . . [8235-27]

65 W of average power and 6-MW peak power generation from a mode-locked fiber oscillator, Martin Baumgartl, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany); Caroline Lecaplain, Ammar Hideur, Univ. de Rouen (France); Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8237-46]

800-W CW near diffraction limited beam delivery through a 100-m long multi-mode fiber, Armin Austerschulte, Moritz M. Vogel, Thomas Rataj, Jan P. Negel, Andreas Voss, Marwan Abdou Ahmed, Thomas Graf, Univ. Stuttgart (Germany) . . . . . [8237-47]

Tuesday 24 January

SESSION 5 . . . . . Tues. 8:00 to 9:00 am

High Power II

Session Chair: **Peter F. Moulton,** Q-Peak, Inc. (USA)

Cascaded Raman fiber laser at 1480 nm with output power of 104 W, V. R. Supradeepa, Jeffrey Nicholson, Clifford Headley, Yin-wen Lee, OFS Labs. (USA); Bera Palsdottir, Dan Jakobsen, OFS Fitel Denmark ApS (Denmark) . . . . . [8237-48]

High-power continuous wave erbium-doped fiber laser pumped by a 1480-nm Raman fiber laser, Jeffrey W. Nicholson, OFS Labs. (USA) . . . . . [8237-49]

Further power scaling of resonantly cladding-pumped all-glass Er-doped silica based fiber laser, Jun Zhang, John McElhenny, Viktor Fromzel, Tigran Sanamyan, Mark Dubinskii, U.S. Army Research Lab. (USA) . . . . . [8237-50]

SESSION 6 . . . . . Tues. 9:05 to 10:15 am

Visible and UV Sources

Session Chair: **Daniel B. Soh,** Sandia National Labs., California (USA)

Efficient nonlinear frequency conversion scheme for cladding-pumped fiber lasers *(Invited Paper)*, Rafal Cieslak, W. Andrew Clarkson, Univ. of Southampton (United Kingdom) . . . . . [8237-51]

High power picosecond fiber laser emitting 50 W at 343 nm at 80 MHz, Damien Sangla, Julien Saby, Benjamin Cocquelin, François Salin, EOLITE Systems (France) . . . . . [8237-52]

Frequency conversion from IR to UV of a high average power and high peak power ultrafast fiber amplifier for scientific and industrial applications, Yoann Zaouter, Amplitude Systemes (France); Marc Hanna, Lab. Charles Fabry de l'Institut d'Optique (France); Franck Morin, Mario Tonin, Rysvan Maleck, Clemens Hönninger, Amplitude Systemes (France); Patrick Georges, Lab. Charles Fabry de l'Institut d'Optique (France); Eric Mottay, Amplitude Systemes (France) . . . . . [8237-53]

SESSION 7 . . . . . Tues. 10:40 am to 12:20 pm

Components

Session Chair: **John D. Minelly,** Coherent, Inc. (USA)

Advanced components for multi-kW fiber lasers *(Invited Paper)*, Donald L. Sipes, Jr., Jason Tafoya, Daniel Schulz, Optical Engines, Inc. (USA); Chad Carlson, Benjamin Ward, U.S. Air Force Academy (USA) . . . . . [8237-54]

Advanced fiber combiner capable of 400-W CW operation for the realization of monolithic counter-propagating pumped high power fiber amplifiers, Thomas Theeg, Laser Zentrum Hannover e.V. (Germany); Hakan Sayinc, Jörg Neumann, Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany) and Ctr. for Quantum Engineering and Space-Time Research (QUEST) (Germany) . . . . . [8237-55]

High-spectral-flatness mid-infrared supercontinuum fiber source and its applications for component characterizations, Jihong Geng, AdValue Photonics, Inc. (USA) . . . . . [8237-56]

Micro-optics for spatial phase, polarization, and spectral control in passive and active fibers *(Invited Paper)*, Eric G. Johnson, Clemson Univ. (USA) . . . . . [8237-57]

Lunch/Exhibition Break . . . . . 12:20 to 1:50 pm

SESSION 8 . . . . . Tues. 1:50 to 3:20 pm

Fiber Designs, Materials and Characterization I

Session Chair: **Siddharth Ramachandran,** The Boston Univ. Photonics Ctr. (USA)

Ultraviolet absorption and excitation spectroscopy of rare-earth-doped glass fibers derived from glassy and crystalline preforms *(Invited Paper)*, Peter D. Dragic, Yuh-Shiuan Liu, Tom Galvin, J. Gary Eden, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [8237-58]

Experimental characterization of robust single-mode operation of 50-µm and 60-µm core chirally coupled-core optical fibers, Xiuquan Ma, Alex Kaplan, Almantas Galvanauskas, Univ. of Michigan (USA) . . . . . [8237-59]

Amplification of a large-mode area single higher order mode in a fiber amplifier, Clifford Headley III, James Phillips, John Fini, Enrico Gonzales, Samir Ghalmi, Man Yan, Jeffrey Nicholson, Patrick Wisk, Jim Fleming, Eric Monberg, Frank Dimarcello, Robert S. Windeler, Michael Fishteyn, OFS Labs. (USA); Khushvinder Brar, Lockheed Martin Aculight (USA); Siddharth Ramachandran, The Boston Univ. Photonics Ctr. (USA); David DiGiovanni, OFS Labs. (USA) . . . . . [8237-60]

A comparative study of tapered fiber laser configurations, Juho Kerttula, Valery Filippov, Tampere Univ. of Technology (Finland); Yuri K. Chamorovskii, Vasiliy Ustimchik, Konstantin M. Golant, Institute of Radio Engineering and Electronics (Russian Federation); Oleg G. Okhotnikov, Tampere Univ. of Technology (Finland) . . . . . [8237-61]

SESSION 9 . . . . . Tues. 3:50 to 6:00 pm

Fiber Designs, Materials and Characterization II

Session Chair: **Adrian L. G. Carter,** Nufern (USA)

Polymer optical fibres: conventional and microstructured fibres *(Invited Paper)*, Alexander Argyros, The Univ. of Sydney (Australia) . . . . [8237-62]

Photonic crystal fiber with large-mode area and low-bending loss for high-power compact lasers and amplifiers, Marek Napierala, Vrije Univ. Brussel (Belgium) and Wroclaw Univ. of Technology (Poland); Elzbieta M. Beres-Pawlik, Wroclaw Univ. of Technology (Poland); Tomasz Nasilowski, Military Univ. of Technology (Poland); Pawel Mergo, Marie Curie-Sklodowska Univ. (Poland); Francis Berghmans, Hugo Thienpont, Vrije Univ. Brussel (Belgium) . . . [8237-63]

Mode analysis of LMA fibers using the correlation filter method, Daniel Flamm, Christian Schulze, Friedrich-Schiller-Univ. Jena (Germany); Oliver A. Schmidt, Max Planck Institute for the Science of Light (Germany); Siegmund Schröter, Institut für Photonische Technologien e.V. (Germany); Michael Duparré, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8237-66]

Efficient high power fiber amplifier utilizing the single mode distributed mode filtering bandgap rod fiber, Marko Laurila, Technical Univ. of Denmark (Denmark); Thomas T. Alkeskjold, NKT Photonics A/S (Denmark); Mette M. Jørgensen, Sidsel R. Petersen, Technical Univ. of Denmark (Denmark); Jes Broeng, NKT Photonics A/S (Denmark); Jesper Lægsgaard, Technical Univ. of Denmark (Denmark). . . . . [8237-65]

Influence of fiber bending on the modal content, Christian Schulze, Daniel Flamm, Friedrich-Schiller-Univ. Jena (Germany); Oliver A. Schmidt, Max Planck Institute for the Science of Light (Germany); Michael Duparré, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8237-64]

CGH-based real-time analysis of fiber Bragg gratings in few mode LMA fibers, Markus Mundus, Friedrich-Schiller Univ. Jena (Germany); Jens U. Thomas, Christian Voigtländer, Ria G. Becker, Cesar Jauregui, Andreas Tünnermann, Stefan Nolte, Friedrich-Schiller Univ. Jena (USA) . . . . . [8237-67]

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

High power all-fiber picosecond laser system for UV light generation, Mizuki Oku, Khanh Kieu, Nasser Peyghambarian, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [8237-68]

Numerical evaluation of pulse compressibility and chirp characterization, Igor I. Korel, Boris Nyushkov, Vladimir Denisov, Institute of Laser Physics (Russian Federation) . . . . . [8237-69]

Sensitivity enhancement of in-line chemical sensing device with C-type fiber and photonic crystal fiber, Sahar Hosseinzadeh Kassani, Jiyoung Park, Kyunghwan Oh, Yonsei Univ. (Korea, Republic of) . . . . . [8237-70]

Pulse energy scaling of ps to ns pulses in highly integrated fiber amplifiers, Hakan Sayinc, Laser Zentrum Hannover e.V. (Germany) and Ctr. for Quantum Engineering and Space-time Research (QUEST) (Germany); Thomas Theeg, Sebastian Kanzelmeyer, Laser Zentrum Hannover e.V. (Germany); Jörg Neumann, Laser Zentrum Hannover e.V. (Germany) and Ctr. for Quantum Engineering and Space-time Research (QUEST) (Germany); Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany) . . . . . [8237-71]

Low noise fiber laser based on gain feedback in a rare-earth doped fiber amplifier chain, Hongdan Wan, Xiaohan Sun, Southeast Univ. (China) [8237-72]

The role of the saturable absorber in a mode-locked fiber laser, Dmitriy Churin, Khanh Kieu, Nasser Peyghambarian, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [8237-73]

Cavity loss adjustment requirement for dual wave laser generation, Ricardo I. Álvarez-Tamayo, Benemérita Univ. Autónoma de Puebla (Mexico); Manuel Durán-Sanchez, Univ.Tecnológica de Puebla (Mexico); Olivier Pottiez, Ctr. de Investigaciones en Óptica, A.C. (Mexico); Baldemar Ibarra-Escamilla, Evgeny A. Kuzin, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . [8237-74]

New mechanical stripping methods for optical fibers, Douglas M. Duke, Wenxin Zheng, William Klimowych, Steven Shaw, AFL Conductor Accessories (USA) . . . . . [8237-75]

25-ps optical pulse at 850 nm with a fiber-based laser, Youngjae Kim, Bryan Burgoyne, Alain Villeneuve, Jr., Genia Photonics Inc. (Canada) . . . . . [8237-76]

Compact picosecond laser for industrial applications, Peer Burdack, Thomas Fox, Stefan Spiekermann, Ingo Freitag, InnoLight GmbH (Germany) . . . . . [8237-77]

Holmium-doped ZBLAN fiber lasers at 1.2 µm, Xiushan Zhu, College of Optical Sciences, The Univ. of Arizona (USA); Jie Zong, NP Photonics, Inc. (USA); Robert A. Norwood, College of Optical Sciences, The Univ. of Arizona (USA); Arturo Chavez-Pirson, NP Photonics, Inc. (USA); Nasser N. Peyghambarian, College of Optical Sciences, The Univ. of Arizona (USA); Narasimha S. Prasad, NASA Langley Research Ctr. (USA) . . . . . [8237-78]

High power single-mode fiber laser and a multi-mode delivery cable, Kosuke Kashiwagi, Akira Fujisaki, Yoshihiro Emori, Takashi Kayahara, The Furukawa Electric Co., Ltd. (Japan) . . . . . [8237-79]

Passively Q-switched 2 µm Tm-doped cladding-pumped all fiber laser with graphene-based saturable absorber, Jiang Liu, Beijing Univ. of Technology (China); Rusheng Wei, Xiangang Xu, Shandong Univ. (China); Pu Wang, Beijing Univ. of Technology (China) . . . . . [8237-80]

Single-mode WDM for core pumping thulium-doped fiber at 795 nm, Gabriel Pelegrina Bonilla, Katharina Hausmann, Kai Liu, Hakan Sayinc, Uwe Morgner, Jörg Neumann, Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany) . . . . . [8237-81]

Atomic layer deposition for fabrication of ytterbium doped fibers, Joan J. Montiel i Ponsoda, Aalto Univ. School of Electrical Engineering (Finland); Markus Bosund, Beneq Oy (Finland); Lars Norin, Acreo AB (Sweden); Mikko Söderlund, Beneq Oy (Finland); Changgeng Ye, Ari Tervonen, Seppo Honkanen, Aalto Univ. School of Electrical Engineering (Finland) . . . . . [8237-82]

Switchable multiwavelength erbium-doped fiber ring laser based on nonlinear polarization rotation, Young-Geun Han, Youngbo Shim, Hanyang Univ. (Korea, Republic of) . . . . . [8237-83]

Generalized transfer function of a quarter-wave-shifted distributed-feedback fiber laser, Thi Kim N. Nguyen, Yann G. Boucher, Pascal Besnard, Ecole Nationale Supérieure des Sciences Appliquées et de Technologie (France) . . . . . [8237-84]

Arc power calibration for fusion splicing optical fibers with variety diameters, Wenxin Zheng, Bryan Malinsky, AFL Conductor Accessories (USA) . . . . . [8237-85]

Plasma zone control for adaptable fusion splicing capability, Douglas M. Duke, Wenxin Zheng, Hiroshi Sugawara, Toshirou Mizushima, AFL Conductor Accessories (USA); Kazuyuki Yoshida, Fujikura Ltd. (Japan) . . . . . [8237-86]

Picosecond swept source laser at 1300 nm, Youngjae Kim, Bryan Burgoyne, Alain Villeneuve, Jr., Genia Photonics Inc. (Canada). . . . . [8237-87]

Tailored fiber Bragg gratings inscribed with a phase mask and a deformed wave front by ultrashort pulses, Ria G. Becker, Christian Voigtländer, Jens U. Thomas, Daniel Richter, Anshuman Singh, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8237-88]

High power single mode optical fiber coupler with enhanced mode field diameter, Thomas Theeg, Laser Zentrum Hannover e.V. (Germany); Katharina Hausmann, Hakan Sayinc, Jörg Neumann, Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany) and Ctr. for Quantum Engineering and Space-Time Research (QUEST) (Germany) . . . . . [8237-89]

Thermo-optic wavelength-tunable fiber laser for the interrogation of fiber Bragg grating sensor systems, Hyojin Kim, Myung Yung Jeong, Chang Seok Kim, Pusan National Univ. (Korea, Republic of); YoungOuk Noh, HyungJong Lee, ChemOptics Inc. (Korea, Republic of); MinCheol Oh, Pusan National Univ. (Korea, Republic of) and ChemOptics Inc. (Korea, Republic of) . . . . . [8237-90]

Quantitative modeling of pulse amplification in multimode cladding pumped Yb/Er co-doped fiber amplifiers, Dan T. Nguyen, Wei Shi, Arturo Chavez-Pirson, NP Photonics, Inc. (USA) . . . . . [8237-91]

Effects of the gain property on the efficiency of the strongly pumped fiber laser, Jianqiu Cao, Shaofeng Guo, Jinyong Leng, Xiaojun Xu, Jinbao Chen, National Univ. of Defense Technology (China) . . . . . [8237-92]

Analytical analysis of coherent combination of amplified ultrashort laser pulses, Arno Klenke, Enrico Seise, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany); Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer Institute for Applied Optics and Precision Engineering (Germany) and Helmholtz-Institute Jena (Germany) . . . . . [8237-93]

All thulium fiber single-mode MOPA delivering 32-nJ picosecond pulses, William Renard, Guillaume Canat, Michel Lefebvre, Pierre Bourdon, ONERA (France) . . . . . [8237-94]

SHARC fibers: a new paradigm for packagable ultralarge-core single-mode fibers, David A. Rockwell, Vladimir V. Shkunov, Raytheon Space and Airborne Systems (USA); John R. Marciante, Univ. of Rochester (USA) . . . . . [8237-95]

Erbium-ytterbium co-doped fiber amplifier with controlled 1060-nm Yb-ASE, Grzegorz J. Sobon, Pawel Kaczmarek, Arkadiusz J. Antonczak, Jaroslaw Sotor, Adam Waz, Grzegorz Dudzik, Karol Krzempek, Krzysztof M. Abramski, Wroclaw Univ. of Technology (Poland) . . . . . [8237-96]

High repetition-rate narrow line-width SESAM mode-locked picosecond Yb-doped all fiber laser, Jiang Liu, Pu Wang, Beijing Univ. of Technology (China) . . . . . [8237-97]

Three-stage all-in-fiber MOPA source operating at 1550 nm with 20W output power, Grzegorz J. Sobon, Pawel Kaczmarek, Arkadiusz J. Antonczak, Jaroslaw Sotor, Adam Waz, Grzegorz Dudzik, Karol Krzempek, Krzysztof M. Abramski, Wroclaw Univ. of Technology (Poland) . . . . . [8237-98]

True crystalline fibers: double-clad LMA design concept of Tm:YAG-core fiber and its mode simulation, Xiaodong Mu, Helmuth Meissner, Huai-Chuan Lee, Onyx Optics Inc. (USA); Mark Dubinskii, U.S. Army Research Lab. (USA) . . . . . [8237-130]

Robustly single-mode large-area fibers with asymmetric bend compensation, John M. Fini, OFS Labs. (USA) . . . . . [8237-131]

Ytterbium-doped large-mode-area photonic crystal fiber amplifier with gain shaping for use at long wavelengths, Sidsel R. Petersen, Mette M. Jørgensen, NKT Photonics A/S (Denmark); Enrico Coscelli, Federica Poli, Stefano Selleri, Univ. degli Studi di Parma (Italy); Marko Laurila, Thomas T. Alkeskjold, NKT Photonics A/S (Denmark); Jesper Lægsgaard, Technical Univ. of Denmark (Denmark). . . . . [8237-132]

Design optimization of a photonic crystal fiber rod amplifier having distributed modal filtering, Mette M. Jørgensen, Sidsel R. Petersen, Marko Laurila, Technical Univ. of Denmark (Denmark); Thomas T. Alkeskjold, NKT Photonics A/S (Denmark); Jesper Lægsgaard, Technical Univ. of Denmark (Denmark) . . . . . [8237-133]

Fiber based generation of azimuthally polarized light, Christoph Jocher, Cesar Jauregui-Misas, Christian Voigtländer, Fabian Stutzki, Stefan Nolte, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8237-134]

Experimental characterization of Hänsch-Couillaud-based stabilization for coherent combining of ultrashort laser pulses, Sven Breitkopf, Friedrich-Schiller-Univ. Jena (Germany); Enrico Seise, Arno Klenke, Manuel Krebs, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz-Institute Jena (Germany). . . . . [8237-135]

Suppression of instability in high-power passively phased fiber laser arrays, Will Ray, Oak Ridge National Lab. (USA); Erik Bochove, Air Force Research Lab. (USA); Yehuda Braiman, Oak Ridge National Lab. (USA); Sami Shakir, TASC, Inc. (USA) . . . . . [8237-136]

Optical frequency comb generation with a flat-top spectrum from a mode-locked Yb fiber laser, Tai Hyun Yoon, Gwang Hoon Jang, Korea Univ. (Korea, Republic of) . . . . . [8237-137]

Programmable laser at 1053 nm with 55-nm tuning range and pulse adjustability from less 100 ps to over 1 ns, Bryan Burgoyne, Youngjae Kim, Alain Villeneuve, Jr., Genia Photonics Inc. (Canada). . . . . [8237-138]

High pulse energy sub-nanosecond Tm-doped fiber laser, Andras Cserteg, Sebastien Guillemet, Yves Hernandez, Domenico Giannone, Multitel A.S.B.L. (Belgium) . . . . . [8237-139]

All-fiber Er-doped amplifier seeded by a gain-switched laser diode, Laura Abrardi, Thomas Feurer, Univ. Bern (Switzerland) . . . . . [8237-140]

Linear precompensation of FM-to-AM conversion due to spectral dispersion and frequency conversion system, Jean-François Gleyze, Commissariat à l'Énergie Atomique (France) . . . . . [8237-141]

Characterization of mid-infrared emissions from C_2H_2, CO, CO_2, and HCN-filled hollow fiber lasers, Andrew M. Jones, Kansas State Univ. (USA); Chenchen Mao, Bastian Baumgart, Vasudevan A. V. Nampoothiri, Neil Campbell, The Univ. of New Mexico (USA); Yingying Y. Wang, Coralie Fourcade-Dutin, Fetah Benabid, Univ. of Bath (United Kingdom); Wolfgang Rudolph, The Univ. of New Mexico (USA); Brian R. Washburn, Kristan L. Corwin, Kansas State Univ. (USA) . . . . . [8237-142]

New approach to fabrication of a Faraday isolator for high power laser applications, Carolin Rothhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany); Miroslaw Rekas, Gerhard Kalkowski, Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8237-143]

High-average-power actively-mode-locked Tm^{3+} fiber lasers, Michael Eckerle, Christelle Kieleck, Philipp Hübner, Institut Franco-Allemand de Recherches de Saint-Louis (France); Stuart D. Jackson, The Univ. of Sydney (Australia); Marc Eichhorn, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [8237-144]

Wednesday 25 January

SESSION 10 . . . . . Wed. 8:10 to 9:50 am

Fiber Laser Applications

Session Chair: **Brandon Shaw,** U.S. Naval Research Lab. (USA)

Fiber lasers and amplifiers for space-based science and exploration *(Invited Paper)*, Anthony W. Yu, NASA Goddard Space Flight Ctr. (USA) . . . . . [8237-06]

New applications for short pulse length and high average power Q-switched fiber lasers, Anthony P. Hoult, IPG Photonics Corp. (USA) . . . . . [8237-07]

Progress in ultrafast fiber lasers for ultralow-jitter signal sources, Jungwon Kim, Kwangyun Jung, Chur Kim, Hyoji Kim, Taekeun Kim, Suhyeon Park, Youjian Song, Heewon Yang, KAIST (Korea, Republic of) . . . . . [8237-08]

Application of high-performance OEM fibre lasers in manufacturing *(Invited Paper)*, Stephen Norman, SPI Lasers (United Kingdom). . . . . [8237-09]

LASE Plenary Session

Wed. 10:20 am to 12:30 pm

Session Chairs: **Friedhelm Dorsch,** TRUMPF GmbH & Co. KG (Germany); **Alberto Piqué,** U.S. Naval Research Lab. (USA)

10:20 am: **Welcome and Opening Remarks,** Friedhelm Dorsch, TRUMPF GmbH & Co. KG (Germany); Alberto Piqué, U.S. Naval Research Lab. (USA)

10:25 am: **Announcement of the Green Photonics Award**, Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

10:30 am: **Plasmonics for Beam Shaping and Wavefront Engineering,** Federico Capasso, Harvard Univ. (USA)

11:10 am: **The National Ignition Facility and Progress Towards Inertial Fusion Ignition,** Edward I. Moses, Lawrence Livermore National Lab. (USA)

11:50 am: **Successful Technology Approach for Lasers in Manufacturing,** Peter Leibinger, TRUMPF GmbH & Co. KG (Germany)

See p. 16 for details.

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 11 . . . . . Wed. 2:00 to 3:30 pm

Fiber Laser Markets

Session Chair: **Sami T. Hendow,** Multiwave Photonics (USA)

Innovations in high power fiber laser applications *(Invited Paper)*, Eckhard Beyer, Fraunhofer IWS Dresden (Germany) and Dresden Univ. of Technology (Germany) . . . . . [8237-10]

Fiber laser beam combining and power scaling progress: AFRL Laser Division *(Invited Paper)*, Torrey J. Wagner, Air Force Research Lab. (USA) . . . . . [8237-11]

From CW to fs: fiber lasers for high-end product manufacturing *(Invited Paper)*, Roland Mayerhofer, Dieter Mairhoermann, Richard Hendel, Michael Mueller, Markus Roehner, Stephan Geiger, ROFIN-BAASEL Lasertechnik GmbH & Co KG (Germany) . . . . . [8237-12]

SESSION 12 . . . . . Wed. 4:00 to 5:00 pm

Narrow Line Sources and Fiber Nonlinearities I

Session Chair: **Mark Dubinskii,** U.S. Army Research Lab. (USA)

Distributed light scattering model for the SBS and SRS threshold powers in small and large mode area passive optical fibers, Marc D. Mermelstein, OFS Labs. (USA) . . . . . [8237-13]

Frequency domain analysis of dynamic refractive index changes in fiber amplifiers, Henrik Tünnermann, Jörg Neumann, Dietmar Kracht, Peter Weßels, Laser Zentrum Hannover e.V. (Germany) and Ctr. for Quantum-Engineering and Space-Time Research (QUEST) (Germany). . . . . [8237-14]

All-fiber broad-range self-sweeping Yb-doped fiber laser, Ivan Lobach, Sergey A. Babin, Sergey Kablukov, Evgeniy Podivilov, Institute of Automation and Electrometry (Russian Federation) . . . . . [8237-15]

SESSION 13 . . . . . Wed. 5:00 to 6:00 pm

Late-Breaking News

Session Chair: **Sami T. Hendow,** Multiwave Photonics (USA)

The submission deadline for the Late Breaking News Session is 9 January 2012.

The website will be open to submissions beginning in October.

See http://spie.org/LA103 for details.

Two-page submissions are required.

Papers are selected and announced the week prior to the conference, so you must be prepared to attend and present before you even know if your paper will be accepted. Accepted papers will be printed as submitted without further revision in the front matter of the proceedings (the front matter is not citable).

Thursday 26 January

SESSION 14 . . . . . Thurs. 8:00 to 10:00 am

Narrow Line Sources and Fiber Nonlinearities II

Session Chair: **Clifford Headley III,** OFS Labs. (USA)

Gain-tailored SBS suppressing photonic crystal fibers for high power applications, Craig Robin, Iyad Dajani, Clint Zeringue, Air Force Research Lab. (USA); Benjamin Ward, U.S. Air Force Academy (USA) . . . . . [8237-16]

YAG-derived fiber for high-power narrow-linewidth fiber lasers, Peter D. Dragic, Yuh-Shiuan Liu, Univ. of Illinois at Urbana-Champaign (USA); John Ballato, Thomas Hawkins, Paul Foy, COMSET Clemson Univ. (USA) . . [8237-17]

High power single-frequency 780-nm fiber laser source for RB trapping and cooling applications, Alain Mugnier, Mathieu Jacquemet, Eric Le Mercier, Ronan Lebref, David Pureur, Quantel Group (France) . . . . . [8237-18]

Er-doped single-frequency photonic crystal fiber amplifier with 70 W of output power for gravitational wave detection, Vincent Kuhn, Dietmar Kracht, Jörg Neumann, Peter Wessels, Laser Zentrum Hannover e.V. (Germany) . . . . . [8237-19]

High-power single-frequency photonic bandgap fiber amplifier at 1178 nm, Meishin Chen, Akira Akira, Yoshiaki Yamahara, Ken-ichi Ueda, The Univ. of Electro-Communications (Japan); Christina B. Olausson, Jens K. Lyngsø, Jes Broeng, NKT Photonics A/S (Denmark) . . . . . [8237-20]

Characterization of a narrowband Raman MOPA with short master oscillator, Alexander Siekiera, Rainer Engelbrecht, Andreas Nothofer, Bernhard Schmauss, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . [8237-21]

SESSION 15 . . . . . Thurs. 10:30 am to 12:00 pm

Mid IR Sources

Session Chair: **Fabio Di Teodoro,** Northrop Grumman Aerospace Systems (USA)

Development of resonantly cladding-pumped holmium-doped fibre lasers *(Invited Paper)*, Alexander V. Hemming, Shayne P. Bennetts, Nikita Simakov, John Haub, Defence Science and Technology Organisation (Australia); Adrian Carter, Nufern (USA) . . . . . [8237-22]

An all-fiber PM MOPA pumped high-power OPO at 3.82 µm based on large aperture PPMgLN, Dejiao Lin, Shaif-ul Alam, Optoelectronics Research Ctr. (United Kingdom); Yonghang Shen, Tao Chen, Zhejiang Univ. (China); David J. Richardson, Optoelectronics Research Ctr. (United Kingdom). . . . . [8237-23]

High-energy monolithic single-frequency pulsed fiber laser at ~2 µm in MOPA configuration, Wei Shi, NP Photonics, Inc. (USA); Eliot Petersen, NP Photonics, Inc. (USA) and Univ. of Arizona (USA); Dan T. Nguyen, Zhidong Yao, Arturo Chavez-Pirson, NP Photonics, Inc. (USA); Nasser Peyghambarian, NP Photonics, Inc. (USA) and College of Optical Sciences, The Univ. of Arizona (USA); Jirong Yu, NASA Langley Research Ctr. (USA) . . . . . [8237-24]

Integrated 100-W polarized narrow linewidth thulium fiber MOPA system, Lawrence Shah, R. Andrew Sims, Pankaj Kadwani, Christina C. Willis, Joshua D. Bradford, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Zachary Roth, Aaron Pung, Menelaos Poutous, Eric G. Johnson, The Univ. of North Carolina at Charlotte (USA); Martin Richardson, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8237-25]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 16 . . . . . Thurs. 1:30 to 3:00 pm

Mode Locked and Ultrafast Fiber Sources

Session Chair: **Almantas Galvanauskas,** Univ. of Michigan (USA)

Mode-locked Tm and Ho fiber lasers *(Invited Paper)*, Qing Wang, Jihong Geng, Tao Luo, Shibin Jiang, AdValue Photonics, Inc. (USA). . . . . [8237-26]

High peak and average power generation by cascaded nonlinear compression of fiber CPA system, Steffen Hädrich, Friedrich-Schiller-Univ. Jena (Germany); Jan Rothhardt, Helmholtz Institute Jena (Germany); Henning Carstens, Stefan Demmler, Thomas Gottschall, Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8237-27]

High energy 2 micron femtosecond fiber laser, Vladimir Protopopov, Lihmei Yang, Jian Liu, PolarOnyx, Inc. (USA) . . . . . [8237-28]

Stretcher fibers for chirped pulse amplifiers at 1030 nm and 1550 nm, Lars Grüner-Nielsen, Dan Jakobsen, Bera Palsdottir, Poul Kristensen, Kim G. Jespersen, OFS Fitel Denmark ApS (Denmark) . . . . . [8237-29]

SESSION 17 . . . . . Thurs. 3:30 to 5:40 pm

Pulsed Fiber Laser Sources

Session Chair: **Robert G. Waarts,** Robert Waarts Consulting (USA)

Toward kW nanosecond fiber lasers with rod type fibers *(Invited Paper)*, François L. Salin, EOLITE Systems (France). . . . . [8237-30]

9-mJ pulse energy Q-switched large-pitch fiber laser system with excellent beam quality, Florian Jansen, Fabian Stutzki, Cesar Jauregui, Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany). . . . . [8237-31]

MW+ peak power sub-nsec 10-kHz repetition rate polarization-maintaining fiber-amplifiers using tapered Yb-doped fibers, Youming Chen, Jean-Luc Fouron, Frank Kimpel, Shantanu Gupta, Fibertek, Inc. (USA). . . . . [8237-32]

High-power fiber based architecture providing extensive temporal and spectral pulse format control, Fabio Di Teodoro, Timothy S. McComb, Northrop Grumman Aerospace Systems (USA) . . . . . [8237-33]

High energy in-band pumped erbium doped pulsed fibre laser, Shaif-ul Alam, Ee Leong Lim, David Richardson, Optoelectronics Research Ctr. (United Kingdom). . . . . [8237-34]

Q-switched and mode-locked pulses amplified with short thulium-doped silicate fibers, Qing Wang, Jihong Geng, Tao Luo, Shibin Jiang, AdValue Photonics, Inc. (USA) . . . . . [8237-35]

Best Oral Student Paper Competition

Thursday 26 January

Award Ceremony · 5:40 to 5:50 pm

For conference 8237: Fiber Lasers IX: Technology, Systems, and Applications, we are pleased to announce that a **cash prize** will be awarded to the best student oral presentation in the conference.

Throughout the conference, qualifying student oral presentations will be evaluated by a conference steering committee, led by Craig Robin. Student presentations will be judged based on scientific merit, impact, and clarity of the presentation (not the manuscript). While the award is not judged by the manuscript, a manuscript must be submitted.

To be eligible for consideration, a student must be listed as an author on an accepted paper, must have conducted the majority of the work being presented, and must make the oral presentation.

To be considered for this prize, please confirm the student presenter of your oral talk by email to Craig Robin [Craig.Robin@kirtland.af.mil], and include your SPIE paper number, paper title, and attach a copy of the university-issued Student ID Card by 5 December 2011.

The winner of the Best Student Oral Presentation Award will be announced during the Student Award Ceremony on Thursday afternoon.

Award Sponsors:

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Conference 8238A

Sunday 22 January 2012 • Part of Proceedings of SPIE Vol. 8238

High Energy/Average Power Lasers and Intense Beam Applications VII

Conference Chairs: **Steven J. Davis,** Physical Sciences Inc. (USA); **Michael C. Heaven,** Emory Univ. (USA); **J. Thomas Schriempf,** Naval Sea Systems Command (USA)

Program Committee: **David L. Carroll,** CU Aerospace LLC (USA); **Jarmila Kodymová,** Institute of Physics of the ASCR, v.v.i. (Czech Republic); **Timothy J. Madden,** Air Force Research Lab. (USA); **William E. McDermott,** Univ. of Denver (USA); **Wilson T. Rawlins,** Physical Sciences Inc. (USA)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:30 to 10:00 am

EOIL and DPAL I

Session Chair: **Steven J. Davis,** Physical Sciences Inc. (USA)

Chemistry of I* excitation in a hybrid catalytic electric-discharge oxygen-iodine laser *(Invited Paper)*, Wilson T. Rawlins, Seonkyung Lee, Steven J. Davis, Physical Sciences Inc. (USA). . . . . [8238A-01]

ElectricOIL performance enhancement via increases in g0L, David L. Carroll, Gabriel Benavides, Joseph Zimmerman, CU Aerospace LLC (USA); Brian Woodard, Univ. of Illinois at Urbana-Champaign (USA); Andrew D. Palla, Joseph T. Verdeyen, CU Aerospace LLC (USA); Wayne C. Solomon, Univ. of Illinois at Urbana-Champaign (USA). . . . . [8238A-02]

XPAL theory and modeling with comparison to experiments, David L. Carroll, Joseph T. Verdeyen, Andrew D. Palla, CU Aerospace LLC (USA) . . . . . [8238A-03]

Optical gain and excitation phenomena in optically pumped alkali atom-rare gas mixtures, Kristin L. Galbally-Kinney, Dan L. Maser, William J. Kessler, Wilson T. Rawlins, Steven J. Davis, Physical Sciences Inc. (USA) . . . . [8238A-04]

SESSION 2 . . . . . Sun. 10:30 to 11:30 am

EOIL and DPAL II

Session Chair: **Wilson T. Rawlins,** Physical Sciences Inc. (USA)

Investigation of radial temperature gradients in diode pumped alkali lasers using tunable diode laser absorption spectroscopy, Charles D. Fox, Glen P. Perram, Air Force Institute of Technology (USA). . . . . [8238A-05]

The kinetics of optically excited Ne* and Kr* metastables in helium at high pressure, Michael C. Heaven, Jiande Han, Humayun Kabir, Emory Univ. (USA) . . . . . [8238A-06]

Potential energy surfaces for the interactions of excited Rb and Cs atoms with methane, Michael C. Heaven, Emory Univ. (USA) . . . . . [8238A-07]

Lunch Break . . . . . 11:30 am to 1:00 pm

SESSION 3 . . . . . Sun. 1:00 to 2:30 pm

Laser Applications

Session Chair: **J. Thomas Schriempf,** Naval Sea Systems Command (USA)

Maritime HEL efficacy analysis *(Invited Paper)*, Stephen M. Hammel, Space and Naval Warfare Systems Command (USA) . . . . . [8238A-08]

Average power scaling of UV excimer lasers drives flat panel display and LIDAR applications, Ralph F. Delmdahl, Rainer Paetzel, Coherent GmbH (Germany) . . . . . [8238A-09]

Development of a double TIG laser process, Jörg Hermsdorf, Laser Zentrum Hannover e.V. (Germany) . . . . . [8238A-10]

Phase controlled stimulated Brillouin scattering phase conjugation mirrors and its applications to the laser fusion driver, Hong Jin Kong, Sangwoo Park, Seongwoo Cha, KAIST (Korea, Republic of); Milan Kalal, Czech Technical Univ. in Prague (Czech Republic) . . . . . [8238A-11]

SESSION 4 . . . . . Sun. 2:30 to 3:30 pm

CO, CO_2, HF

Session Chair: **David L. Carroll,** CU Aerospace LLC (USA)

MOPA carbon monoxide laser system emitting nanosecond pulses, Andrey A. Ionin, Igor Kinyaevskiy, Yurii Klimachev, Andrey Kotkov, Andrey Kozlov, P.N. Lebedev Physical Institute (Russian Federation). . . . . [8238A-12]

Electrical and radiation characteristics of a multi-atmosphere small-sized sealed-off CO_2-laser, Boris A. Kozlov, Ryazan State Radioengineering Univ. (Russian Federation) . . . . . [8238A-13]

A simplified model for HF chemical laser amplifier, Wen Guang Liu, Xing Chen, Hongyan Wang, Wenyu Li, Weihong Hua, National Univ. of Defense Technology (China) . . . . . [8238A-14]

Courses of Related Interest

SC818 Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm

SC977 Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Tuesday 24 January 2012 • Part of Proceedings of SPIE Vol. 8238

Atmospheric and Oceanic Propagation of Electromagnetic Waves VI

Conference Chair: **Olga Korotkova,** Univ. of Miami (USA)

Program Committee: **Larry C. Andrews,** Univ. of Central Florida (USA); **Yahya Kemal Baykal,** Çankaya Univ. (Turkey); **Yangjian Cai,** Soochow Univ. (China); **Frank D. Eaton,** Air Force Research Lab. (USA); **Greg Gbur,** The Univ. of North Carolina at Charlotte (USA); **G. Charmaine Gilbreath,** U.S. Naval Research Lab. (USA); **Merrick C. Haller,** Oregon State Univ. (USA); **Vladimir P. Lukin,** V.E. Zuev Institute of Atmospheric Optics (Russian Federation); **Alex S. Mahalov,** Arizona State Univ. (USA); **Ronald L. Phillips,** Florida Space Institute (USA); **Jixiong Pu,** Huaqiao Univ. (China); **Robert K. Tyson,** The Univ. of North Carolina at Charlotte (USA); **Daomu Zhao,** Zhejiang Univ. (China)

Tuesday 24 January

SESSION 5 . . . . . Tues. 1:30 to 3:20 pm

Modeling of Turbulence and its Influence on EM Radiation

Session Chair: **Nathan H. Farwell,** Univ. of Miami (USA)

SESSION 6 . . . . . Tues. 3:50 to 5:30 pm

Mitigation of Atmospheric and Oceanic Turbulence: Theory and Experiments

Session Chair: **Olga Korotkova,** Univ. of Miami (USA)

Courses of Related Interest

LA109	8238B Atmospheric and Oceanic Propagation of Electromagnetic Waves VI
SC188	Laser Beam Propagation for Applications in Laser Communications, Laser Radar, and Active Imaging (Phillips, Andrews) Wednesday, 8:30 am to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Conference 8239

Tuesday-Thursday 24-26 January 2012 • Proceedings of SPIE Vol. 8239

High Power Laser Materials Processing: Lasers, Beam Delivery, Diagnostics, and Applications

Conference Chairs: **Eckhard Beyer,** Fraunhofer IWS Dresden (Germany); **Timothy Morris,** TRUMPF Inc. (USA)

Program Committee: **Milan Brandt,** RMIT Univ. (Australia); **Craig Bratt,** Fraunhofer USA, Inc. (USA); **Edward Chlebus,** Wroclaw Univ. of Technology (Poland); **Ingomar Kelbassa,** RWTH Aachen (Germany); **Wolfgang Knapp,** Cooperation Laser Franco-Allemande (France); **Isamu Miyamoto,** Osaka Univ. (Japan); **Thomas P. Pearsall,** European Photonics Industry Consortium (France); **Silke Pflueger,** Laserline Inc. (USA); **Michael Schmidt,** Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); **Jens Standfuss,** Fraunhofer IWS Dresden (Germany); **Anja Techel,** Fraunhofer IWS Dresden (Germany); **Luigi Tricarico,** Politecnico di Bari (Italy); **Kunihiko Washio,** Paradigm Laser Research Ltd. (Japan); **Andreas Wetzig,** Fraunhofer IWS Dresden (Germany); **Minlin Zhong,** Tsinghua Univ. (China)

Tuesday 24 January

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Controlling the thermally induced focal shift in laser processing heads, Jan-Philipp Negel, Felix Abt, David Blázquez-Sánchez, Armin Austerschulte, Margit Hafner, Thomas Liebig, Philipp von Strobl-Albeg, Rudolf Weber, Marwan Abdou-Ahmed, Andreas Voss, Thomas Graf, Univ. Stuttgart (Germany) [8239-36]

Process reliability of critical weldings, Jens Hahn, SITEC Industrietechnologie GmbH (Germany). . . . . [8239-37]

Through the Optical Combiner Monitoring in remote fiber laser welding of zinc coated steels, Daniele Colombo, Barbara Previtali, Politecnico di Milano (Italy); Manuel Lai, Daniele Bassan, Ctr. Ricerche Fiat S.C.p.A. (Italy); Giovanni Masotti, El.En. S.p.A. (Italy) . . . . . [8239-38]

Design of a laser-friction stir welding process on innovative materials, Giuseppe Casalino, Chiara Furio, Sabina Luisa Campanelli, Antonio D. Ludovico, Politecnico di Bari (Italy) . . . . . [8239-39]

Parameters in selective laser melting for processing metallic powders, Tomasz Kurzynowski, Edward Chlebus, Bogumila Kuznicka, Wroclaw Univ. of Technology (Poland) . . . . . [8239-40]

Courses of Related Interest

SC748	High-Power Fiber Sources (Nilsson) Sunday, 8:30 am to 5:30 pm
SC1020	Splicing of Specialty Fibers and Glass Processing of Fused Fiber Components for Fiber Lasers (Wang) Sunday, 8:30 am to 12:30 pm
SC974	Interconnection and Splicing of High-Power Optical Fibers (Yablon) Monday, 8:30 am to 12:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Wednesday 25 January

SESSION 1 . . . . . Wed. 8:00 to 10:00 am

Invited Session

Session Chair: **Eckhard Beyer,** Fraunhofer IWS Dresden (Germany)

Laser plasma sources for EUV lithography *(Invited Paper)*, M. C. Richardson, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8239-01]

The story of laser brazing technology *(Invited Paper)*, Peter Hoffmann, ERLAS Erlanger Lasertechnik GmbH (Germany). . . . . [8239-02]

Innovations in laser cladding and direct metal deposition *(Invited Paper)*, Christoph Leyens, Technische Univ. Dresden (Germany). . . . . [8239-03]

Structural strengthening of rocket nozzle extension by means of laser metal deposition *(Invited Paper)*, Michel Honoré, Force Institute (Denmark); Lise Brox, Michael Hallberg, Volvo Aero Corp. (Sweden). . . . . [8239-04]

LASE Plenary Session

Wed. 10:20 am to 12:30 pm

Session Chairs: **Friedhelm Dorsch,** TRUMPF GmbH & Co. KG (Germany); **Alberto Piqué,** U.S. Naval Research Lab. (USA)

10:20 am: **Welcome and Opening Remarks,** Friedhelm Dorsch, TRUMPF GmbH & Co. KG (Germany); Alberto Piqué, U.S. Naval Research Lab. (USA)

10:25 am: **Announcement of the Green Photonics Award**, Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

10:30 am: **Plasmonics for Beam Shaping and Wavefront Engineering,** Federico Capasso, Harvard Univ. (USA)

11:10 am: **The National Ignition Facility and Progress Towards Inertial Fusion Ignition,** Edward I. Moses, Lawrence Livermore National Lab. (USA)

11:50 am: **Successful Technology Approach for Lasers in Manufacturing,** Peter Leibinger, TRUMPF GmbH & Co. KG (Germany)

See p. 16 for details.

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 2 . . . . . Wed. 2:00 to 3:40 pm

Lasers and Laser Systems in Macro Processing

Session Chair: **Silke Pflueger,** Laserline Inc. (USA)

The role of high power lasers in macro trends affecting product design and manufacturing in heavy industry, Ed Hansen, ESAB North America (USA) . . . . . [8239-05]

Frequency doubled high-power disk lasers in pulsed and continuous-wave operation, Alexander Hangst, TRUMPF Laser- und Systemtechnik GmbH (Germany); Sascha Weiler, TRUMPF Inc. (USA); Dirk H. Sutter, Christian Stolzenburg, Ivo Zawischa, Steffen Kalfhues, Alexander Killi, TRUMPF Laser GmbH & Co. KG (Germany); Marco Holzer, Uwe Kriegshaeuser, TRUMPF Laser- und Systemtechnik GmbH (Germany). . . . . [8239-06]

Lasers for industrial production processing: tailored tools with increasing flexibility, Wolfram Rath, ROFIN-SINAR Laser GmbH (Germany) . . . . . [8239-07]

High power diode lasers: generation of line focus geometries and its applications, Jens Meinschien, Melanie Brodner, Dirk Hauschild, Vitalij N. Lissotschenko, Alexei S. Mikhailov, Thomas Mitra, Stephan Schneider, LIMO Lissotschenko Mikrooptik GmbH (Germany) . . . . . [8239-08]

High-power transmission characterization of Chalcogenide glasses using a Tm:fiber laser system, Pankaj Kadwani, Joshua D. Bradford, Robert A. Sims, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); J. David Musgraves, Kathleen A. Richardson, Clemson Univ. (USA); Lawrence Shah, Martin C. Richardson, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8239-09]

SESSION 3 . . . . . Wed. 4:10 to 5:50 pm

Applications: Welding

Session Chair: **Timothy Morris,** TRUMPF Inc. (USA)

Advantages of fibre lasers in 3D metal cutting and welding applications supported by a 'beam in motion (BIM)' beam delivery system, Torsten Scheller, JENOPTIK Automatisierungstechnik GmbH (Germany). . . . . [8239-10]

Influence of particle formation on laser remote applications with high brilliant radiation, Tobias Scholz, Klaus Dickmann, Fachhochschule Münster (Germany) . . . . . [8239-11]

T-joints of Ti alloys with hybrid laser-MIG welding: macro-graphic and micro-hardness analyses, Luigi Tricarico, Roberto Spina, Gianfranco Palumbo, Donato Sorgente, Leonardo Daniele Scintilla, Politecnico di Bari (Italy); Marco Brandizzi, Ctr. Ricerche Fiat S.C.p.A. (Italy); Annunziata Anna Satriano, Consorzio CALEF (Italy). . . . . [8239-12]

Improvements of the welding performance of plasma arcs by a superimposed fibre laser beam, Achim Mahrle, Sascha Rose, Michael Schnick, Thomas Pinder, Technische Univ. Dresden (Germany); Eckhard Beyer, Fraunhofer IWS Dresden (Germany); Uwe Füssel, Technische Univ. Dresden (Germany) . . . . . [8239-13]

Examinations on laser-welded joints of ultra-thin metallic foils, Andreas Patschger, Fachhochschule Jena (Germany); Matthias Hild, JENOPTIK Automatisierungstechnik GmbH (Germany); Jean Pierre Bergmann, Technische Univ. Ilmenau (Germany); Jens Bliedtner, Fachhochschule Jena (Germany) . . . . . [8239-14]

Thursday 26 January

SESSION 4 . . . . . Thurs. 8:00 to 10:10 am

Applications: Surface Treatment and Cladding

Session Chair: **Christoph Leyens,** Technische Univ. Dresden (Germany)

Identification of phase transformation using optical emission spectroscopy for direct metal deposition process *(Invited Paper)*, Lijun Song, Jyoti Mazumder, Univ. of Michigan (USA) . . . . . [8239-15]

A novel additive manufacturing process of using direct diode lasers to hard-face and repair of components for enhanced surface wear and corrosion resistance, Frank Gaebler, Keith Parker, Coherent, Inc. (USA) . . . . . [8239-16]

Laser heat treatment with latest system components, Steffen Bonss, Jan Hannweber, Udo Karsunke, Stefan Kuehn, Marko Seifert, Eckhard Beyer, Fraunhofer IWS Dresden (Germany) . . . . . [8239-17]

Local heat treatment of high strength steels with zoom-optics and 10kW-diode laser, Markus Baumann, Volker Krause, Laserline GmbH (Germany) . . . . . [8239-18]

Laser cladding by using solid-state and direct diode laser sources, Jürgen Metzger, TRUMPF Laser- und Systemtechnik GmbH (Germany); David L. Havrilla, David C. Locke, TRUMPF Inc. (USA); Antonio Candel-Ruiz, TRUMPF Laser- und Systemtechnik GmbH (Germany) . . . . . [8239-19]

Multi-kW laser cladding using cylindrical collimators and square-formed fibers, Mats Blomqvist, Stuart Campbell, Optoskand AB (Sweden); Jyrki Latokartano, Jari Tuominen, Tampere Univ. of Technology (Finland). . . . . [8239-20]

SESSION 5 . . . . . Thurs. 10:40 am to 12:30 pm

Applications: Cutting

Session Chair: **Andreas Wetzig,** Fraunhofer IWS Dresden (Germany)

Wavelength dependency in high power laser cutting and welding *(Invited Paper)*, Stephan Ziermann, David L. Havrilla, TRUMPF Inc. (USA); Benjamin Krummenauer, TRUMPF Laser- und Systemtechnik GmbH (Germany) . . . . . [8239-21]

Energy balance in disk and CO_2 laser beam inert gas fusion cutting, Leonardo Daniele Scintilla, Luigi Tricarico, Politecnico di Bari (Italy); Andreas Wetzig, Eckhard Beyer, Fraunhofer IWS Dresden (Germany). . . . . [8239-22]

Applicability of various beam sources for high power laser cutting of non-oriented electrical steel, René Siebert, Fraunhofer IWS Dresden (Germany); Harry Thonig, TRUMPF Sachsen GmbH (Germany); Andreas Wetzig, Eckhard Beyer, Fraunhofer IWS Dresden (Germany) . . . . . [8239-23]

Tailor cutting of crystalline solar cells by laser micro jet, Franz Bruckert, Institut National Polytechnique de Grenoble (France); Pedro Torres, Benjamin Carron, Bernold Richerzhagen, Synova S.A. (Switzerland). . . . . [8239-24]

Combining remote ablation cutting and remote welding: opportunities and application areas, Jan Musiol, Technische Univ. München (Germany); Matthias Luetke, Fraunhofer IWS Dresden (Germany); Markus Schweier, Jens Hatwig, Technische Univ. München (Germany); Andreas Wetzig, Fraunhofer IWS Dresden (Germany); Michael F. Zaeh, Technische Univ. München (Germany); Eckhard Beyer, Fraunhofer IWS Dresden (Germany) . . . . . [8239-25]

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 6 . . . . . Thurs. 2:00 to 3:30 pm

Beam Delivery and Diagnostics I

Session Chair: **Kunihiko Washio,**
Paradigm Laser Research Ltd. (Japan)

Mid-infrared imaging Fourier transform spectrometry for high power fiber and CO_2 laser irradiated plexiglass, fiberglass, and painted metals *(Invited Paper)*, Roberto Acosta, Kevin C. Gross, Michael A. Marciniak, Glen P. Perram, Air Force Institute of Technology (USA) . . . . . [8239-26]

Spectroscopic closed loop control of penetration depth in laser beam welding process, Teresa Sibillano, Domenico Rizzi, Antonio Ancona, Francesco P. Mezzapesa, Pietro Mario Lugarà, CNR-IFN UOS Bari (Italy); Ali Riza Konuk, Ronald Aarts, Bert Huis in 't Veld, Univ. Twente (Netherlands). . . . . [8239-27]

NIR-camera-based online diagnostics of laser beam welding processes, Friedhelm Dorsch, Holger Braun, Steffen Kessler, Dieter Pfitzner, TRUMPF Werkzeugmaschinen GmbH + Co. KG (Germany); Volker Rominger, TRUMPF Laser- und Systemtechnik GmbH (Germany) . . . . . [8239-28]

High-power fiber optic cable with integrated active sensors, Mats Blomqvist, Ola Blomster, Hans Bergstrand, Magnus Pålsson, Optoskand AB (Sweden) . . . . . [8239-29]

SESSION 7 . . . . . Thurs. 4:00 to 6:00 pm

Beam Delivery and Diagnostics II

Session Chair: **Wolfgang Knapp,**
Cooperation Laser Franco-Allemande (France)

Beam delivery systems and processing heads for 1µm high brightness laser cutting systems, Hagen Zimer, Roman Niedrig, Björn Wedel, HIGHYAG Lasertechnologie GmbH (Germany) . . . . . [8239-30]

Unique beam delivery and processing tools for high power solid state laser processing, Tracey S. Ryba, David Havrilla, TRUMPF Inc. (USA); Marco Holzer, Martin Bea, TRUMPF Laser- und Systemtechnik GmbH (Germany) . . . [8239-31]

Maximum uptime and minimum focus shift in high-power 1µm laser beam delivery, Thomas R. Kugler, Laser Mechanisms, Inc. (USA) . . . . . [8239-32]

Ultra low absorption glasses and optical coatings for reduced thermal focus shift in high power optics, Christopher S. Wood, Derrick Carpenter, Ove Lyngnes, Nick Traggis, Precision Photonics Corp. (USA); David Gritz, Heraeus Quartz America LLC (USA) . . . . . [8239-33]

Self-compensation of thermal lensing in optics for high-brightness solid-state lasers, Stefan Piehler, Andreas Voss, Marwan Abdou-Ahmed, Thomas Graf, Univ. Stuttgart (Germany). . . . . [8239-34]

Fabrication and characteristic of a new multicore fiber for high power delivery, Huifeng Wei, Yangtze Optical Fibre and Cable Co., Ltd. (China); Peiguang Yan, Chunyu Guo, Shuangchen Ruan, Shenzhen Univ. (China); Su Chen, Jiangtao Guo, Jiang Li, Yangtze Optical Fibre and Cable Co., Ltd. (China) . . . . . [8239-35]

Conference 8240

Tuesday-Thursday 24-26 January 2012 • Proceedings of SPIE Vol. 8240

Nonlinear Frequency Generation and Conversion: Materials, Devices, and Applications XI

Conference Chair: **Konstantin L. Vodopyanov,** Stanford Univ. (USA)

Conference Co-Chair: **Yehoshua Y. Kalisky,** Nuclear Research Ctr. Negev (Israel)

Program Committee: **Darrell J. Armstrong,** Sandia National Labs. (USA); **Pinhas Blau,** Soreq Nuclear Research Ctr. (Israel); **Majid Ebrahim-Zadeh,** ICFO - Instituto de Ciencias Fotónicas (Spain); **Peter P. Günter,** ETH Zurich (Switzerland); **Angus J. Henderson,** Lockheed Martin Aculight (USA); **Baldemar Ibarra-Escamilla,** Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); **Yun-Shik Lee,** Oregon State Univ. (USA); **Rita D. Peterson,** Air Force Research Lab. (USA); **Peter E. Powers,** Univ. of Dayton (USA); **Kenneth L. Schepler,** Air Force Research Lab. (USA); **Peter G. Schunemann,** BAE Systems (USA); **Andrei V. Shchegrov,** KLA-Tencor Corp. (USA); **Wei Shi,** NP Photonics, Inc. (USA); **Ramesh K. Shori,** Naval Air Warfare Ctr. Weapons Div. (USA)

Tuesday 24 January

SESSION 1 . . . . . Tues. 8:10 to 10:00 am

Visible and UV Lasers I

Controlling of sub-cycle pulse in UV-Vis-IR by multilayer optics *(Invited Paper)*, Vladimir Pervak, Ludwig-Maximilians-Univ. München (Germany) . . . . . [8240-01]

Generation of yellow-orange picosecond pulses at 595 nm by sum-frequency mixing of fiber-amplified gain-switched laser diodes, Kristian Lauritsen, Thomas Schoenau, Rainer Erdmann, PicoQuant GmbH (Germany) . . . . . [8240-02]

Highly efficient Q-switched green microchip laser based on second harmonic generation in MgO-doped PPLN, Haitao Zhao, Kostyantyn Sukhoy, Univ. of Manitoba (Canada); Ivan T. Lima, Jr., Univ. of Manitoba (Canada) and North Dakota State Univ. (USA); Arkady Major, Univ. of Manitoba (Canada) . . . . . [8240-03]

Power-scalable tunable UV, visible, and NIR generation from an ultrafast fiber OPA based on four wave mixing in PCF, Michael J. Yarrow, Fianium Ltd. (United Kingdom); William J. Wadsworth, Univ. of Bath (United Kingdom); Laure Lavoute, Univ. of Bath (United Kingdom) and Amplitude Systemes (France); John Clowes, Anatoly Grudinin, Fianium Ltd. (United Kingdom) . . . . . [8240-04]

Continuous-wave fourth harmonic generation in a whispering-gallery resonator, Jeremy Moore, Matthew Tomes, Tal Carmon, Mona Jarrahi, Univ. of Michigan (USA) . . . . . [8240-05]

SESSION 2 . . . . . Tues. 10:30 am to 12:30 pm

Terahertz Generation

Intracavity generation of continuous wave terahertz radiation *(Invited Paper)*, Maik Scheller, Desert Beam Technologies LLC (USA) and College of Optical Sciences, The Univ. of Arizona (USA); Abraham Young, Univ. of Arizona (USA); Joe M. Yarborough, Mahmoud Fallahi, Jerome V. Moloney, Martin Koch, Stephan W. Koch, Desert Beam Technologies LLC (USA); Christian d'Aubigny, Christopher Walker, Univ. of Arizona (USA) . . . . . [8240-06]

Terahertz-induced optical modulation in quantum-well microcavity, Yun-Shik Lee, Joseph L. Tomaino, Andrew D. Jameson, Oregon State Univ. (USA); Galina Khitrova, Hyatt M. Gibbs, College of Optical Sciences, The Univ. of Arizona (USA); Andrea C. Klettke, Mackillo Kira, Stephan W. Koch, Philipps-Univ. Marburg (Germany) . . . . . [8240-07]

Efficient parametric THz generation pumped by monolithic pulsed fiber lasers at ~2 µm in MOPA configuration, Wei Shi, NP Photonics, Inc. (USA); Eliot B. Petersen, NP Photonics, Inc. (USA) and College of Optical Sciences, The Univ. of Arizona (USA); Qiang Fang, Khanh Kieu, College of Optical Sciences, The Univ. of Arizona (USA); Arturo Chavez-Pirson, NP Photonics, Inc. (USA); Nasser Peyghambarian, NP Photonics, Inc. (USA) and College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [8240-08]

Coherent electro-optical detection of THz-wave generated from synchronously pumped picosecond THz parametric oscillator, Yuma Takida, Tatsuya Ohira, Yuzuru Tadokoro, Hiroshi Kumagai, Shigeki Nashima, Osaka City Univ. (Japan) . . . . . [8240-09]

Single-cycle terahertz pulses with amplitudes exceeding 1 MV/cm generated by optical rectification in $LiNbO_3$ and application to nonlinear optics *(Invited Paper)*, Hideki Hirori, Koichiro Tanaka, Kyoto Univ. (Japan) . . . . . [8240-10]

Lunch/Exhibition Break . . . . . 12:30 to 1:40 pm

SESSION 3 . . . . . Tues. 1:40 to 3:30 pm

Optical Parametric Devices

Optical parametric oscillation in orientation patterned GaAs waveguides *(Invited Paper)*, Moshe B. Oron, Pinhas Blau, Shaul Pearl, Mordechai Katz, Soreq Nuclear Research Ctr. (Israel) . . . . . [8240-11]

Sub-nanosecond 1-kHz low-threshold non-critical OPO based on periodically poled KTP crystal pumped at 1064 nm, Georgi Marchev, Valentin Petrov, Aleksey Tyazhev, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Valdas Pasiskevicius, Nicky Thilmann, Fredrik Laurell, Royal Institute of Technology (Sweden); Ivan Buchvarov, Sofia Univ. St. Kliment Ohridski (Bulgaria) . . . . . [8240-12]

Comparison of linear and RISTRA cavities for a 1064-nm pumped $CdSiP_2$ OPO, Georgi Marchev, Aleksey Tyazhev, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Georg Stöppler, Marc Eichhorn, Institut Franco-Allemand de Recherches de Saint-Louis (France); Peter G. Schunemann, BAE Systems (USA); Valentin Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) . . . . . [8240-13]

Improved space bandwidth product in image upconversion, Jeppe S. Dam, Peter Tidemand-Lichtenberg, Christian Pedersen, Technical Univ. of Denmark (Denmark) . . . . . [8240-14]

Image upconversion: a low noise infrared sensor?, Jeppe S. Dam, Peter Tidemand-Lichtenberg, Christian Pedersen, Technical Univ. of Denmark (Denmark) . . . . . [8240-15]

SESSION 4 . . . . . Tues. 4:00 to 6:00 pm

Visible and UV Lasers II

Joint Session with Conference 8235

Session Chair: **W. Andrew Clarkson,** Univ. of Southampton (United Kingdom)

Coherent quasi-CW 153-nm light source at high repetition rate *(Invited Paper)*, Yutaka Nomura, Institute for Molecular Science (Japan) and Japan Science and Technology Agency (Japan); Yoshiaki Ito, The Univ. of Tokyo (Japan); Akira Ozawa, The Univ. of Tokyo (Japan) and Japan Science and Technology Agency (Japan); Xiaoyang Wang, Chuangtian Chen, Technical Institute of Physics and Chemistry (China); Shik Shin, The Univ. of Tokyo (Japan) and Japan Science and Technology Agency (Japan); Shuntaro Watanabe, Tokyo Univ. of Science (Japan) and Japan Science and Technology Agency (Japan); Yohei Kobayashi, The Univ. of Tokyo (Japan) and Japan Science and Technology Agency (Japan) . . . . . [8240-16]

Frequency-doubled diode laser for direct pumping of ultrashort Ti:sapphire lasers, André Müller, Ole B. Jensen, Technical Univ. of Denmark (Denmark); Angelika Unterhuber, Tuan Le, Andreas Stingl, FEMTOLASERS Produktions GmbH (Austria); Karl-Heiz Hasler, Bernd Sumpf, Götz Erbert, Ferdinand-Braun-Institut (Germany); Peter E. Andersen, Paul M. Petersen, Technical Univ. of Denmark (Denmark). . . . . [8235-45]

Mode hop free tunable blue laser, Kang Li, Univ. of Glamorgan (United Kingdom); Hongying Wang, Xi'an Univ. of Arts and Science (China); Jungang Huang, Ray Chaney, Nigel J. Copner, Univ. of Glamorgan (United Kingdom) . . . . . [8235-46]

High-power compact green laser source based on wavelength-stabilized pump laser diodes, Kendra Gallup, Xiaodong Yang, Wentao Hu, Charles Wang, Jeffrey E. Ungar, Laurent Vaissie, Laser Operations LLC / QPC Lasers (USA) . . . . . [8235-47]

Designable nonlinear optical device: QPM quartz for VUV spectrum *(Invited Paper)*, Sunao Kurimura, National Institute for Materials Science (Japan); Masaki Harada, National Institute for Materials Science (Japan) and Nikon Corp. (Japan); Ken-ichi Muramatsu, Motoi Ueda, Nikon Corp. (Japan); Muneyuki Adachi, National Institute for Materials Science (Japan) and NIDEK Co., Ltd. (Japan); Tsuyoshi Yamada, Tokio Ueno, NIDEK Co., Ltd. (Japan) . . . . . [8240-17]

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Bright soliton propagation in inhomogeneous N-coupled nonlinear Schrödinger system using Darboux-transformation, Mani Rajan Senthil, Anna Univ. Chennai (India) . . . . . [8240-42]

Multilayer core asymmetric Bragg reflection waveguides for monolithic three-wave mixing, Payam Abolghasem, Amr S. Helmy, Univ. of Toronto (Canada) . . . . . [8240-43]

Cerenkov third harmonic generation via cascaded chi(2) processes in a periodic-poled $LiTaO_3$ waveguide, Xiaopeng Hu, Changdong Chen, Gang Zhao, Shining Zhu, Nanjing Univ. (China) . . . . . [8240-44]

Nonlinear wideband optical filters for laser protection applications, Ariela Donval, Yuval Ofir, Tali Fisher, Ofir Lipman, Moshe Oron, KiloLambda Technologies, Ltd. (Israel) . . . . . [8240-45]

Generation of white-light through frequency upconversion in praseodymium-ytterbium codoped nano-structured fluorogermanate glass, Artur S. Gouveia-Neto, Nathalia P. Rios, Luciano A. Bueno, Univ. Federal Rural de Pernambuco (Brazil) . . . . . [8240-46]

Modeling parametric waveguide terahertz generation, Peter E. Powers, Joseph Haus, Chen Ye, Univ. of Dayton (USA); Wei Shi, Arturo Chavez-Pirson, NP Photonics, Inc. (USA). . . . . [8240-47]

Second harmonic generation and optical parametric amplification using fan-shaped optical superlattice, Xinjie Lv, Gang Zhao, Shining Zhu, Nanjing Univ. (China) . . . . . [8240-48]

High amplification of BEFWM with the liquid fluorocarbon, Frank F. Wu, Anatoliy Khizhnyak, Vladimir Markov, MetroLaser, Inc. (USA) . . . . . [8240-49]

Numerical simulation for the nanosecond singly-resonant optical parametric oscillator using one- and two-dimensional fast Fourier transformation, Bum Ku Rhee, Wha-Keun Ahn, Sogang Univ. (Korea, Republic of); Myungsik Cha, Pusan Univ. (Korea, Republic of) . . . . . [8240-50]

Supercontinuum generation in standard telecom fiber using picoseconds pulses, Julián M. Estudillo-Ayala, Roberto Rojas-Laguna, Univ. de Guanajuato (Mexico); Juan C. Hernández-García, Ctr. de Investigaciones en Óptica, A.C. (Mexico); Ruth I. Mata-Chavez, Monica Trejo-Duran, Daniel Jauregui-Vazquez, Juan M. Sierra-Hernandez, José A. Andrade-Lucio, Univ. de Guanajuato (Mexico). . . . . [8240-51]

Parametric down conversion in one dimensional-photonic band gap structure, Prathan Buranasiri, King Mongkut's Institute of Technology Ladkrabang (Thailand). . . . . [8240-52]

Analyses of optical packet switching techniques based on nonlinear materials with respect to various label formats, Matej Komanec, Stanislav Zvanovec, Czech Technical Univ. in Prague (Czech Republic). . . . . [8240-53]

Sum-frequency generation of continuous-wave tunable ultraviolet coherent light in BBO-installed external cavity, Kenta Mukoyama, Kazuhiro Tokuyama, Hiroshi Kumagai, Osaka City Univ. (Japan); Norihiro Inoue, Naoaki Fukuda, Toshio Takiya, Hitachi Zosen Corp. (Japan) . . . . . [8240-54]

Tunable terahertz parametric oscillator synchronously pumped by mode-locked picosecond Ti:Sapphire laser with MgO-doped $LiNbO_3$, Yuzuru Tadokoro, Yuma Takida, Tatsuya Ohira, Hiroshi Kumagai, Shigeki Nashima, Osaka City Univ. (Japan). . . . . [8240-55]

Nonlinear optical properties of Er^{3+} ions doped TeO_2-Li_2O-W_2O glass by 800nm femtosecond laser excitation, Ghizal F. Ansari, All Saints' College of Technology (India); Sachin K. Mahajan, Jitendra Parashar, Sr., Samrat Ashok Technological Institute (India) . . . . . [8240-56]

Influence of losses induced by macrobends in the supercontinuum generation using standard fiber, Roberto Rojas-Laguna, Julián M. Estudillo-Ayala, Ruth I. Mata-Chávez, Everardo Vargas-Rodríguez, José A. Andrade-Lucio, Univ. de Guanajuato (Mexico); Carlos O. Rodríguez-Ramírez, Univ Politécnica de San Luis Potosí (Mexico) . . . . . [8240-57]

Experimental and numerical investigation of highly absorbing nonlinear organic chromophores, Gene Parilov, Mary J. Potasek, Simphotek Inc. (USA) . . . . . [8240-58]

Arrangement of an advanced acousto-optical processor for modeling the triple correlations of low-power optical pulse trains, Alexandre S. Shcherbakov, Vahram Chavushyan, Ana V. Hanessian de la Graza, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [8240-59]

Quasi phase matching through periodic step structure, Takafumi Ohfuchi, Hitachi Zosen Corp. (Japan); Nobuyuki Hirano, Hiroya Matsukawa, Osaka City Univ. (Japan); Koichiro Nakayama, Hitachi Zosen Corp. (Japan); Hiroshi Kumagai, Osaka City Univ. (Japan); Norihiro Inoue, Naoaki Fukuda, Toshio Takiya, Hitachi Zosen Corp. (Japan) . . . . . [8240-60]

Optical parametric generation and amplification in 2.7-3.1 μm spectral range using periodically poled lithium niobate with femtosecond pumping, Ieva Pipinyte, Valdemar Stankevic, Viktorija Pyragaite, Ona Balachninaite, Vilnius Univ. (Lithuania); Robert Eckardt, Gooch & Housego, Cleveland (USA); Valdas Sirutkaitis, Vilnius Univ. (Lithuania) . . . . . [8240-61]

Fabrication and characteristic of long photonic crystal fiber taper, Peiguang Yan, Shenzhen Univ. (China); Huifeng Wei, Yangtze Optical Fibre and Cable Co., Ltd. (China); Shuangchen Ruan, Chunyu Guo, Jie Shu, Junqing Zhao, Shenzhen Univ. (China) . . . . . [8240-62]

A multi-phonon light scattering and resolution of acousto-optic devices, Alexandre S. Shcherbakov, Vahram Chavushyan, Ana V. Hanessian de la Graza, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Sergey A. Nemov, St. Petersburg State Polytechnical Univ. (Russian Federation). [8240-63]

Wednesday 25 January

SESSION 5 . . . . . Wed. 8:00 to 9:50 am

Nonlinear Fiber Devices and Applications

Mid-IR supercontinuum generation from chalcogenide fibers *(Invited Paper)*, Jas Sanghera, U.S. Naval Research Lab. (USA) . . . . . [8240-18]

Photonic crystal fibers for supercontinuum generation pumped by a gain-switched CW fiber laser, Casper Larsen, Technical Univ. of Denmark (Denmark); Danny Noordegraaf, Kim P. Hansen, NKT Photonics A/S (Denmark); Kent E. Mattsson, Ole Bang, Technical Univ. of Denmark (Denmark) . . [8240-19]

Single frequency acoustically tailored Raman fiber amplifier, Christopher L. Vergien, Iyad Dajani, Craig Robin, Clint Zeringue, Air Force Research Lab. (USA) . . . . . [8240-20]

Higher-order modulation instability in nonlinear fiber optics, Miro Erkintalo, Tampere Univ. of Technology (Finland); Kamal Hammani, Bertrand Kibler, Christophe Finot, Guy Millot, Univ. de Bourgogne (France); Nail Akhmediev, The Australian National Univ. (Australia); John M. Dudley, Univ. de Franche-Comté (France); Goëry Genty, Tampere Univ. of Technology (Finland) . . . . . [8240-21]

Demonstration of minute continuous-wave triggered supercontinuum generation at 1 μm for high-speed biophotonic applications, Yi Qiu, Chi Zhang, Kenneth K. Y. Wong, Kevin K. Tsia, The Univ. of Hong Kong (Hong Kong, China) . . . . . [8240-22]

Courses of Related Interest

SC1060	Fundamentals of Nonlinear Optics (Powers) Sunday, 8:30 am to 12:30 pm
SC931	Applied Nonlinear Frequency Conversion (Paschotta) Monday, 8:30 am to 5:30 pm
SC1053	Ultrafast Laser Pulse Shaping and Adaptive Pulse Compression (Dantus) Tuesday, 1:30 to 5:30 pm
SC1020	Splicing of Specialty Fibers and Glass Processing of Fused Fiber Components for Fiber Lasers (Wang) Sunday, 8:30 am to 12:30 pm
SC974	Interconnection and Splicing of High-Power Optical Fibers (Yablon) Monday, 8:30 am to 12:30 pm
SC746	Introduction to Ultrafast Technology (Trebino) Tuesday, 1:30 to 5:30 pm
SC744	Ultrafast Fiber Lasers (Fermann) Sunday, 1:30 to 5:30 pm
SC1012	Coherent Mid-Infrared Sources and Applications (Vodopyanov) Sunday, 1:30 to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

LASE Plenary Session

Wed. 10:20 am to 12:30 pm

Session Chairs: **Friedhelm Dorsch,** TRUMPF GmbH & Co. KG (Germany); **Alberto Piqué,** U.S. Naval Research Lab. (USA)

10:20 am: **Welcome and Opening Remarks,** Friedhelm Dorsch, TRUMPF GmbH & Co. KG (Germany); Alberto Piqué, U.S. Naval Research Lab. (USA)

10:25 am: **Announcement of the Green Photonics Award**, Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

10:30 am: **Plasmonics for Beam Shaping and Wavefront Engineering,** Federico Capasso, Harvard Univ. (USA)

11:10 am: **The National Ignition Facility and Progress Towards Inertial Fusion Ignition,** Edward I. Moses, Lawrence Livermore National Lab. (USA)

11:50 am: **Successful Technology Approach for Lasers in Manufacturing,** Peter Leibinger, TRUMPF GmbH & Co. KG (Germany)

See p. 16 for details.

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 6 . . . . . Wed. 1:30 to 3:40 pm

Ultrafast Nonlinear Devices and Applications

Three-dimensional light bullets *(Invited Paper)*, Stefano Minardi, Falk Eilenberger, Friedrich-Schiller-Univ. Jena (Germany); Yaroslav Kartashov, ICFO - Institut de Ciències Fotòniques (Spain); Alexander Szameit, Friedrich-Schiller-Univ. Jena (Germany); Ulrich Röpke, Jens Kobelke, Kay Schuster, Hartmut Bartelt, Institut für Photonische Technologien e.V. (Germany); Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany); Lluis Torner, ICFO - Institut de Ciències Fotòniques (Spain); Falk Lederer, Andreas Tünnermann, Thomas Pertsch, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8240-23]

High-energy 450-MHz $CdSiP_2$ picosecond optical parametric oscillator near 6.3 microns for biomedical applications, Chaitanya Kumar Suddapalli, ICFO - Institut de Ciències Fotòniques (Spain); Antonio Agnesi, Paolo Dallocchio, Federico Pirzio, Giancarlo C. Reali, Univ. degli Studi di Pavia (Italy); Kevin T. Zawilski, Peter G. Schunemann, BAE Systems (USA); Majid Ebrahim-Zadeh, ICFO - Institut de Ciències Fotòniques (Spain) . . . . . [8240-24]

Ultrafast mid-IR generation in $CdSiP_2$ (CSP) using a mode-locked near-IR fiber laser pump source, Benjamin R. Johnson, Daniel Creeden, David Kelly, Kevin T. Zawilski, Peter G. Schunemann, BAE Systems (USA) . . . . . [8240-25]

Few cycle high energy pulse compression at MHz repetition rate, Wolfgang Köhler, FEMTOLASERS Produktions GmbH (Austria); Thomas Ganz, Peter Baum, MPQ-LMU Lab. for Attosecond and High-Field Physics (Germany) . . . . . [8240-26]

A highly efficient broadband picosecond pump high gain OPCPA system demonstrating 50% conversion to signal for Ti-sapphire seed pulses: an ideal seed for high-contrast, large-energy CPA laser systems, Waseem Shaikh, Ian Musgrave, Rutherford Appleton Lab. (United Kingdom) . . . [8240-27]

Broadband OPCPA pumped by ultra-narrowband gaseous iodine laser, Ondrej Novák, Institute of Physics of the ASCR, v.v.i. (Czech Republic) and Czech Technical Univ. (Czech Republic); Hana Turcicová, Institute of Physics of the ASCR, v.v.i. (Czech Republic); Martin Divoký, Martin Smrz, Jaroslav Huynh, Institute of Physics of the ASCR, v.v.i. (Czech Republic) and Czech Technical Univ. (Czech Republic); Petr Straka, Institute of Physics of the ASCR, v.v.i. (Czech Republic) . . . . . [8240-28]

Thursday 26 January

SESSION 7 . . . . . Thurs. 8:00 to 10:00 am

Mid-IR Frequency Comb and Supercontinuum Generation

Microresonator-based optical frequency comb generation *(Invited Paper)*, Yoshitomo Okawachi, Kasturi Saha, Jacob S. Levy, Y. Henry Wen, Cornell Univ. (USA); Mark A. Foster, The Johns Hopkins Univ. (USA); Michal F. Lipson, Alexander L. Gaeta, Cornell Univ. (USA) . . . . . [8240-29]

Mid-infrared frequency combs based on microresonators *(Invited Paper)*, Christine Y. Wang, Max-Planck-Institut für Quantenoptik (Germany) and Menlo Systems GmbH (Germany); Tobias Herr, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Pascal Del'Haye, Max-Planck-Institut für Quantenoptik (Germany) and Menlo Systems GmbH (Germany); Albert Schliesser, Max-Planck-Institut für Quantenoptik (Germany) and Ecole Polytechnique Fédérale de Lausanne (Switzerland); Johannes Hofer, Max-Planck-Institut für Quantenoptik (Germany); Aurore Vicet, Guilhem Boissier, Pierre Grech, Institut d'Electronique du Sud, CNRS, Univ. Montpellier 2 (France); Ronald Holzwarth, Max-Planck-Institut für Quantenoptik (Germany) and Menlo Systems GmbH (Germany); Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik (Germany) and Ludwig-Maximilians-Univ. München (Germany); Nathalie Picqué, Max-Planck-Institut für Quantenoptik (Germany) and Ludwig-Maximilians-Univ. München (Germany) and Institut des Sciences Moléculaires d'Orsay, CNRS, Univ. Paris-Sud (France); Tobias J. Kippenberg, Max-Planck-Institut für Quantenoptik (Germany) and Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8240-30]

Remote molecular spectroscopy with a broadband mid-IR frequency comb, Nick C. Leindecker, Alireza Marandi, Robert L. Byer, Konstantin L. Vodopyanov, Stanford Univ. (USA) . . . . . [8240-31]

Second-order coherence properties of supercontinuum: from modal representation to experiments, Goëry Genty, Miro Erkintalo, Tampere Univ. of Technology (Finland); Minna M. Surakka, Jari Turunen, Univ. of Eastern Finland (Finland); Ari T. Friberg, Aalto Univ. (Finland) . . . . . [8240-32]

High-quality 3.6-fs pulses by compression of an octave-spanning supercontinuum, Jan Rothhardt, Friedrich-Schiller-Univ. Jena (Germany) and Helmholtz Institute Jena (Germany); Stefan Demmler, Friedrich-Schiller-Univ. Jena (Germany); Alexander M. Heidt, Stellenbosch Univ. (South Africa); Alexander Hartung, Hartmut Bartelt, Institut für Photonische Technologien e.V. (Germany); Erich G. Rohwer, Stellenbosch Univ. (South Africa); Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8240-33]

SESSION 8 . . . . . Thurs. 10:30 am to 12:00 pm

Nonlinear Materials and Characterization I

Applications of extremely nondegenerate two-photon absorption in semiconductors *(Invited Paper)*, Eric W. Van Stryland, Dmitry A. Fishman, Scott Webster, Claudiu M. Cirloganu, David J. Hagan, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8240-34]

Twofold enhancement of two photon absorption by tailored photon statistics, Henning Kurzke, Michael Seefeldt, Axel M. Heuer, Ralf Menzel, Univ. Potsdam (Germany) . . . . . [8240-35]

Two-photon pumped amplified spontaneous emission in seeded CdSe/CdS nanorods, Tze Chien Sum, Guichuan Xing, Nanyang Technological Univ. (Singapore); Yile Liao, Sabyasachi Chakrabortty, National Univ. of Singapore (Singapore); Cheng Hon Huan, Nanyang Technological Univ. (Singapore); Yin Thai Chan, National Univ. of Singapore (Singapore) . . [8240-36]

Optical characterization of colloidal gold nanoparticles prepared by sputtering deposition, Hemerson Castro, Univ. Federal de Alagoas (Brazil); Heberton Wender, Sergio Teixeira, Univ. Federal do Rio Grande do Sul (Brazil); Márcion A. R. C. Alencar, Jandir Hickmann, Univ. Federal de Alagoas (Brazil) . . . . . [8240-37]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 9 . . . . . Thurs. 1:30 to 3:00 pm

Nonlinear Materials and Characterization II

Chi(3) third harmonic generation and triple photon generation *(Invited Paper)*, Benoit Boulanger, Audrey Dot, Adrien Borne, Patricia Segonds, Institut NÉEL (France); Kamel Bencheikh, Juan Ariel Levenson, Lab. de Photonique et de Nanostructures, CNRS (France); Simon Richard, HORIBA Jobin Yvon S.A.S. (France) . . . . . [8240-38]

Growth of single-crystal cesium germanium chloride from the melt, Nicholas J. Condon, Steven R. Bowman, Shawn O'Connor, U.S. Naval Research Lab. (USA) . . . . . [8240-39]

Investigation and characterization of optical homogeneity of mid-IR nonlinear optical crystals for product yield improvement activities, Benjamin R. Johnson, Kevin Zawilski, Peter G. Schunemann, BAE Systems (USA) . . . . . [8240-40]

Simultaneous multiphoton absorption in rutile (TiO_2) across the half-bandgap, Christopher C. Evans, Jonathan D. B. Bradley, Harvard Univ. (USA); Erwin A. Marti-Panameno, Benemérita Univ. Autónoma de Puebla (Mexico); Eric Mazur, Harvard Univ. (USA) . . . . . [8240-41]

Conference 8241

Sunday-Tuesday 22-24 January 2012 • Proceedings of SPIE Vol. 8241

High-Power Diode Laser Technology and Applications X

Conference Chair: **Mark S. Zediker,** Foro Energy, Inc. (USA)

Program Committee: **Friedrich G. Bachmann,** LUMERA LASER GmbH (Germany); **Stefan W. Heinemann,** Fraunhofer USA, Inc. (USA); **Volker K. Krause,** Laserline GmbH (Germany); **Robert J. Martinsen,** nLIGHT Corp. (USA); **Kurt J. Linden,** Spire Corp. (USA); **Erik P. Zucker,** JDSU (USA)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:20 to 10:10 am

High Power Systems

Session Chair: **Robert J. Martinsen,** nLIGHT Corp. (USA)

kW-class direct diode lasers with comparable brightness to fiber, disk, and carbon dioxide lasers *(Invited Paper)*, Robin K. Huang, James Burgess, Michael Kaiman, Robert Overman, John Glenn, Bien Chann, TeraDiode, Inc. (USA) . . . . . [8241-01]

A 13-kW fiber-coupled diode laser for pumping applications, David Matthews, Klaus Kleine, Laserline Inc. (USA); Volker Krause, Arnd Koesters, Daniel Duennwald, Laserline GmbH (Germany); Silke Pflueger, Laserline Inc. (USA) . . . . . [8241-02]

High brightness fibre coupled diode lasers of up to 4-kW output power for material processing, Michael Voß, Jens Meinschien, Peter Bruns, Lutz Aschke, LIMO Lissotschenko Mikrooptik GmbH (Germany) . . . . . [8241-03]

kW-class line sources for direct applications, Tobias P. Koenning, Kimberly R. Alegria, Zuolan Wang, Steve Patterson, DILAS Diode Laser, Inc. (USA) . . . . . [8241-04]

3000-W CW diode laser cladding system, Lingling Xiong, Xi'an Institute of Optics and Precision Mechanics (China); Min Wang, Yanfang Zheng, Di Wu, Pu Zhang, Xi'an Focuslight Technologies Co., Ltd. (China); Xiaoning Li, Zhenfu Wang, Xingsheng Liu, Xi'an Institute of Optics and Precision Mechanics (China) . . . . . [8241-05]

SESSION 2 . . . . . Sun. 10:40 am to 12:00 pm

Laser Diode Reliability

Session Chair: **Kurt J. Linden,** Spire Corp. (USA)

Emission properties of diode laser bars during pulsed high-power operation, Jens W. Tomm, Martin Hempel, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Petra Hennig, JENOPTIK Laser GmbH (Germany); Thomas Elsaesser, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) . . . . . [8241-06]

High power QCW laser bars and stacks, Eckard Deichsel, JENOPTIK Laser GmbH (Germany). . . . . [8241-07]

High performance diode lasers emitting at 780-820 nm, Ling Bao, Mark A. Devito, Mike Grimshaw, nLIGHT Corp. (USA); Paul O. Leisher, Rose-Hulman Institute of Technology (USA); Hailong Zhou, Weimin Dong, Xingguo Guan, Shiguo Zhang, Robert J. Martinsen, Jim Haden, nLIGHT Corp. (USA). . [8241-08]

High power single emitters for fiber coupled diode packages, Moshe Levy, Noam Rapaport, Dan Yanson, Yoram Karni, Moshe Shamay, Renana Tessler, Yaroslav Don, SCD Semiconductor Devices (Israel). . . . . [8241-09]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Sun. 1:30 to 5:10 pm

High Power Packaging and Cooling

Session Chair: **Volker Krause,** Laserline GmbH (Germany)

Modular VCSEL solution for uniform line illumination in the kW range *(Invited Paper)*, Holger Moench, Stephan Gronenborn, Pavel Pekarski, Philips Research (Germany); Michael Miller, Philips Technologie GmbH U-L-M Photonics (Germany); Gero Heusler, Raimond Dumoulin, Xi Gu, Armand Pruijmboom, Philips Lighting B.V. (Netherlands). . . . . [8241-10]

High reliability 20-KW QCW area array diode laser, Xiaoning Li, Xi'an Institute of Optics and Precision Mechanics (China); Lijun Kang, Jingwei Wang, Pu Zhang, Xi'an Focuslight Technologies Co., Ltd. (China); Lingling Xiong, Xingsheng Liu, Xi'an Institute of Optics and Precision Mechanics (China) . . . . . [8241-11]

Automated alignment of optical components for high-power diode lasers, Sebastian Haag, Vicente Guerrero Lule, Nicolas Pyschny, Fraunhofer-Institut für Produktionstechnologie (Germany). . . . . [8241-12]

Operating condition limitations of high density QCW arrays, Jeremy Junghans, Joseph Levy, Ryan Feeler, Northrop Grumman Cutting Edge Optronics (USA). . . . . [8241-13]

Long pulse compact and high brightness near 1-kW QCW diode laser stack, Stewart W. Wilson, Gregory B. Altshuler, Palomar Medical Technologies, Inc. (USA); Mikhail Inochkin, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Andrey Erofeev, Palomar Medical Technologies, Inc. (USA); Valery Khramov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Felix I. Feldchtein, Dental Photonics, Inc. (USA). . . . . [8241-14]

Record-brightness laser-diode bars for fiber coupling, Mehmet Dogan, Science Research Lab., Inc. (USA); Rajiv Pathak, Coherent, Inc. (USA); Steve Ellison, Advanced Reseach Corp. (USA); Henry Eppich, Keith D. Lang, Richard H. Chin, Science Research Lab., Inc. (USA); Aland K. Chin, Somerville Laser Technology, LLC (USA); Jonah H. Jacob, Science Research Lab., Inc. (USA) . . . . . [8241-15]

High power semiconductor laser array packaged on micro-channel cooler using gold-tin soldering technology, Jingwei Wang, Xi'an Focuslight Technologies Co., Ltd. (China) . . . . . [8241-16]

Newly developed high power laser diode bars, Nobuto Kageyama, Takenori Morita, Kousuke Torii, Motoki Takauji, Takehito Nagakura, Junya Maeda, Hirofumi Miyajima, Harumasa Yoshida, Hamamatsu Photonics K.K. (Japan). . . . . [8241-17]

10-W CW blue-violet laser diode array on the micro-channel cooler, Nobuyasu Suzuki, Kiyoshi Morimoto, Panasonic Corp. (Japan). . . . . [8241-18]

Monday 23 January

SESSION 4 . . . . . Mon. 8:00 to 10:10 am

High Brightness / Frequency Stabilized

Session Chair: **Erik P. Zucker,** JDSU (USA)

Wavelength-stabilized fiber-coupled diode laser module with >500-W output and 20-mm x mrad beam quality *(Invited Paper)*, Daniel M. Grasso, Nathan Shou, Henry Chen, Rajiv Pathak, Pamela Liang, Coherent, Inc. (USA); Sungwon Roh, LG Innotek (Korea, Republic of); Dicky Lee, Coherent, Inc. (USA) . . . . . [8241-19]

Very high brightness diode laser, Stefan Heinemann, Benjamin E. Lewis, Fraunhofer USA, Inc. (USA); Aleksandr Ryasnyanskiy, K. Shavitranuruk, Vadim Smirnov, Christine P. Spiegelberg, Leonid B. Glebov, Optigrate Corp. (USA) . . . . . [8241-20]

VBG controlled narrow bandwidth diode laser arrays, Joseph L. Levy, Ryan Feeler, Jeremy Junghans, Northrop Grumman Cutting Edge Optronics (USA) . . . . . [8241-21]

10-W Reliable 100-µm wide broad area lasers with internal grating stabilization, Paul Crump, Jörg Fricke, Christoph M. Schultz, Hans Wenzel, Steffen Knigge, Olaf Brox, Andre Maassdorf, Frank Bugge, Götz Erbert, Ferdinand-Braun-Institut (Germany) . . . . . [8241-22]

High brightness 975-nm pumps with ultra-stable wavelength stabilization, Alexander Ovtchinnikov, Valentin P. Gapontsev, Nikolay Moshegov, Pavel A. Trubenko, Alexey Komissarov, Igor Berishev, Nikolay Strougov, Vadim V. Chuyanov, Oleg Raisky, IPG Photonics Corp. (USA) . . . . . [8241-23]

High-peak-power and high-brightness pulsed single and array diode laser sources, Yan Xiao, Don Olson, Toby Garrod, Manoj Kanskar, Alfalight, Inc. (USA) . . . . . [8241-24]

SESSION 5 . . . . . Mon. 10:40 am to 12:00 pm

High Power Laser Devices I

Session Chair: **Stefan W. Heinemann,** Fraunhofer USA, Inc. (USA)

High-power diode laser pumps for alkali lasers (DPALs), Heiko Kissel, Bernd Köhler, Jens Biesenbach, DILAS Diodenlaser GmbH (Germany) . . . . . [8241-25]

High efficiency high brightness diode lasers at 1470 nm/1550 nm for medical and defense applications, Jeffrey E. Ungar, Robert M. Lammert, Wentao Hu, Laurent Vaissie, Laser Operations LLC / QPC Lasers (USA) . . . . . [8241-26]

Slab-coupled optical waveguide lasers and amplifiers, Gary M. Smith, Joseph P. Donnelly, Leo J. Missaggia, Michael K. Connors, Shawn M. Redmond, Kevin J. Creedon, David C. Mathewson, Reuel B. Swint, Antonio Sanchez-Rubio, George W. Turner, MIT Lincoln Lab. (USA) . . . . . [8241-27]

High power broad-area diode lasers optimized for fiber laser pumping, Jürgen Gilly, m2k-laser GmbH (Germany); Heiko Kissel, Jens Biesenbach, DILAS Diodenlaser GmbH (Germany); Márc T. Kelemen, m2k-laser GmbH (Germany) . . . . . [8241-28]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 6 . . . . . Mon. 1:30 to 3:10 pm

High Power Laser Devices II

Session Chair: **Stefan W. Heinemann,** Fraunhofer USA, Inc. (USA)

Progress in increasing the maximum achievable output power of broad area diode lasers, Paul Crump, Hans Wenzel, Götz Erbert, Günther Traenkle, Ferdinand-Braun-Institut (Germany) . . . . . [8241-29]

Compact sources for the generation of high-peak power wavelength-stabilized laser pulses in the picoseconds and nanoseconds ranges, Hans Wenzel, Andreas Klehr, Sven Schwertfeger, Armin Liero, Thomas Hoffmann, Olaf Brox, Madlen Thomas, Götz Erbert, Günther Tränkle, Ferdinand-Braun-Institut (Germany) . . . . . [8241-30]

High efficiency kW-class semiconductor laser bars with passive cooling, John G. Bai, Zhigang Chen, nLIGHT Corp. (USA); Paul O. Leisher, Rose-Hulman Institute of Technology (USA); Mark DeFranza, Mike Grimshaw, Mark A. DeVito, Robert J. Martinsen, Jim Haden, nLIGHT Corp. (USA) . . . . . [8241-31]

Extremely low losses 14xx single mode laser diode leading to 550-mW output power module with 0-75°C case temperature and 10-W consumption, Jean-René Burie, Patrick Garabédian, Christophe Starck, Philippe Pagnod-Rossiaux, Mauro Bettiati, Miguel Do Nascimento, Jean Noel Reygrobellet, Jean-Claude Bertreux, François Laruelle, 3S PHOTONICS SA (France) . . . . . [8241-32]

Improvement of wall plug efficiency in near infrared lateral single-mode LDs at high temperature, Tetsuya Yagi, Takuto Maruyama, Masatsugu Kusunoki, Naoyuki Shimada, Motoharu Miyashita, Mitsubishi Electric Corp. (Japan) . . . . . [8241-33]

Courses of Related Interest

SC974	Interconnection and Splicing of High-Power Optical Fibers (Yablon) Monday, 8:30 am to 12:30 pm
SC1020	Splicing of Specialty Fibers and Glass Processing of Fused Fiber Components for Fiber Lasers (Wang) Sunday, 8:30 am to 12:30 pm
SC747	Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

SESSION 7 . . . . . Mon. 3:40 to 5:40 pm

High Power Laser Devices III

Session Chair: **Friedrich G. Bachmann,** LUMERA LASER GmbH (Germany)

Industrial high power diode lasers: reliability, power, and brightness, Stephan G. Strohmaier, Haiyan An, Thilo Vethake, TRUMPF Photonics (USA) . . . . . [8241-34]

High power-highly efficient temperature-tolerate laser diodes in the 1470-nm wavelength range, John J. Callahan, David Bean, Ed McIntyre, Matthew Hamerstrom, SemiNex Corp. (USA) . . . . . [8241-35]

Advances in performance and beam quality of 9xx-nm laser diodes tailored for efficient fiber coupling, Christian Lauer, Harald König, Günther Grönninger, Sebastian Hein, Alvaro Gomez-Iglesias, Michael Furitsch, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany); Heiko Kissel, Paul Wolf, Jens Biesenbach, DILAS Diodenlaser GmbH (Germany) . . . . . [8241-36]

Comparative study of the performance of semiconductor laser based coherent Doppler lidars, Peter John L. Rodrigo, Christian Pedersen, Technical Univ. of Denmark (Denmark) . . . . . [8241-37]

1540-nm surface-emitting distributed feedback (SE-DFB) laser for range finding application, Manoj Kanskar, Toby Garrod, Don Olson, Yan Xiao, Alfalight, Inc. (USA) . . . . . [8241-38]

External-cavity high-power dual-wavelength tapered amplifier with tunable THz frequency difference, Mingjun Chi, Ole B. Jensen, Paul M. Petersen, Technical Univ. of Denmark (Denmark) . . . . . [8241-39]

Tuesday 24 January

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Experimental studies for improvement of thermal effects in a high power fiber-coupled diode laser module operating at 808 nm, Ashraf F. El-Sherif, Military Technical College (Egypt) . . . . . [8241-40]

Physics of failure investigation in high power broad-area InGaAs-AlGaAs strained quantum well lasers, Yongkun Sin, Neil Ives, Stephen LaLumondiere, Brendan Foran, Nathan Presser, William Lotshaw, Steven C. Moss, The Aerospace Corp. (USA) . . . . . [8241-41]

The optical system designing for the laser array with high power, Jun Chang, Lifei Zhang, Dalin Song, Beijing Institute of Technology (China) . . . . . [8241-42]

Testing of a compact and self-contained active heat sink for advanced high-power laser diodes, John Vetrovec, Amardeep S. Litt, Drew A. Copeland, Aqwest, LLC (USA); Jeremy Junghans, Northrop Grumman Cutting Edge Optronics (USA) . . . . . [8241-44]

High-power single emitters and laser bars with improved performance developed at JENOPTIK, Martin Zorn, Ralf Huelsewede, Olaf Hirsekorn, Ulrike Haesler, Jürgen Sebastian, JENOPTIK Diode Lab GmbH (Germany); Petra Hennig, JENOPTIK Laser GmbH (Germany) . . . . . [8241-45]

Application of room temperature pulsed Fabry-Perot quantum cascade laser in situ monitor concentration of methane, Lei Li, Jilin Univ. (China) . . . . . [8241-46]

Scalable high-power and high-brightness fiber coupled diode laser devices, Bernd Köhler, Paul Wolf, Andreas Unger, DILAS Diodenlaser GmbH (Germany); Armin Segref, DILAS Diode Laser, Inc. (USA); Heiko Kissel, Jens Biesenbach, DILAS Diodenlaser GmbH (Germany) . . . . . [8241-47]

Monday-Tuesday 23-24 January 2012 • Proceedings of SPIE Vol. 8242

Vertical External Cavity Surface Emitting Lasers (VECSELs) II

Conference Chair: **Anne C. Tropper,** Univ. of Southampton (United Kingdom)

Program Committee: **Martin D. Dawson,** Univ. of Strathclyde (United Kingdom); **Juan L. Chilla,** Coherent, Inc. (USA); **Eli Kapon,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Ursula Keller,** ETH Zurich (Switzerland); **Jerome V. Moloney,** College of Optical Sciences, The Univ. of Arizona (USA); **Oleg G. Okhotnikov,** Tampere Univ. of Technology (Finland); **Edik U. Rafailov,** Univ. of Dundee (United Kingdom); **Alexei Sirbu,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Monday 23 January

Opening Remarks . . . . . Mon. 8:00 to 8:15 am

Anne C. Tropper, Univ. of Southampton (United Kingdom)

SESSION 1 . . . . . Mon. 8:15 to 10:15 am

Ultrafast VECSELs I

Session Chair: **Ursula Keller,** ETH Zurich (Switzerland)

MIXSELs for frequency combs *(Invited Paper)*, Thomas Südmeyer, Valentin J. Wittwer, Selina Pekarek, M. Hoffmann, Oliver D. Sieber, Matthias C. Golling, Ursula Keller, ETH Zurich (Switzerland). . . . . [8242-01]

Picosecond to sub-picosecond pulse generation from mode-locked 1.55-µm VECSELs *(Invited Paper)*, Sophie Bouchoule, Zhuang Zhao, Elisabeth Galopin, Harmand Jean-Christophe, Jinyan Song, Ctr. National de la Recherche Scientifique (France); Jean Decobert, Alcatel-Thales III-V Lab. (France); Jean-Louis Oudar, Ctr. National de la Recherche Scientifique (France) . . . . . [8242-02]

Passively mode-locked GaSb-based VECSELs emitting sub-400-fs pulses at 2 µm *(Invited Paper)*, Mircea Guina, Antti Härkönen, Jonna Paajaste, Jukka-Pekka Alanko, Soile Suomalainen, Christian Grebing, Gunter Steinmeyer, Tampere Univ. of Technology (Finland). . . . . [8242-03]

Harmonically and fundamentally mode-locked InGaAs-AlGaAs disk laser generating pulse repetition rates in the 100 GHz or pulse durations in the 100-fs range *(Invited Paper)*, Uwe Griebner, Peter Klopp, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Martin Zorn, Markus Weyers, Ferdinand-Braun-Institut (Germany) . . . . . [8242-04]

SESSION 2 . . . . . Mon. 10:45 am to 12:30 pm

High Power

Session Chair: **Juan L. Chilla,** Coherent, Inc. (USA)

20-watt CW TEM00 intracavity doubled optically pumped semiconductor laser at 532 nm *(Invited Paper)*, Jill D. Berger, Douglas W. Anthon, Andrea Caprara, Juan L. Chilla, Sergei V. Govorkov, Arnaud Y. Lepert, Wayne Mefferd, Qi-Ze Shu, Luis Spinelli, Coherent, Inc. (USA) . . . . . [8242-05]

High-power quantum dot semiconductor disk lasers *(Invited Paper)*, Jussi Rautiainen, Tampere Univ. of Technology (Finland); Mantas Butkus, Univ. of Dundee (United Kingdom); Igor Krestnikov, Innolume GmbH (Germany); Edik U. Rafailov, Univ. of Dundee (United Kingdom); Oleg G. Okhotnikov, Tampere Univ. of Technology (Finland). . . . . [8242-06]

Recent advances in the development of yellow-orange GaInNAs-based semiconductor disk lasers *(Invited Paper)*, Tomi Leinonen, Ville-Markus Korpijärvi, Antti Härkönen, Mircea Guina, Tampere Univ. of Technology (Finland). . . . . [8242-07]

Strategies for power scaling VECSELs, Tsuei-Lian Wang, Jörg Hader, Yushi Kaneda, Jerome V. Moloney, College of Optical Sciences, The Univ. of Arizona (USA); Bernardette Kunert, Wolfgang Stolz, Philipps Univ. Marburg (Germany) . . . . . [8242-08]

Lunch Break . . . . . 12:30 to 2:00 pm

SESSION 3 . . . . . Mon. 2:00 to 3:30 pm

Cavity Design

Session Chair: **Anne C. Tropper,** Univ. of Southampton (United Kingdom)

Monolithic approaches to VECSEL devices *(Tutorial)*, Martin D. Dawson, Jennifer E. Hastie, Stephane Calvez, Univ. of Strathclyde (United Kingdom). . . . . [8242-09]

Wavelength tuning of VECSELs by cavity geometry, Chris Hessenius, Mahmoud Fallahi, Jerome V. Moloney, College of Optical Sciences, The Univ. of Arizona (USA); Robert G. Bedford, Air Force Research Lab. (USA) . . . . [8242-10]

Development of EP-VECSELs for mode locking applications *(Invited Paper)*, Jonathan R. Orchard, David T. Childs, Li Chih Lin, Benjamin J. Stevens, David M. Williams, Richard A. Hogg, The Univ. of Sheffield (United Kingdom); Mantas Butkus, Edik U. Rafailov, Univ. of Dundee (United Kingdom); Stephan Gronenborn, Johanna Kolb, Hoger Moench, Philips Research (Germany); Michael Miller, Philips Technologie GmbH U-L-M Photonics (Germany); Martin Hoffmann, Yohann Barbarin, Wolfgang P. Pallmann, Deran H. Maas, Phillip Kreuter, Bernd Witzigmann, Matthias C. Golling, Thomas Sudmeyer, Ursula Keller, ETH Zurich (Switzerland) . . . . . [8242-11]

SESSION 4 . . . . . Mon. 4:00 to 5:45 pm

Single Frequency and Mid-IR

Session Chair: **Oleg G. Okhotnikov,** Tampere Univ. of Technology (Finland)

GaSb-based semiconductor disk lasers: recent advances in power scaling and narrow linewidth operation *(Invited Paper)*, Joachim Wagner, Marcel Rattunde, Benno Rösener, Sebastian Kaspar, Tino Töpper, Christian Manz, Klaus Köhler, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [8242-12]

2.7-µm single-frequency TEM00 operation of Sb-based diode-pumped external-cavity VCSEL, Arnaud Garnache, Univ. Montpellier 2 (France) . . . . . [8242-13]

Evaluation of the single-frequency operation of a short vertical external-cavity semiconductor laser at 852 nm, Fabiola A. Camargo, Lab. Charles Fabry (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Sud (France); Lu Bai, Sylvie Janicot, Lab. Charles Fabry (France); Isabelle Sagnes, Ctr. National de la Recherche Scientifique (France); Arnaud Garnache, Univ. Montpellier 2 (France); Patrick Georges, Gaëlle Lucas-Leclin, Lab. Charles Fabry (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Sud (France). . . . . [8242-14]

µGaSb-based semiconductor disk laser above 2-µm wavelength with <100-kHz linewidth and 1000-mW output power, Sebastian Kaspar, Tino Töpper, Marcel Rattunde, Benno Rösener, Christian Manz, Klaus Köhler, Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [8242-15]

IV-VI mid-infrared VECSEL on Si-substrate *(Invited Paper)*, Matthias Fill, Ferdinand Felder, Mohamed Rahim, Amir Khiar, Hans Zogg, ETH Zurich (Switzerland) . . . . . [8242-16]

Tuesday 24 January

SESSION 5 . . . . . Tues. 8:00 to 10:00 pm

Intracavity Nonlinear Conversion

Session Chair: **Martin D. Dawson,** Univ. of Strathclyde (United Kingdom)

VECSELs: non-equilibrium effects and THz emission *(Invited Paper)*, Stephan W. Koch, Philipps-Univ. Marburg (Germany) . . . . . [8242-17]

Advances in narrow-linewidth continuous wave semiconductor disk laser pumped optical parametric oscillators *(Invited Paper)*, Nils Hempler, Gordon Robertson, M Squared Lasers Ltd. (United Kingdom); Craig Hamilton, Solus Technologies Ltd. (United Kingdom); Gareth T. Maker, Graeme P. A. Malcolm, M Squared Lasers Ltd. (United Kingdom) . . . . . [8242-18]

CW Raman lasers intracavity pumped by VECSELs *(Invited Paper)*, Jennifer E. Hastie, Daniele C. Parrotta, Martin D. Dawson, Alan J. Kemp, Univ. of Strathclyde (United Kingdom) . . . . . [8242-19]

589-nm single-frequency VECSEL for sodium guidestar applications, Chris Hessenius, Mahmoud Fallahi, Jerome V. Moloney, College of Optical Sciences, The Univ. of Arizona (USA); Robert G. Bedford, Air Force Research Lab. (USA) . . . . . [8242-20]

UV laser emission around 330 nm via intracavity frequency doubling of a tunable red AlGaInP-VECSEL, Hermann Kahle, Thomas Schwarzbäck, Marcus Eichfelder, Robert K. Roßbach, Michael Jetter, Peter Michler, Univ. Stuttgart (Germany) . . . . . [8242-21]

SESSION 6 . . . . . Tues. 10:30 am to 12:15 pm

Ultrafast VECSELs II

Session Chair: **Uwe Griebner,** Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany)

High-average power modelocked VECSELs and MIXSELs *(Tutorial)*, Ursula Keller, ETH Zurich (Switzerland) . . . . . [8242-22]

Multiphoton imaging with compact semiconductor disk lasers *(Invited Paper)*, Pablo Loza-Alvarez, Rodrigo Aviles-Espinosa, ICFO - Institut de Ciències Fotòniques (Spain); David Artigas-García, ICFO - Institut de Ciències Fotòniques (Spain) and Univ. Politècnica de Catalunya (Spain) . . . . . [8242-23]

Frequency-tuneable ultrashort pulse VECSEL sources *(Invited Paper)*, Keith G. Wilcox, Univ. of Southampton (United Kingdom) . . . . . [8242-24]

Lunch/Exhibition Break . . . . . 12:15 to 1:30 pm

SESSION 7 . . . . . Tues. 1:30 to 3:30 pm

Active Region Design

Session Chair: **Edik U. Rafailov,** Univ. of Dundee (United Kingdom)

Quantum dot gain structures for VECSELs *(Tutorial)*, Udo W. Pohl, Technische Univ. Berlin (Germany) . . . . . [8242-25]

Recent progress in near-infrared VECSEL grown by metal organic vapour phase epitaxy *(Tutorial)*, Wolfgang Stolz, Philipps-Univ. Marburg (Germany) . . . . . [8242-26]

Influence of non-radiative carrier losses on pulsed and CW VECSEL performance *(Invited Paper)*, Alexandre Laurain, Jörg Hader, Tsuei-Lian Wang, Mike Yarborough, Yi-Ying Lai, College of Optical Sciences, The Univ. of Arizona (USA); Ganesh Balakrishnan, Thomas J. Rotter, Pankaj Ahirwar, The Univ. of New Mexico (USA); Jerome V. Moloney, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [8242-27]

Courses of Related Interest

SC747	Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm
SC1012	Coherent Mid-Infrared Sources and Applications (Vodopyanov) Sunday, 1:30 to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

SESSION 8 . . . . . Tues. 4:00 to 5:45 pm

Latest Concepts

Session Chair: **Jerome V. Moloney,** The Univ. of Arizona (USA)

Non-diffracting beams from surface-emitting lasers *(Invited Paper)*, Grigorii S. Sokolovskii, Univ. of Dundee (United Kingdom) and Ioffe Physico-Technical Institute (Russian Federation); Sergey N. Losev, Vladimir I. Kuchinskii, Ioffe Physico-Technical Institute (Russian Federation); Wilson Sibbett, Univ. of St. Andrews (United Kingdom); Edik U. Rafailov, Univ. of Dundee (United Kingdom) . . . . . [8242-28]

Dual-frequency operation of a vertical external-cavity semiconductor laser at 852 nm, Fabiola A. Camargo, Jessica Barrientos, Lab. Charles Fabry (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Sud (France); Ghaya Baili, Loïc Morvan, Daniel Dolfi, Thales Research & Technology (France); Isabelle Sagnes, Ctr. National de la Recherche Scientifique (France); Arnaud Garnache, Univ. Montpellier 2 (France); Fabien Bretenaker, Lab. Aimé Cotton (France) and Ctr. National de la Recherche Scientifique (France); Patrick Georges, Lab. Charles Fabry (France); Gaëlle Lucas-Leclin, Lab. Charles Fabry (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Sud (France) . . . . . [8242-29]

Organic VECSELs: towards low-cost UV-visible lasers *(Invited Paper)*, Sébastien Chénais, Univ. Paris 13 (France) and Ctr. National de la Recherche Scientifique (France); Hadi Rabbani-Haghighi, Univ. Paris 13 (France); Alain Siove, Sébastien Forget, Univ. Paris 13 (France) and Ctr. National de la Recherche Scientifique (France) . . . . . [8242-30]

VECSEL development in AFRL *(Invited Paper)*, Robert G. Bedford, Air Force Research Lab. (USA) . . . . . [8242-31]

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Characterization of gain parameters in quantum-dot and quantum-well based VECSEL structures, Mario Mangold, Valentin J. Wittwer, Oliver D. Sieber, Martin Hoffmann, Matthias C. Golling, Thomas Sudmeyer, Ursula Keller, ETH Zurich (Switzerland) . . . . . [8242-32]

Wetting-layer-pumped continuous-wave quantum dot VECSEL, Hani J. Kbashi, Adrian H. Quarterman, Oliver J. Morris, Univ. of Southampton (United Kingdom); Mohamed Henini, The Univ. of Nottingham (United Kingdom); Anne C. Tropper, Keith G. Wilcox, Univ. of Southampton (United Kingdom) . [8242-33]

Sub-80-fs timing jitter of a stabilized SESAM modelocked VECSEL, Valentin J. Wittwer, Robbert van der Linden, ETH Zurich (Switzerland); Bojan Resan, Kurt J. Weingarten, Time-Bandwidth Products AG (Switzerland); Thomas Suedmeyer, Ursula Keller, ETH Zurich (Switzerland) . . . . . [8242-34]

High-average power femtosecond VECSELs with tunable repetition rates up to 10 GHz, Oliver D. Sieber, Valentin J. Wittwer, Martin Hoffmann, Matthias C. Golling, Thomas Südmeyer, Ursula Keller, ETH Zurich (Switzerland) [8242-35]

Strain compensation of InGaAs/GaAs SDL gain mirrors grown by molecular beam epitaxy, Sanna Ranta, Tomi Leinonen, Miki Tavast, Teemu Hakkarainen, Tampere Univ. of Technology (Finland); Ilpo Suominen, Cavitar Ltd. (Finland); Mircea Guina, Tampere Univ. of Technology (Finland) . . . . . [8242-36]

A wavelength-tuneable picosecond-pulse passively mode-locked VECSEL, Oliver J. Morris, Keith G. Wilcox, Adrian H. Quarterman, Hani J. Kbashi, Univ. of Southampton (United Kingdom); Ian Farrer, Harvey E. Beere, David A. Ritchie, Univ. of Cambridge (United Kingdom); Anne C. Tropper, Univ. of Southampton (United Kingdom) . . . . . [8242-37]

MBE growth of electrically pumped VECSELs, Matthias C. Golling, Wolfgang P. Pallmann, Christian A. Zaugg, Thomas Südmeyer, Ursula Keller, ETH Zurich (Switzerland) . . . . . [8242-38]

Monday-Thursday 23-26 January 2012 • Proceedings of SPIE Vol. 8243

Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XVII

Conference Chairs: **Guido Hennig,** Daetwyler Graphics AG (Switzerland); **Xianfan Xu,** Purdue Univ. (USA); **Bo Gu,** IPG Photonics Corp. (China); **Yoshiki Nakata,** Osaka Univ. (Japan)

Program Committee: **Craig B. Arnold,** Princeton Univ. (USA); **J. Thomas Dickinson,** Washington State Univ. (USA); **Jan J. Dubowski,** Univ. de Sherbrooke (Canada); **Bruno Frei,** Solneva SA (Switzerland); **Sami T. Hendow,** Multiwave Photonics (USA); **Andrew S. Holmes,** Imperial College London (United Kingdom); **Yongfeng Lu,** Univ. of Nebraska-Lincoln (USA); **Michel Meunier,** Ecole Polytechnique de Montréal (Canada); **Andreas Michalowski,** Univ. Stuttgart (Germany); **Beat Neuenschwander,** Berner Fachhochschule Technik und Informatik (Switzerland); **Hiroyuki Niino,** National Institute of Advanced Industrial Science and Technology (Japan); **Alberto Piqué,** U.S. Naval Research Lab. (USA); **Stephan W. Roth,** BLZ Bayerisches Laserzentrum GmbH (Germany); **Razvan Stoian,** Lab. Hubert Curien (France); **Koji Sugioka,** RIKEN (Japan)

Monday 23 January

Opening Remarks . . . . . Mon. 8:15 to 8:20 am

Guido Hennig, Daetwyler Graphics AG (Switzerland)

SESSION 1 . . . . . Mon. 8:20 to 9:50 am

Direct Writing

Session Chairs: **Xianfan Xu,** Purdue Univ. (USA); **Hiroyuki Niino,** National Institute of Advanced Industrial Science and Technology (Japan)

Near-field nanopatterning on rough surfaces using optically trapped microspheres *(Invited Paper)*, Craig B. Arnold, Princeton Univ. (USA) . [8243-01]

Picosecond fiber laser microfabrication of THz wire-grid polarizers on polymer membrane substrates, Tim D. Gerke, Fianium Ltd. (USA); Dylan Fast, Vladimir Kozlov, Microtech Instruments, Inc. (USA) . . . . . [8243-02]

Laser direct writing of high refractive index polymer/TiO_2 nanocomposites, Qingchuan Guo, Reza Ghadiri, Cemal Esen, Olaf Medenbach, Andreas Ostendorf, Ruhr-Univ. Bochum (Germany) . . . . . [8243-03]

Bimetallic grayscale photomasks written using flat-top beam vs. Gaussian beam, Reza Qarehbaghi, Glenn H. Chapman, Waris Boonyasiriwat, Simon Fraser Univ. (Canada) . . . . . [8243-04]

SESSION 2 . . . . . Mon. 10:20 am to 12:20 pm

Fundamental Aspects of Laser-Material Interaction

Session Chairs: **Hiroyuki Niino,** National Institute of Advanced Industrial Science and Technology (Japan); **Xianfan Xu,** Purdue Univ. (USA)

Multiple interactions between an excimer laser beam and a ZnO single crystal target, Enam Khan, Steve Langford, J. Thomas Dickinson, Washington State Univ. (USA). . . . . [8243-05]

Optimization of the volume ablation rate for metals at different laser pulse-durations from ps to fs, Beat Neuenschwander, Beat Jaeggi, Marc Schmid, Urs Hunziker, Berner Fachhochschule Technik und Informatik (Switzerland) . . . . . [8243-06]

Time-and space resolved microscopy of induced ablation with ultrashort laser pulses, Matthias Domke, Stephan Rapp, Gerhard Heise, Heinz Huber, Hochschule München (Germany) . . . . . [8243-07]

Ultrafast coherent phonon excitation and non-thermal melting: a molecular dynamics study, Yaguo Wang, Xianfan Xu, Purdue Univ. (USA). . . . . [8243-08]

Control of multiphoton and avalanche ionization using a UV-IR pulse train in femtosecond laser micromachining of fused silica, Xiaoming Yu, Qiumei Bian, Baozhen Zhao, Kansas State Univ. (USA); Zenghu Chang, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Shuting Lei, Kansas State Univ. (USA) . . . . . [8243-09]

Laser ablation plasmas for diagnostics of structured electronic and optical materials during or after laser processing, Rick Russo, Lawrence Berkeley National Lab. (USA); Alexander A. Bolshakov, Jong Yoo, Applied Spectra, Inc. (USA); Jhanis Gonzalez, Lawrence Berkeley National Lab. (USA) . . . . . [8243-10]

Lunch Break . . . . . 12:20 to 1:40 pm

SESSION 3 . . . . . Mon. 1:40 to 3:10 pm

Laser Modification of Materials

Session Chairs: **Guido Hennig,** Daetwyler Graphics AG (Switzerland); **Bo Gu,** IPG Photonics Corp. (China)

Novel semiconductors and nanoscale patterning using pulsed lasers *(Invited Paper, Presentation Only)*, Michael J. Aziz, Harvard Univ. (USA) . [8243-11]

Annealing of sol-gel derived metal-oxide thin films by a UV laser pulse train, Jie Zhang, Panasonic Boston Lab. (USA) . . . . . [8243-12]

F2 laser modification of silicone-coated polycarbonate for lightweight automobile window, Masayuki Okoshi, Yoshihiko Nojima, National Defense Academy (Japan); Hidetoshi Nojiri, RENIAS Co., Ltd. (Japan); Narumi Inoue, National Defense Academy (Japan) . . . . . [8243-13]

Laser-induced transient stress distribution inside a single crystal by time-resolved birefringence imaging, Takaya Tochio, Masaaki Sakakura, Shingo Kanehira, Yasuhiko Shimotsuma, Kiyotaka Miura, Kazuyuki Hirao, Kyoto Univ. (Japan). . . . . [8243-14]

SESSION 4 . . . . . Mon. 3:40 to 6:00 pm

Laser Nanoscale Materials Processing and Manufacturing

Joint Session with Conference 8245

Session Chair: **Richard F. Haglund, Jr.,** Vanderbilt Univ. (USA)

Surface plasmon-assisted nanolithography with nanometric accuracy *(Invited Paper)*, Kosei Ueno, Hokkaido Univ. (Japan) . . . . . [8243-15]

XPS study of InP/InGaAs/InGaAsP microstructure irradiated by KrF and ArF lasers in different environments, Neng Liu, Khalid Moumanis, Sonia Blais, Jan J. Dubowski, Univ. de Sherbrooke (Canada) . . . . . [8245-13]

Designed near fields for parallel surface nanostructures, Frank Hubenthal, Sören Maag, Abdul-Aleem Jamali, Bernd Witzigmann, Frank Träger, Univ. Kassel (Germany) . . . . . [8245-14]

Laser ablation and nano-material fabrication in supercritical fluids *(Invited Paper)*, Ken-ichi Saitow, Hiroshima Univ. (Japan) . . . . . [8243-16]

Dynamics of TiO_2 nanoparticle formation and deposition for nanostructured thin films, Jason Readle, Alex A. Puretzky, Christopher Rouleau, Oak Ridge National Lab. (USA); Rudresh Ghosh, Rene Lopez, The Univ. of North Carolina at Chapel Hill (USA); Gyula Eres, Murari Regmi, Oak Ridge National Lab. (USA); Gerd Duscher, The Univ. of Tennessee (USA); Mina Yoon, David B. Geohegan, Oak Ridge National Lab. (USA) . . . . . [8245-15]

Template-assisted metal nanoneedle/nanoprotrusion array fabrication at a sub-diffraction-limited scale, Yuto Tanaka, Keio Univ. (Japan) and Harvard Univ. (USA); Jonathan D. B. Bradley, Eric Mazur, Harvard Univ. (USA); Minoru Obara, Keio Univ. (Japan) . . . . . [8243-17]

Tuesday 24 January

SESSION 5 . . . . . Tues. 8:00 to 10:10 am

Ultrafast Laser 3D-Fabrication

Joint Session with Conference 8247

Session Chairs: **Yoshiki Nakata,** Osaka Univ. (Japan);
Beat Neuenschwander, Berner Fachhochschule Technik und Informatik (Switzerland)

Applications of picosecond laser and pulse-burst in precision manufacturing *(Invited Paper)*, Ralf Knappe, LUMERA LASER GmbH (Germany) . . . . . [8243-18]

High sensitive concentration analysis of biochemical liquids using a microfluidic chip fabricated by femtosecond laser, Yasutaka Hanada, Koji Sugioka, Katsumi Midorikawa, RIKEN (Japan) . . . . . [8243-19]

Ultrahigh precision surface structuring by synchronizing a galvo scanner with an ultrashort pulsed laser system in MOPA arrangement, Beat Jaeggi, Beat Neuenschwander, Urs Hunziker, Thomas Meier, Markus Zimmermann, Karl-Heinz Selbmann, Ivan Gut, Berner Fachhochschule Technik und Informatik (Switzerland); Guido Hennig, Daetwyler Graphics AG (Switzerland). . . . [8243-20]

Micro-lens fiber inline Fabry-Perot interferometer fabricated by femtosecond laser, Yinan Zhang, Lei Yuan, Tao Wei, Qun Han, Hai Xiao, Missouri Univ. of Science and Technology (USA). . . . . [8243-21]

Three-dimensional silver nanostructure fabrication through multiphoton photoreduction, Kevin Vora, Seung-Yeon Kang, Shobha Shukla, Eric Mazur, Harvard Univ. (USA) . . . . . [8247-35]

Material specific effects and limitations during ps-laser generation of micro structures, Jens Hildenhagen, Klaus Dickmann, Uli Engelhardt, Fachhochschule Münster (Germany) . . . . . [8247-36]

SESSION 6 . . . . . Tues. 10:40 am to 12:10 pm

Ultrafast Laser-induced Modification of Glasses or Transparent Materials

Joint Session with Conference 8247

Session Chair: **Stefan Nolte,** Friedrich-Schiller-Univ. Jena (Germany)

Laser processing with ultrashort vortex pulses *(Invited Paper)*, Cyril Hnatovsky, Vladlen G. Shedov, Wieslaw Z. Krolikowski, Andrei V. Rode, The Australian National Univ. (Australia) . . . . . [8243-22]

Machining of glass and quartz using nanosecond and picosecond laser pulses, David Ashkenasi, Tristan Kaszemeikat, Norbert Mueller, Andreas Lemke, Laser- und Medizin-Technologie GmbH, Berlin (Germany); Hans Joachim Eichler, Technische Univ. Berlin (Germany) . . . . . [8243-23]

Water assisted microhole drilling in fused silica using burst-train femtosecond laser pulses, Takayuki Tamaki, Nara National College of Technology (Japan); Saeid Rezaei, Jianzhao Li, Peter R. Herman, Univ. of Toronto (Canada). . . . . [8247-37]

Fabrication of photo-induced microstructure embedded inside ZnO crystal, Yuichiro Ishikawa, Yasuhiko Shimotsuma, Akio Kaneta, Masaaki Sakakura, Masayuki Nishi, Kiyotaka Miura, Kazuyuki Hirao, Yoichi Kawakami, Kyoto Univ. (Japan). . . . . [8243-24]

Lunch/Exhibition Break . . . . . 12:10 to 1:20 pm

Courses of Related Interest

SC689	Precision Laser Micromachining (Schaeffer) Wednesday, 1:30 to 5:30 pm
SC743	Micromachining with Femtosecond Lasers (Nolte, Schaffer) Monday, 1:30 to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

SESSION 7 . . . . . Tues. 1:20 to 3:00 pm

Ultrafast Laser Surface Processing

Joint Session with Conference 8247

Session Chairs: **Beat Neuenschwander,**
Berner Fachhochschule Technik und Informatik (Switzerland);
Yoshiki Nakata, Osaka Univ. (Japan)

Comparison of picosecond and femtosecond laser ablation for surface engraving of metals and semiconductor, John Lopez, Rémi Torres, Anne Lidolff, Charly Loumena, ALPhANOV (France); Martin Delaigue, Clemens Hönninger, Eric Mottay, Sylvain Ricaud, Amplitude Systemes (France) . . . . . [8243-25]

Correlating texturing, milling, and scribing of ceramics and metals using ns and fs pulsed fiber lasers, Sami T. Hendow, Multiwave Photonics (USA); Arzu M. Ozkan, Lumyn Technologies LLC (USA); Eric P. Mottay, Amplitude Systemes (France). . . . . [8243-26]

Sub-wavelength multi-period ripple phenomena on stainless steel irradiated with high repetition rate femtosecond laser pulses, Ladan E. Abolghasemi, Univ. of Toronto (Canada); Abbas Hosseini, FiLaser Inc. (Canada); Peter R. Herman, Univ. of Toronto (Canada) . . . . . [8247-38]

Structural changes of copper induced by high repetition rate femtosecond laser pulses, Stéphane Valette, David Bruneel, Ecole Centrale de Lyon (France); Eric Audouard, Univ. Jean Monnet Saint-Etienne (France); Ronan Le Harzic, Fraunhofer-Institut für Biomedizinische Technik (Germany); Stéphane Benayoun, Ecole Centrale de Lyon (France) . . . . . [8247-39]

Femtosecond-laser-induced nanowires with very high aspect ratios at the surface fused silica, Arnaud Royon, Gautier Papon, Mathieu Dumergue, Jean-Christophe Delagnes, Kevin Bourhis, Yannick Petit, Thierry Cardinal, Yannick Deshayes, Lionel Canioni, Univ. Bordeaux 1 (France) . . . . . [8247-40]

SESSION 8 . . . . . Tues. 3:30 to 6:00 pm

Fundamentals and Diagnostics in Ultrafast Laser Processing

Joint Session with Conference 8247

Session Chair: **Michel Meunier,**
Ecole Polytechnique de Montréal (Canada)

Probing ultrafast laser-matter interactions with fs x-rays *(Invited Paper)*, Klaus Sokolowski-Tinten, Univ. Duisburg-Essen (Germany). . . . . [8243-27]

In and out of resonance plasmonics enhanced ultrafast laser nanoablation of surfaces, Alexandre Robitaille, Étienne Boulais, Michel Meunier, Ecole Polytechnique de Montréal (Canada) . . . . . [8247-41]

Raman spectroscopy as a diagnostic means of sapphire dicing using ultrashort pulsed lasers, Jiyeon Choi, Dongsig Shin, Yongkwon Cho, Jeong Suh, Korea Institute of Machinery & Materials (Korea, Republic of) . . . . [8243-28]

Influence of pulse duration on the hole formation during short and ultrashort pulse laser deep drilling, Sven Doering, Soeren Richter, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tuennermann, Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer Institute for Applied Optics and Precision Engineering (Germany) . . . . . [8247-42]

Direct investigation of the ablation rate evolution during laser drilling of high aspect ratio micro-holes, Francesco P. Mezzapesa, Univ. degli Studi di Bari (Italy) and CNR-IFN UOS Bari (Italy); Teresa Sibillano, Lorenzo L. Columbo, CNR-IFN UOS Bari (Italy); Francesca Di Niso, Univ. degli Studi di Bari (Italy); Antonio Ancona, CNR-IFN UOS Bari (Italy); Maurizio Dabbicco, Univ. degli Studi di Bari (Italy) and CNR-IFN UOS Bari (Italy); Francesco De Lucia, Univ. degli Studi di Bari (Italy); Pietro M. Lugarà, Gaetano Scamarcio, Univ. degli Studi di Bari (Italy) and CNR-IFN UOS Bari (Italy) . . . . . [8243-29]

Real-time automatic depth control of laser processing at kilohertz rates, Paul J. Webster, Kevin D. Mortimer, Joe X. Z. Yu, James M. Fraser, Queen's Univ. (Canada). . . . . [8243-30]

Two-photon laser-assisted device alteration for silicon integrated-circuit debug, Keith A. Serrels, Dmitry Skvortsov, Praveen K. Vedagarbha, DCG Systems, Inc. (USA). . . . . [8247-43]

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Development of laser-base application system with high precision and speed, Kwanghyun Ryu, Suk-hoon Shin, Hyeong-chan Park, Tae-sang Hwang, ASTJETEC Co., Ltd. (Korea, Republic of) . . . . . [8243-46]

Reproduction a unit of power of the laser radiation in compliance with the redefinition of the optical watt, Jan A. Owsik, Military Univ. of Technology (Poland); Anatoly A. Liberman, Anatoly A. Kovalev, Sergey A. Moskalyuk, All-Russia Research Institute of Optical and Physical Measurements (Russian Federation); Anna Z. Rembielinska, LOT Polish Airlines (Poland) . . . . . [8243-47]

Nanostructure formation on lithium niobate surfaces by high-repetition rate sub-15-fs near-infrared laser pulses, Martin H. Straub, Benjamin Weigand, Karsten König, Univ. des Saarlandes (Germany) . . . . . [8243-48]

Acoustic damage detection in laser-cut CFRP composite materials, Michiteru Nishino, Advanced Laser and Process Technology Research Association (Japan); Yoshihisa Harada, Takayuki Suzuki, Hiroyuki Niino, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [8243-49]

Femtosecond laser doping and nanostructuring of silicon for photovoltaics, Benjamin Franta, Meng-Ju Sher, Yu-Ting Lin, Katherine C. Phillips, Eric Mazur, Harvard Univ. (USA) . . . . . [8243-50]

Generation of new nanostructures in designed matrix by interfering femtosecond laser processing, Kazuma Momoo, Yoshiki Nakata, Noriaki Miyanaga, Osaka Univ. (Japan) . . . . . [8243-51]

High aspect ratio of near-field nano-lens for deep nano-crater patterning, Ichiro Fujimura, Mitsuhiro Terakawa, Keio Univ. (Japan) . . . . . [8243-52]

Wednesday 25 January

SESSION 9 . . . . . Wed. 8:50 to 9:50 am

Laser Surface Texturing / Polishing I

Session Chair: **Stefan Roth,** Leica Camera AG (Germany)

Periodic nano trench structure fabricated by high speed scanning CW laser, Satoru Kaneko, Takeshi Ito, Chihiro Kato, Satomi Tanaka, Kanagawa Industrial Technology Ctr. (Japan); Akira Matsuno, Takashi Nire, Phoeton Corp. (Japan); Mamoru Yoshimoto, Tokyo Institute of Technology (Japan) . . . [8243-31]

Tribological enhancement of surface properties by multi-scale femtosecond laser texturing: relation between laser treatment, topography, and wettability, Pavel Bizi-Bandoki, Stéphane Valette, Stéphane Benayoun, Ecole Centrale de Lyon (France); Eric Audouard, Univ. Jean Monnet Saint-Etienne (France) . . . . . [8243-32]

Laser polishing, Andre Temmler, RWTH Aachen (Germany); Edgar Willenborg, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [8243-33]

LASE Plenary Session

Wed. 10:20 am to 12:30 pm

Session Chairs: **Friedhelm Dorsch,** TRUMPF GmbH & Co. KG (Germany); **Alberto Piqué,** U.S. Naval Research Lab. (USA)

10:20 am: **Welcome and Opening Remarks,** Friedhelm Dorsch, TRUMPF GmbH & Co. KG (Germany); Alberto Piqué, U.S. Naval Research Lab. (USA)

10:25 am: **Announcement of the Green Photonics Award**, Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

10:30 am: **Plasmonics for Beam Shaping and Wavefront Engineering,** Federico Capasso, Harvard Univ. (USA)

11:10 am: **The National Ignition Facility and Progress Towards Inertial Fusion Ignition,** Edward I. Moses, Lawrence Livermore National Lab. (USA)

11:50 am: **Successful Technology Approach for Lasers in Manufacturing,** Peter Leibinger, TRUMPF GmbH & Co. KG (Germany)

See p. 16 for details.

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 10 . . . . . Wed. 2:00 to 3:00 pm

Laser Surface Texturing / Polishing II

Session Chair: **Stefan Roth,** Leica Camera AG (Germany)

Formation of tribological structures by laser ablation, Niels Schilling, Mike Paschke, Udo Klotzbach, Fraunhofer IWS Dresden (Germany); Sami T. Hendow, Multiwave Photonics (Portugal) . . . . . [8243-34]

Laser-induced front side etching of commercial glasses with short and ultra-short laser pulses, Pierre Lorenz, Klaus Zimmer, Martin Ehrhardt, Anja Wehrmann, Leibniz-Institut für Oberflächenmodifizierung e.V. (Germany) . . . . . [8243-35]

Facile and flexible fabrication of gapless microlens arrays using a femtosecond laser microfabrication and replication process, Hewei Liu, Feng Chen, Xi'an Jiaotong Univ. (China) . . . . . [8243-36]

SESSION 11 . . . . . Wed. 3:30 to 5:50 pm

Novel Laser Systems and Optics for Laser Micro/Nanomachining

Session Chairs: **Bo Gu,** IPG Photonics Corp. (China); **Guido Hennig,** Daetwyler Graphics AG (Switzerland)

Control of material properties by simultaneous photoexcitations at multiple light spots using a spatial light modulator *(Invited Paper)*, Masaaki Sakakura, Takaya Tochio, Masahiro Shimizu, Naomi Yasuda, Kyoto Univ. (Japan); Masatoshi Ohnishi, Qualtec Co. Inc. (Japan); Yasuhiko Shimotsuma, Kiyotaka Miura, Kazuyuki Hirao, Kyoto Univ. (Japan) . . . . . [8243-37]

Green line-shaped focus and multiple-foci parallel processing in photovoltaic and other applications on Si, Mikhail M. Ivanenko, Klaus Bagschik, Wyacheslav Grimm, Alexei Krasnaberski, LIMO Lissotschenko Mikrooptik GmbH (Germany) . . . . . [8243-38]

Investigation of micro lens multi spot generator for parallel micromachining of silicon with picosecond and nanosecond laser, Maik Zimmermann, Stephan Roth, BLZ Bayerisches Laserzentrum GmbH (Germany) and Erlangen Graduate School in Advanced Optical Technologies (Germany); Michael Schmidt, BLZ Bayerisches Laserzentrum GmbH (Germany) and Erlangen Graduate School in Advanced Optical Technologies (Germany) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [8243-39]

Using acoustic energy for structuring light fields in laser processing and imaging *(Invited Paper)*, Marti Duocastella, Craig B. Arnold, Princeton Univ. (USA) . . . . . [8243-40]

New nanosecond Q-switched 213 and 224-nm lasers for fiber Bragg grating writing in hydrogen-free optical fibers, Mathieu Gagné, Raman Kashyap, Ecole Polytechnique de Montréal (Canada) . . . . . [8243-41]

Laser cutting of carbon fiber reinforced plastics (CFRP), Hiroyuki Niino, Yoshizou Kawaguchi, Tadatake Sato, Aiko Narazaki, Ryozo Kurosaki, Yoshihisa Harada, National Institute of Advanced Industrial Science and Technology (Japan); Takahiro Nagashima, Zyunpei Kase, Masafumi Matsushita, Koichi Furukawa, Michiteru Nishino, Advanced Laser and Process Technology Research Association (Japan) . . . . . [8243-42]

Thursday 26 January

SESSION 12 . . . . . Thurs. 3:30 to 5:30 pm

Photovoltaics

Joint Session with Conference 8244

Session Chair: **Rainer Kling,** Laser Zentrum Hannover e.V. (Germany)

Structuring of functional thin films and surfaces with picosecond-pulsed lasers *(Invited Paper)*, Gediminas Raciukaitis, Paulius Gecys, Mindaugas Gedvilas, Bogdan Voisiat, Ctr. for Physical Sciences and Technology (Lithuania) . . . . . [8243-43]

Laser processes for future solar cells *(Invited Paper)*, Andreas Letsch, Robert Bosch GmbH (Germany) . . . . . [8243-44]

Selective ablation of thin films in latest generation CIGS solar cells with picosecond pulses, Andreas Burn, Martin Muralt, Berner Fachhochschule Technik und Informatik (Switzerland); Reiner Witte, Bruno Frei, Solneva SA (Switzerland); Stephan Bücheler, EMPA (Switzerland); Valerio Romano, Berner Fachhochschule Technik und Informatik (Switzerland) . . . . . [8243-45]

Conference 8244

Tuesday-Thursday 24-26 January 2012 • Proceedings of SPIE Vol. 8244

Laser-based Micro- and Nanopackaging and Assembly VI

Conference Chairs: **Friedrich G. Bachmann,** LUMERA LASER GmbH (Germany); **Wilhelm Pfleging,** Karlsruher Institut für Technologie (Germany); **Kunihiko Washio,** Paradigm Laser Research Ltd. (Japan)

Conference Co-Chairs: **Jun Amako,** Seiko Epson Corp. (Japan); **Willem Hoving,** XiO Photonics B.V. (Netherlands); **Yongfeng Lu,** Univ. of Nebraska-Lincoln (USA)

Program Committee: **Craig B. Arnold,** Princeton Univ. (USA); **Francois Courvoisier,** Univ. de Franche-Comté (France); **Ramona Eberhardt,** Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); **Bo Gu,** IPG Photonics Corp. (China); **Duncan P. Hand,** Heriot-Watt Univ. (United Kingdom); **Minghui Hong,** National Univ. of Singapore (Singapore); **Lan Jiang,** Beijing Institute of Technology (China); **Nam Seong Kim,** EO Technics Co., Ltd. (Korea, Republic of); **Sonja M. Kittel,** Robert Bosch GmbH (Germany); **Rainer Kling,** Laser Zentrum Hannover e.V. (Germany); **Udo Klotzbach,** Fraunhofer IWS Dresden (Germany); **Thomas Klotzbücher,** Institut für Mikrotechnik Mainz GmbH (Germany); **Xinbing Liu,** Panasonic Boston Lab. (USA); **Marius Przybylski,** ATL Lasertechnik GmbH (Germany); **Yasu Osako,** Electro Scientific Industries, Inc. (USA); **Roberto Osellame,** Politecnico di Milano (Italy); **Andreas Ostendorf,** Ruhr-Univ. Bochum (Germany); **Alberto Piqué,** U.S. Naval Research Lab. (USA); **Razvan Stoian,** Lab. Hubert Curien (France); **Koji Sugioka,** RIKEN (Japan); **Akira Watanabe,** Tohoku Univ. (Japan); **Xianfan Xu,** Purdue Univ. (USA)

Tuesday 24 January

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Massive process parallelization for laser surface modification: approach and boundaries, Viktor Schütz, Uwe Stute, Laser Zentrum Hannover e.V. (Germany) . . . . . [8244-33]

The applying of the scanning systems in the cutting process for small thickness non-ferrous metals using fiber laser for it, Igor V. Poliakov, Sergey G. Gorny, Konstantin Yudin, Laser Technology Ctr. (Russian Federation); Mikhail O. Nikonchuk, West-Ter Research Ctr. (Russian Federation). . . [8244-34]

Wednesday 25 January

SESSION 1 . . . . . Wed. 8:20 to 9:50 am

Welding, Bonding, Brazing

Session Chair: **Friedrich G. Bachmann,** LUMERA LASER GmbH (Germany)

Welding of transparent materials with ultrashort laser pulses *(Invited Paper)*, Sören Richter, Sven Döring, Felix Zimmermann, Friedrich-Schiller-Univ. Jena (Germany); Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Stefan Nolte, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany). . . . . [8244-01]

Direct welding of fused silica with femtosecond fiber laser, Huan Huang, Jian Liu, Lihmei Yang, PolarOnyx, Inc. (USA) . . . . . [8244-02]

High throughput high accuracy laser soldering of optoelectronic chips, Torsten Vahrenkamp, Achim Weber, Detlef Rose, Stefan Heinecke, ficonTEC Service GmbH (Germany); Robert Parkin, Loughborough Univ. (United Kingdom); Horst Kreitlow, ficonTEC Service GmbH (Germany) . . . . . [8244-03]

End cap splicing of photonic crystal fibers with outstanding quality for high power applications, Steffen Böhme, Andrea Kliner, Simone Fabian, Thomas Schreiber, Ramona Eberhardt, Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany). . . . . [8244-04]

LASE Plenary Session

Wed. 10:20 am to 12:30 pm

Session Chairs: **Friedhelm Dorsch,** TRUMPF GmbH & Co. KG (Germany); **Alberto Piqué,** U.S. Naval Research Lab. (USA)

10:20 am: **Welcome and Opening Remarks,** Friedhelm Dorsch, TRUMPF GmbH & Co. KG (Germany); Alberto Piqué, U.S. Naval Research Lab. (USA)

10:25 am: **Announcement of the Green Photonics Award**, Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

10:30 am: **Plasmonics for Beam Shaping and Wavefront Engineering,** Federico Capasso, Harvard Univ. (USA)

11:10 am: **The National Ignition Facility and Progress Towards Inertial Fusion Ignition,** Edward I. Moses, Lawrence Livermore National Lab. (USA)

11:50 am: **Successful Technology Approach for Lasers in Manufacturing,** Peter Leibinger, TRUMPF GmbH & Co. KG (Germany)

See p. 16 for details.

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 2 . . . . . Wed. 1:30 to 3:40 pm

Structuring and Modification of Thin Flims

Session Chair: **Kunihiko Washio,** Paradigm Laser Research Ltd. (Japan)

Amorphous Si crystallization by 405-nm GaN laser diodes for high performance TFT applications: advantages of using 405-nm wavelength *(Invited Paper)*, Kiyoshi Morimoto, Panasonic Semiconductor Discrete Devices Co., Ltd. (Japan); Nobuyasu Suzuki, Panasonic Corp. (Japan); Xinbing Liu, Panasonic Boston Lab. (USA); Katsuya Samonji, Kazuhiko Yamanaka, Panasonic Semiconductor Discrete Devices Co., Ltd. (Japan); Masaaki Yuri, Panasonic Corp. (Japan). . . . . [8244-05]

Heat-induced structure formation in metal films generated by single ultrashort laser pulses, Jürgen Koch, Claudia Unger, Boris N. Chichkov, Laser Zentrum Hannover e.V. (Germany) . . . . . [8244-06]

Sub-micron structuring of indium-tin-oxide thin films using femtosecond fiber laser pulses, Chung-Wei Cheng, Industrial Technology Research Institute South (Taiwan). . . . . [8244-07]

Laser micromachining of organic LEDs, Tino Petsch, Jens Haenel, Maurice Clair, Christian Scholz, 3D-Micromac AG (Germany) . . . . . [8244-08]

Analysis and characterization of the laser decal transfer process, Scott A. Mathews, Raymond C. Y. Auyeung, Alberto Piqué, U.S. Naval Research Lab. (USA) . . . . . [8244-09]

Laser origami: a new technique for assembling 3D microstructures, Alberto Piqué, Scott A. Mathews, Nicholas A. Charipar, Andrew J. Birnbaum, U.S. Naval Research Lab. (USA) . . . . . [8244-10]

SESSION 3 . . . . . Wed. 4:00 to 6:30 pm

Laser Nano-Structuring

Session Chair: **Yongfeng Lu,** Univ. of Nebraska-Lincoln (USA)

3D processing using femtosecond lasers for aperiodic volume optics *(Invited Paper)*, Rafael Piestun, Univ. of Colorado at Boulder (USA). . . . [8244-11]

Nano-structured surfaces by laser interference lithography and fs-laser direct writing as substrates for surface-enhanced Raman spectroscopy, Thomas Klotzbücher, Lhoucine Ben Mohammadi, Nina Hundertmark, Frank Kullmann, Frederik Fleissner, Institut für Mikrotechnik Mainz GmbH (Germany) . . . . . [8244-12]

In situ diagnostics on fs-laser induced modification of glasses for selective etching, Martin Hermans, Jens Gottmann, Anna Schiffer, RWTH Aachen (Germany) . . . . . [8244-13]

Large area direct fabrication of periodic arrays using interference patterning, Andres F. Lasagni, Teja Roch, Denise Langheinrich, Matthias Bieda, Heidi Perez, Andreas Wetzig, Eckhard Beyer, Fraunhofer IWS Dresden (Germany) . . . . . [8244-14]

Integration of a three-dimensional filter in a microfluidic chip for separation of microscale particles, Nicola Bellini, Politecnico di Milano (Italy); Yu Gu, Massachusetts Institute of Technology (USA); Lorenzo Amato, Giulio Cerullo, Politecnico di Milano (Italy); Roberto Osellame, Istituto di Fotonica e Nanotecnologie (Italy) . . . . . [8244-15]

Surface-enhanced Raman spectroscopy using Au-coated vertically aligned carbon nanotubes, Xiangnan He, H. Huang, Masoud Mahjouri-Samani, Yang Gao, Wei Xiong, M. Mitchell, Wei Hu, Yunshen Zhou, Yongfeng Lu, Univ. of Nebraska-Lincoln (USA) . . . . . [8244-16]

Enhancement of laser-induced breakdown spectroscopy signals using both hemispherical cavity and magnetic field, Lianbo Guo, Univ. of Nebraska-Lincoln (USA) and Wuhan National Lab. for Optoelectronics (China); Xiangnan He, B.Y. Zhang, C.M. Li, Wei Hu, Yunshen Zhou, Univ. of Nebraska-Lincoln (USA); Z.X. Cai, Xiaoyan Zeng, Wuhan National Lab. for Optoelectronics (China); Yongfeng Lu, Univ. of Nebraska-Lincoln (USA) . . . . . [8244-17]

Thursday 26 January

SESSION 4 . . . . . Thurs. 8:30 to 10:00 am

Laser Micro-Structuring and Modification I

Session Chair: **Udo Klotzbach,** Fraunhofer IWS Dresden (Germany)

Laser structuring of metallic mould inserts by using µs, ns, and ps-laser ablation *(Invited Paper)*, Steffen G. Scholz, Cardiff Univ. (United Kingdom) . . . . . [8244-18]

Laser-chemical precision machining of micro forming tools at low laser powers, Salar Mehrafsun, Peiran Zhang, Frank Vollertsen, Gert Goch, Bremer Institut für angewandte Strahltechnik GmbH (Germany) . . . . . [8244-19]

Laser micro-machined semi-slinky like MEMS structures: novel interface coolers, Serap Celen, Ege Üniv. (Turkey) . . . . . [8244-20]

Process limitations in microassembling using holographic optical tweezers, Reza Ghadiri, Qingchuan Guo, Cemal Esen, Andreas Ostendorf, Ruhr-Univ. Bochum (Germany) . . . . . [8244-21]

SESSION 5 . . . . . Thurs. 10:30 am to 12:20 pm

Laser Micro-Structuring and Modification II

Session Chair: **Willem Hoving,** XiO Photonics B.V. (Netherlands)

Laser machining of carbon fibre reinforced polymeric (CFRP) composite materials *(Invited Paper)*, Lin Li, The Univ. of Manchester (United Kingdom) . . . . . [8244-22]

Plastic optofluidic chip fabricated by femtosecond laser ablation, Rebeca Martinez, Shane M. Eaton, Giulio Cerullo, Roberta Ramponi, Roberto Osellame, Istituto di Fotonica e Nanotecnologie (Italy) . . . . . [8244-23]

Control of element distribution in glass with femtosecond laser, Masahiro Shimizu, Masaaki Sakakura, Masayuki Nishi, Yasuhiko Shimotsuma, Kazuyuki Hirao, Kiyotaka Miura, Kyoto Univ. (Japan). . . . . [8244-24]

Compact high power ps laser and its application in large area engraving, Keming Du, EdgeWave GmbH (Germany); Stephan Brüning, Schepers GmbH (Germany); Arnold Gillner, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [8244-25]

Rotating optics for laser taper-drilling in research and production, David Ashkenasi, Tristan Kaszemeikat, Norbert Mueller, Laser- und Medizin-Technologie GmbH, Berlin (Germany); Hans Joachim Eichler, Technische Univ. Berlin (Germany); Tino Petsch, Jens Haenel, Markus Lasch, Christian Scholz, 3D-Micromac AG (Germany) . . . . . [8244-26]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

SESSION 6 . . . . . Thurs. 1:30 to 3:00 pm

Batteries

Session Chair: **Wilhelm Pfleging,** Karlsruher Institut für Technologie (Germany)

From reel to pack: laser processes in the production of lithium-ion-batteries *(Invited Paper)*, Benjamin Schmieder, Manz Automation AG (Germany) . . . . . [8244-27]

Laser adjusted three-dimensional Li-Mn-O cathode architectures for secondary rechargeable lithium-ion cells, Johannes Pröll, Robert Kohler, Maika Torge, Michael Bruns, Karlsruher Institut für Technologie (Germany); Marius Przybylski, ATL Lasertechnik GmbH (Germany); Julian Fischer, Sven Ulrich, Wilhelm Pfleging, Karlsruher Institut für Technologie (Germany). [8244-28]

Influence of laser-generated surface structures on electrochemical performance of lithium cobalt oxide, Robert Kohler, Johannes Proell, Heino Besser, Karlsruher Institut für Technologie (Germany); Marius Przybylski, ATL Lasertechnik GmbH (Germany); Julian Fischer, Sven Ulrich, Wilhelm Pfleging, Karlsruher Institut für Technologie (Germany) . . . . . [8244-29]

Transient thermal analysis and mechanical strength testing of pulsed laser welded ground ribbons to battery joints, Yaomin Lin, Alfred E. Mann Foundation for Scientific Research (USA) . . . . . [8244-30]

SESSION 7 . . . . . Thurs. 3:30 to 5:30 pm

Photovoltaics

Joint Session with Conference 8243

Session Chair: **Rainer Kling,** Laser Zentrum Hannover e.V. (Germany)

Structuring of functional thin films and surfaces with picosecond-pulsed lasers *(Invited Paper)*, Gediminas Raciukaitis, Paulius Gecys, Mindaugas Gedvilas, Bogdan Voisiat, Ctr. for Physical Sciences and Technology (Lithuania) . . . . . [8243-43]

Laser sintering of Si and Ge nano- and microparticle films toward solar cells by solution process, Akira Watanabe, Tohoku Univ. (Japan). . . . [8244-31]

Laser processes for future solar cells *(Invited Paper)*, Andreas Letsch, Robert Bosch GmbH (Germany) . . . . . [8243-44]

Selective ablation of thin films in latest generation CIGS solar cells with picosecond pulses, Andreas Burn, Martin Muralt, Berner Fachhochschule Technik und Informatik (Switzerland); Reiner Witte, Bruno Frei, Solneva SA (Switzerland); Stephan Bücheler, EMPA (Switzerland); Valerio Romano, Berner Fachhochschule Technik und Informatik (Switzerland). . . . . [8243-45]

High quality micro-machining using ultracompact picosecond lasers, Oliver Haupt, Stefan Spiekermann, Ingo Freitag, InnoLight GmbH (Germany) . . . . . [8244-32]

Courses of Related Interest

SC689	Precision Laser Micromachining (Schaeffer) Wednesday, 1:30 to 5:30 pm
SC743	Micromachining with Femtosecond Lasers (Nolte, Schaffer) Monday, 1:30 to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Conference 8245

Monday-Tuesday 23-24 January 2012 • Proceedings of SPIE Vol. 8245

Synthesis and Photonics of Nanoscale Materials IX

Conference Chairs: **Frank Träger,** Univ. Kassel (Germany); **Jan J. Dubowski,** Univ. de Sherbrooke (Canada); **David B. Geohegan,** Oak Ridge National Lab. (USA)

Program Committee: **Carmen N. Afonso,** Consejo Superior de Investigaciones Científicas (Spain); **Paolo Biagioni,** Politecnico di Milano (Italy); **J. Thomas Dickinson,** Washington State Univ. (USA); **Haim Grebel,** New Jersey Institute of Technology (USA); **Costas P. Grigoropoulos,** Univ. of California, Berkeley (USA); **Tony F. Heinz,** Columbia Univ. (USA); **Ilko K. Ilev,** U.S. Food and Drug Administration (USA); **Hiroshi Kumagai,** Osaka City Univ. (Japan); **Thomas K. Lippert,** Paul Scherrer Institut (Switzerland); **Vladimir M. Shalaev,** Purdue Univ. (USA); **Xianfan Xu,** Purdue Univ. (USA); **Yaqiong Xu,** Vanderbilt Univ. (USA)

Monday 23 January

SESSION 1 . . . . . Mon. 8:20 to 10:10 am

Frontiers in Plasmonics

Session Chair: **Frank Träger,** Univ. Kassel (Germany)

The nano-optics of plasmonic optical tweezers, SERS substrates, and multi-colored silicon nanowires *(Invited Paper)*, Kenneth B. Crozier, Harvard Univ. (USA) . . . . . [8245-01]

Plasmon resonances in structures with atomic-scale gaps *(Invited Paper)*, Johannes Kern, Swen Grossmann, Nadja Tarakina, Monika Emmerling, Martin Kamp, Tim Häckel, Julius-Maximilians-Univ. Würzburg (Germany); Jer-Shing Huang, National Tsing Hua Univ. (Taiwan); Paolo Biagioni, CNISM, Politecnico di Milano (Italy); Jord C. Prangsma, Bert Hecht, Julius-Maximilians-Univ. Würzburg (Germany) . . . . . [8245-02]

Multi-photon autocorrelation in Au dipole antennas, Paolo Biagioni, Daniele Brida, Politecnico di Milano (Italy); Jer-Shing Huang, National Tsing-Hua Univ. (Taiwan); Johannes Kern, Julius-Maximilians-Univ. Würzburg (Germany); Lamberto Duò, Politecnico di Milano (Italy); Bert Hecht, Julius-Maximilians-Univ. Würzburg (Germany); Marco Finazzi, Giulio Cerullo, Politecnico di Milano (Italy) . . . . . [8245-03]

Ultrafast plasmon dynamics of individual nano-rod antennas, Dario Polli, Margherita Zavelani-Rossi, Giuseppe Della Valle, Marco Marangoni, Politecnico di Milano (Italy); Pierre-Michel Adam, Univ. de Technologie Troyes (France); Giulio Cerullo, Politecnico di Milano (Italy) . . . . . [8245-04]

SESSION 2 . . . . . Mon. 10:45 am to 12:00 pm

Nanoparticle Synthesis and Applications

Session Chair: **Jan J. Dubowski,** Univ. de Sherbrooke (Canada)

Elucidating effects of nanoscale structural variations on local plasmonic modes via photon localization microscopy *(Invited Paper)*, Alexander S. McLeod, Alexander Weber-Bargioni, Jeff B. Neaton, Stefano Cabrini, P. James Schuck, Lawrence Berkeley National Lab. (USA) . . . . . [8245-05]

Self-assembled metal nanoparticles into rings: applications to plasmonics, Thomas Lerond, Julien Proust, Hélène Yockell-Lelievre, Davy Gérard, Jerome Plain, Univ. de Technologie Troyes (France) . . . . . [8245-06]

Putting plasmonic near-field probes in perspective: the case for campanile geometry, Wei Bao, Univ. of California, Berkeley (USA) and Lawrence Berkeley National Lab. (USA); P. James Schuck, Lawrence Berkeley National Lab. (USA); Miguel B. Salmeron, Univ of California, Berkeley (USA) and Lawrence Berkeley National Lab. (USA); Alexander Weber-Bargioni, Lawrence Berkeley National Lab. (USA) . . . . . [8245-07]

Lunch Break . . . . . 12:00 to 1:15 pm

SESSION 3 . . . . . Mon. 1:15 to 3:10 pm

Graphene and Carbon Nanotubes

Session Chair: **David B. Geohegan,** Oak Ridge National Lab. (USA)

Laser direct writing of micro graphene patterns *(Invited Paper)*, Yongfeng Lu, J. B. Park, Yunshen Zhou, Univ. of Nebraska-Lincoln (USA) . . . . . [8245-08]

In situ optical diagnostics of graphene synthesis, Alex A. Puretzky, David B. Geohegan, Norbert Thonnard, Jason Readle, Christopher Rouleau, Gyula Eres, Murari Regmi, Gerd Duscher, Mina Yoon, Oak Ridge National Lab. (USA) . . . . . [8245-09]

Laser direct growth of graphene on semiconductor substrate, Dapeng Wei, Xianfan Xu, Purdue Univ. (USA). . . . . [8245-10]

Femtosecond laser assisted photobleaching of single-wall carbon nanotubes, Satoru Shoji, Hideaki Kobayashi, Thomas C. Rodgers, Osaka Univ. (Japan); Satoshi Kawata, Osaka Univ. (Japan) and RIKEN (Japan) . . . . [8245-11]

Density and orientation control of carbon nanotube synthesis, Yunhao Cao, Tu Hong, Yaqiong Xu, Vanderbilt Univ. (USA). . . . . [8245-12]

SESSION 4 . . . . . Mon. 3:40 to 6:00 pm

Laser Nanoscale Materials Processing and Manufacturing

Joint Session with Conference 8243

Session Chair: **Richard F. Haglund, Jr.,** Vanderbilt Univ. (USA)

Surface plasmon-assisted nanolithography with nanometric accuracy *(Invited Paper)*, Kosei Ueno, Hokkaido Univ. (Japan) . . . . . [8243-15]

XPS study of InP/InGaAs/InGaAsP microstructure irradiated by KrF and ArF lasers in different environments, Neng Liu, Khalid Moumanis, Sonia Blais, Jan J. Dubowski, Univ. de Sherbrooke (Canada) . . . . . [8245-13]

Designed near fields for parallel surface nanostructures, Frank Hubenthal, Sören Maag, Abdul-Aleem Jamali, Bernd Witzigmann, Frank Träger, Univ. Kassel (Germany) . . . . . [8245-14]

Laser ablation and nano-material fabrication in supercritical fluids *(Invited Paper)*, Ken-ichi Saitow, Hiroshima Univ. (Japan) . . . . . [8243-16]

Dynamics of TiO_2 nanoparticle formation and deposition for nanostructured thin films, Jason Readle, Alex A. Puretzky, Christopher Rouleau, Oak Ridge National Lab. (USA); Rudresh Ghosh, Rene Lopez, The Univ. of North Carolina at Chapel Hill (USA); Gyula Eres, Murari Regmi, Oak Ridge National Lab. (USA); Gerd Duscher, The Univ. of Tennessee (USA); Mina Yoon, David B. Geohegan, Oak Ridge National Lab. (USA) . . . . . [8245-15]

Template-assisted metal nanoneedle/nanoprotrusion array fabrication at a sub-diffraction-limited scale, Yuto Tanaka, Keio Univ. (Japan) and Harvard Univ. (USA); Jonathan D. B. Bradley, Eric Mazur, Harvard Univ. (USA); Minoru Obara, Keio Univ. (Japan) . . . . . [8243-17]

Tuesday 24 January

SESSION 5 . . . . . Tues. 8:20 to 10:15 am

Nanoparticle Characterization and Biological Applications

Session Chair: **Frank Hubenthal,** Univ. Kassel (Germany)

Exploring exciton-plasmon coupling in laser- and electron-beam fabricated nanostructures *(Invited Paper)*, Richard F. Haglund, Jr., Benjamin J. Lawrie, Vanderbilt Univ. (USA); Richard Mu, Fisk Univ. (USA); Kyeong-Won Kim, David P. Norton, Univ. of Florida (USA). . . . . [8245-16]

Noble metal nanoparticles on quartz supports as SERS substrates excited by a diode laser system for SERDS, Robert Ossig, Univ. Kassel (Germany); Yong-Hyok Kwon, Heinz-Detlef Kronfeldt, Technische Univ. Berlin (Germany); Frank Träger, Frank Hubenthal, Univ. Kassel (Germany) . . . . . [8245-17]

Characterization of silicon fibrous nanoparticles aggregate structure synthesized using femtosecond laser pulses, Sivakumar Manickam, Amrita Univ. (India); Krishnan Venkatakrishnan, Tan Bo, Ryerson Univ. (Canada) . . . . . [8245-18]

Plasmonic control of far-field interference for regular ripple formation on various material substrates irradiated by femtosecond laser, Go Obara, Naoki Maeda, Tomoya Miyanishi, Mitsuhiro Terakawa, Minoru Obara, Keio Univ. (Japan). . . . . [8245-19]

Influence of the growing parameters on the size distribution of PbTe nanoparticles produced by laser ablation under inert gas atmosphere, Eugenio Rodriguez, Ctr. de Investigación en Ciencia Aplicada y Tecnología Avanzada (Mexico); Diogo B. Almeida, Univ. Estadual de Campinas (Brazil); Said Agouam, Univ. de València (Spain); Ricardo Sis Moreira, Carlos Lenz Cesar, Univ. Estadual de Campinas (Brazil); Ernesto Jimenez Villar, Univ. de València (Spain); Luiz C. Barbosa, Univ. Estadual de Campinas (Brazil) [8245-20]

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Femtosecond ablation of aluminum for synthesis of nanoparticles and nanostructures and their optical characterization, Gopala Krishna Podagatlapalli, Hamad Syed, Surya Prakash Tewari, Soma Venugopal Rao, Univ. of Hyderabad (India). . . . . [8245-21]

Direct observation of surface plasmon far field for regular surface ripple formation by femtosecond laser irradiation of silicon wafer, Naoki Maeda, Go Obara, Tomoya Miyanishi, Keio Univ. (Japan); Nikolay N. Nedyalkov, Institute of Electronics (Bulgaria); Minoru Obara, Keio Univ. (Japan) . . . . . [8245-22]

Influence of ZnO buffer layer on ZnO nanowire growth by nanoparticle-assisted pulsed laser deposition, Daisuke Nakamura, Kota Okazaki, Iyampermal A. Palani, Kazuki Kubo, Koji Tsuta, Mitsuhiro Higashihata, Tatsuo Okada, Kyushu Univ. (Japan) . . . . . [8245-23]

Femtosecond laser doped and nanostructured TiO_2 for photocatalysis, Katherine C. Phillips, Elizabeth C. Landis, Cynthia M. Friend, Eric Mazur, Harvard Univ. (USA) . . . . . [8245-24]

Novel beam splitter for high-order harmonics with WO_3/TiO_2 bilayer grown on c-plane sapphire substrate by sequential surface chemical reactions, Yasutaka Sanjo, Masaki Murata, Hiroshi Kumagai, Osaka City Univ. (Japan); Yasuo Nabekawa, Katsumi Midorikawa, RIKEN (Japan); Masaya Chigane, Osaka Municipal Technical Research Institute (Japan). . . . . [8245-25]

Courses of Related Interest

SC689	Precision Laser Micromachining (Schaeffer) Wednesday, 1:30 to 5:30 pm
SC743	Micromachining with Femtosecond Lasers (Nolte, Schaffer) Monday, 1:30 to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Conference 8246

Tuesday-Thursday 24-26 January 2012 • Proceedings of SPIE Vol. 8246

Free-Space Laser Communication Technologies XXIV

Conference Chairs: **Hamid Hemmati,** Jet Propulsion Lab. (USA); **Don M. Boroson,** MIT Lincoln Lab. (USA)

Program Committee: **Vincent W. Chan,** Massachusetts Institute of Technology (USA); **Renny A. Fields,** The Aerospace Corp. (USA); **G. Charmaine Gilbreath,** U.S. Naval Research Lab. (USA); **Michael A. Krainak,** NASA Goddard Space Flight Ctr. (USA); **Robert Lange,** Tesat-Spacecom GmbH & Co. KG (Germany); **Zoran Sodnik,** European Space Research and Technology Ctr. (Netherlands); **Morio Toyoshima,** National Institute of Information and Communications Technology (Japan); **Alan E. Willner,** The Univ. of Southern California (USA); **Shiro Yamakawa,** Japan Aerospace Exploration Agency (Japan)

Tuesday 24 January

SESSION 1 . . . . . Tues. 1:30 to 3:30 pm

Invited Talks I

Session Chair: **Hamid Hemmati,** Jet Propulsion Lab. (USA)

Underwater blue-green laser communications in support of undersea dominance *(Invited Paper)*, Greg Mooradian, QinetiQ North America (USA) . . . . . [8246-01]

Satellite-based quantum communications *(Invited Paper)*, Richard J. Hughes, Jane E. Nordholt, Los Alamos National Lab. (USA) . . . . . [8246-02]

Achievable capacity using photon-counting array-based receivers with on-off-keyed and frequency-shift-keyed modulation formats *(Invited Paper)*, Bryan S. Robinson, Don M. Boroson, MIT Lincoln Lab. (USA) . . . . . [8246-03]

On approaching the ultimate limits of communication using a photon-counting detector *(Invited Paper)*, Baris I. Erkmen, Bruce E. Moision, Kevin M. Birnbaum, Samuel J. Dolinar, Jr., Jet Propulsion Lab. (USA) . . . . . [8246-04]

SESSION 2 . . . . . Tues. 4:00 to 5:30 pm

Invited Talks II

Session Chair: **Don M. Boroson,** MIT Lincoln Lab. (USA)

Low-frequency vibration isolation system for deep space optical communications payload *(Invited Paper)*, Gerardo G. Ortiz, Virginio Sannibale, Jet Propulsion Lab. (USA) . . . . . [8246-05]

Current development status of small optical transponder (SOTA) for satellite-ground laser communications *(Invited Paper)*, Yoshihisa Takayama, Morio Toyoshima, Yoshisada Koyama, Hideki Takenaka, Maki Akioka, National Institute of Information and Communications Technology (Japan); Koichi Shiratama, Ichiro Mase, Osamu Kawamoto, NEC TOSHIBA Space Systems, Ltd. (Japan) . . . . . [8246-06]

Directly-modulated, high-power semiconductor lasers *(Invited Paper)*, Gary M. Smith, Erik K. Duerr, Andrew M. Siegel, Joseph P. Donnelly, Leo J. Missaggia, Michael K. Connors, Pablo I. Hopman, Andrew K. Stimac, David C. Mathewson, George W. Turner, Paul W. Juodawlkis, MIT Lincoln Lab. (USA) . . . . . [8246-07]

TECHNICAL EVENT

Laser Communications

7:30 to 9:00 pm

Session Chairs: **Hamid Hemmati,** Jet Propulsion Lab. (USA) and **Don Boroson,** MIT Lincoln Lab. (USA)

This technical event on Laser Communications will hold its informal annual meeting in conjunction with the Free-Space Laser Communication Technologies XXIII conference. All professionals involved in theory and applications of free-space laser communications, remote sensing and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Attendees are invited to bring suggestions for discussion topics.

Wednesday 25 January

LASE Plenary Session

Wed. 10:20 am to 12:30 pm

Session Chairs: **Friedhelm Dorsch,** TRUMPF GmbH & Co. KG (Germany); **Alberto Piqué,** U.S. Naval Research Lab. (USA)

10:20 am: **Welcome and Opening Remarks,** Friedhelm Dorsch, TRUMPF GmbH & Co. KG (Germany); Alberto Piqué, U.S. Naval Research Lab. (USA)

10:25 am: **Announcement of the Green Photonics Award**, Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

10:30 am: **Plasmonics for Beam Shaping and Wavefront Engineering,** Federico Capasso, Harvard Univ. (USA)

11:10 am: **The National Ignition Facility and Progress Towards Inertial Fusion Ignition,** Edward I. Moses, Lawrence Livermore National Lab. (USA)

11:50 am: **Successful Technology Approach for Lasers in Manufacturing,** Peter Leibinger, TRUMPF GmbH & Co. KG (Germany)

See p. 16 for details.

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 3 . . . . . Wed. 2:00 to 3:00 pm

Detection, Modulation, and Coding

Session Chair: **Robert Lange,** Tesat-Spacecom GmbH & Co. KG (Germany)

Limits on achievable dimensional and photon efficiencies with intensity modulation and photon-counting due to non-ideal photon-counter behavior, Bruce E. Moision, Jet Propulsion Lab. (USA) . . . . . [8246-08]

Development and evaluation of a digital signal processing for single polarization QPSK modulation format, Kazuomi Endo, Youichi Hashimoto, Kiyoshi Fukuchi, NEC Corp. (Japan) . . . . . [8246-09]

Design of encoders and decoders for code/pulse-position-swapping (C/CPPS) based on sonar codes, Antonio J. Mendez, Mendez R&D Associates (USA) . . . . . [8246-10]

SESSION 4 . . . . . Wed. 3:30 to 5:50 pm

Demonstrations

Session Chair: **Hamid Hemmati,** Jet Propulsion Lab. (USA)

Overview and status of the Lunar Laser Communications Demonstration, Don M. Boroson, Bryan S. Robinson, Dennis A. Burianek, Daniel V. Murphy, MIT Lincoln Lab. (USA) . . . . . [8246-11]

Laser communication terminals for the European data relay system, Robert Lange, Frank F. Heine, Mark Gregory, Hartmut Kaempfner, Tesat-Spacecom GmbH & Co. KG (Germany); Michael Lutzer, Rolf Meyer, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [8246-12]

Free-space quantum cryptography over 144 km towards space applications, Rupert Ursin, Univ. Wien (Austria) . . . . . [8246-13]

10 Gb/s lasercom transceiver for LEO spacecraft, Joseph M. Kovalik, Hamid Hemmati, Abhijit Biswas, Jet Propulsion Lab. (USA) . . . . . [8246-14]

40-Gbit/s optical free space transmission experiment using QPSK modulation format, Yoichi Hashimoto, NEC Corp. (Japan) . . . . . [8246-15]

Free space laser communication experiments from earth to the Lunar Reconnaissance Orbiter, Xiaoli Sun, David R. Skillman, Ronald S. Zellar, Gregory A. Neumann, Leva McIntire, Evan D. Hoffman, David E. Smith, NASA Goddard Space Flight Ctr. (USA); Maria T. Zuber, Massachusetts Institute of Technology (USA) . . . . . [8246-16]

Long range beam propagation for quantum communications, Ivan Capraro, Adaptica S.r.l. (Italy); Andrea Tomaello, Alberto Dall'Arche, Francesca Gerlin, Giuseppe Vallone, Paolo Villoresi, Univ. degli Studi di Padova (Italy) . . . [8246-17]

Thursday 26 January

SESSION 5 . . . . . Thurs. 8:30 to 10:10 am

Lasers

Session Chair: **Don M. Boroson,** MIT Lincoln Lab. (USA)

All-semiconductor-based narrow linewidth high-power laser system for laser communication applications in space at 1060 nm, Stefan Spiessberger, Ferdinand-Braun-Institut (Germany); Max Schiemangk, Humboldt-Univ. zu Berlin (Germany); Alexander Sahm, Frank Bugge, Jörg Fricke, Hans Wenzel, Andreas Wicht, Götz Erbert, Günther Tränkle, Ferdinand-Braun-Institut (Germany) . . . . . [8246-18]

–1.5 micron MOPA deep space downlink transmitter, Donald L. Sipes, Jr., Jason D. Tafoya, Optical Engines, Inc. (USA) . . . . . [8246-19]

Short-wavelength (1010-1030-nm) Yb-fiber-MOPA based multi-aperture high-power uplink laser beacons for space communication, Doruk Engin, Frank Kimpel, Shantanu Gupta, Fibertek, Inc. (USA) . . . . . [8246-20]

Preliminary results of space grade laser transmitters for optical communications, Malcolm W. Wright, Jet Propulsion Lab. (USA) . . . . [8246-21]

Design of a 40 Watt 1.5 micron uplink transmitter for Lunar Laser Communications, David O. Caplan, John J. Carney, MIT Lincoln Lab. (USA); Robert E. Lafon, W. M. Keck Observatory (USA); Mark L. Stevens, MIT Lincoln Lab. (USA) . . . . . [8246-22]

SESSION 6 . . . . . Thurs. 10:40 to 11:40 am

Atmospheric Propagation

Session Chair: **Abhijit Biswas,** Jet Propulsion Lab. (USA)

Anisoplanatism over horizontal paths: comparison of theoretical and experimental results, Jeremy P. Bos, Aleksandr V. Sergeyev, Michael C. Roggemann, Michigan Technological Univ. (USA) . . . . . [8246-23]

Mitigation of time-spatial influence in free-space optical networks utilizing route diversity, Jiri Libich, Stanislav Zvanovec, Czech Technical Univ. in Prague (Czech Republic) . . . . . [8246-24]

Cloud attenuation models and availability of optical ground-space links, Nicolas Perlot, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [8246-25]

Lunch/Exhibition Break . . . . . 11:40 am to 1:10 pm

SESSION 7 . . . . . Thurs. 1:10 to 2:50 pm

Detectors/Optics/Ranging

Session Chair: **Joseph M. Kovalik,** Jet Propulsion Lab. (USA)

Initial performance of the LLCD superconducting nanowire array receiver, Eric A. Dauler, Danna Rosenberg, Richard J. Molnar, Jung U. Yoon, Matthew E. Grein, MIT Lincoln Lab. (USA) . . . . . [8246-26]

Superconducting nanowire arrays for multi-meter free space optical communications receivers, William H. Farr, Jeffry Stern, Jet Propulsion Lab. (USA) . . . . . [8246-27]

Optimum beam setting for near-field free-space optical communication system with bidirectional beacon tracking, Yoshinori Arimoto, National Institute of Information and Communications Technology (Japan). . . . . [8246-28]

Conical refraction multiplexing for free space optical communications, Yurii V. Loiko, Kenzi Aradj, Alex Turpin, Todor K. Kalkandjiev, Jordi Mompart, Univ. Autònoma de Barcelona (Spain) . . . . . [8246-29]

The Lunar Laser Communications Demonstration time-of-flight system, Bryan S. Robinson, Don M. Boroson, Mark L. Stevens, Joseph A. Greco, Matthew M. Willis, Barry R. Romkey, Jan E. Kansky, Jeffrey Matthews, Steven Constantine, Hemonth G. Rao, MIT Lincoln Lab. (USA) . . . . . [8246-30]

SESSION 8 . . . . . Thurs. 3:20 to 4:40 pm

Analysis and Testing

Session Chair: **Yoshihisa Takayama,** National Institute of Information and Communications Technology (Japan)

Throughput maximization of optical LEO-ground links, Nicolas Perlot, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [8246-31]

Evaluation of deep-space laser communication under different mission scenarios, Abhijit Biswas, Sabino Piazzolla, Bruce E. Moision, P. Douglas Lisman, Jet Propulsion Lab. (USA) . . . . . [8246-32]

Simulation of a deep space optical transceiver, Joel F. Shields, Martin Regehr, Abhijit Biswas, Jet Propulsion Lab. (USA) . . . . . [8246-33]

Radiation hardening techniques for rare-earth-based optical fibers and amplifiers, Sylvain Girard, Commissariat à l'Énergie Atomique (France); Marilena Vivona, Univ. Jean Monnet Saint-Etienne (France); Luciano Mescia, Politecnico di Bari (Italy); Arnaud Laurent, iXFiber SAS (France); Youcef Ouerdane, Univ. Jean Monnet Saint-Etienne (France); Claude Marcandella, Commissariat à l'Énergie Atomique (France); Francesco Prudenzano, Politecnico di Bari (Italy); Aziz Boukenter, Univ. Jean Monnet Saint-Etienne (France); Thierry Robin, Benoit Cadier, iXFiber SAS (France); Marco Cannas, Univ. degli studi di Palermo (Italy) . . . . . [8246-34]

Courses of Related Interest

SC188	Laser Beam Propagation for Applications in Laser Communications, Laser Radar, and Active Imaging (Phillips, Andrews) Wednesday, 8:30 am to 5:30 pm
SC931	Applied Nonlinear Frequency Conversion (Paschotta) Monday, 8:30 am to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC977	Fundamentals of Laser Beam Profile Measurements (Rypma) Tuesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Conference 8247

Sunday-Wednesday 22-25 January 2012 • Proceedings of SPIE Vol. 8247

Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XII

Conference Chairs: **Alexander Heisterkamp,** Laser Zentrum Hannover e.V. (Germany); **Michel Meunier,** Ecole Polytechnique de Montréal (Canada); **Stefan Nolte,** Friedrich-Schiller-Univ. Jena (Germany)

Program Committee: **Craig B. Arnold,** Princeton Univ. (USA); **James E. Carey III,** SiOnyx Inc. (USA); **Xun Gu,** Max-Planck-Institut für Quantenoptik (Germany); **Denise M. Krol,** Univ. of California, Davis (USA); **Eric Mazur,** Harvard Univ. (USA); **Michael M. Mielke,** Raydiance, Inc. (USA); **Eric Mottay,** Amplitude Systemes (France); **Christopher B. Schaffer,** Cornell Univ. (USA); **Alexander Szameit,** Technion-Israel Institute of Technology (Israel); **Alfred Vogel,** Univ. zu Lübeck (Germany); **Wataru Watanabe,** National Institute of Advanced Industrial Science and Technology (Japan)

Conference Cosponsors:

Amplitude SYSTEMES

APE

Sunday 22 January

SESSION 1 . . . . . Sun. 8:30 to 10:10 am

Cell Manipulation and Optoporation Using Nano- and Microparticles

Session Chair: **Alexander Heisterkamp,** Laser Zentrum Hannover e.V. (Germany)

Biodegradable microsphere mediated cell perforation using femtosecond laser pulse, Mitsuhiro Terakawa, Tatsuki Mitsuhashi, Keio Univ. (Japan) . . . . . [8247-01]

Basic mechanisms of out of resonance plasmonic enhanced laser (ORPEL) nanocavitation in water, Michel Meunier, Etienne Boulais, Rémi Lachaine, Ecole Polytechnique de Montréal (Canada) . . . . . [8247-02]

Novel large-scale plasmon-based cell transfection, Oliver Hauser, Valeria Nuzzo, Harvard Univ. (USA); Remi Lachaine, Ecole Polytechnique de Montréal (Canada); Paul Peng, Harvard Univ. (USA); Eric D. Diebold, Univ. of California, Los Angeles (USA); Michel Meunier, Ecole Polytechnique de Montréal (Canada); Eric Mazur, Harvard Univ. (USA) . . . . . [8247-03]

Cancer cell manipulation using femtosecond pulses and gold nanoparticles, Dvir Yelin, Limor Minai, Daniella Yeheskely-Hayon, Lior Golan, Gili Bisker, Technion-Israel Institute of Technology (Israel) . . . . . [8247-04]

Nano particles insertion into individual mammalian cells using optical tweezers, Muhammad Waleed, Jung-Dae Kim, Yong-Gu Lee, Gwangju Institute of Science and Technology (Korea, Republic of) . . . . . [8247-05]

SESSION 2 . . . . . Sun. 10:40 am to 12:10 pm

Laser Fabrication of Scaffolds and Artificial Biostructures

Session Chair: **Michel Meunier,** Ecole Polytechnique de Montréal (Canada)

Towards designer extracellular matrices *(Invited Paper)*, Georg von Freymann, Univ. of Kaiserslautern (Germany); Franziska Klein, Benjamin Richter, Thomas Striebel, Clemens M. Franz, Martin Wegener, Martin Bastmeyer, Karlsruher Institut für Technologie (Germany) . . . . . [8247-06]

Femtosecond laser two-photon polymerization of three-dimensional scaffolds for tissue engineering and regenerative medicine applications, Veronica Aprile, Shane M. Eaton, Matteo Laganà, Giulio Cerullo, Manuela T. Raimondi, Roberto Osellame, Politecnico di Milano (Italy) . . . . . [8247-07]

Femtosecond laser micropatterned polypyrrole artificial muscle actuators with enhanced electrochemical strain response, Kenneth K. C. Lee, Univ. of Toronto (Canada) and Ryerson Univ. (Canada); Lucy Li, John D. W. Madden, The Univ. of British Columbia (Canada); Peter R. Herman, Univ. of Toronto (Canada); Victor X. D. Yang, Ryerson Univ. (Canada) . . . . . [8247-08]

Laser microfabrication of polymer implants for stem cell growth and cardiovascular surgery, Mangirdas Malinauskas, Sima Rekštyte, Paulius Danilevicius, Evaldas Balciunas, Vytautas Purlys, Roaldas Gadonas, Vilnius Univ. (Lithuania) . . . . . [8247-09]

Lunch/BiOS Exhibition Break . . . . . 12:10 to 2:00 pm

SESSION 3 . . . . . Sun. 2:00 to 3:10 pm

Nonlinear Laser Surgery and Imaging

Session Chair: **Georg von Freymann,** Nanoscribe GmbH (Germany)

Prospects for automated dissection and surgery with amplified ultrashort pulses of laser light *(Invited Paper)*, David Kleinfeld, Univ. of California, San Diego (USA) . . . . . [8247-10]

Microchip laser technology for precise and fast creation of Lasik flaps, Norbert Linz, Sebastian Freidank, Sebastian Eckert, Univ. zu Lübeck (Germany); Kerstin Schlott, Medizinisches Laserzentrum Lübeck GmbH (Germany); Sebastian Faust, Stefan Schwed, SCHWIND eye-tech-solutions GmbH & Co. KG (Germany); Alfred Vogel, Univ. zu Lübeck (Germany) . . . . . [8247-11]

Neuronal rat cell imaging using supercontinuum source, Stefano Taccheo, Swansea Univ. (United Kingdom); Silvia Soria, Istituto di Fisica Applicata Nello Carrara (Italy); Cosimo D'Andreas, Politecnico di Milano (Italy); Kay Schuster, Institut für Photonische Technologien e.V. (Germany); Franco Quercioli, Istituto Nazionale di Ottica (Italy) . . . . . [8247-12]

SESSION 4 . . . . . Sun. 3:40 to 4:40 pm

Ultrashort Laser Systems for Biomedical

Session Chair: **David Kleinfeld,** Univ. of California, San Diego (USA)

Octave spanning Ti:sapphire laser for cost effective multimodal CARS/OCT, Angelika Unterhuber, Boris Pova?ay, Medizinische Univ. Wien (Austria); Tuan Le, FEMTOLASERS Produktions GmbH (Austria); Tschackad Kamali, Bernd Hofer, Medizinische Univ. Wien (Austria); Andreas Stingl, FEMTOLASERS Produktions GmbH (Austria); Wolfgang Drexler, Medizinische Univ. Wien (Austria) . . . . . [8247-13]

Alignment and maintenance free all-fiber laser sources for CARS microscopy based on frequency conversion by four-wave mixing, Martin Baumgartl, Mario Chemnitz, Friedrich-Schiller-Univ. Jena (Germany); Tobias Meyer, Jürgen Popp, Institut für Photonische Technologien e.V. (Germany); Thomas Gottschall, Cesar Jauregui, Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8247-14]

Low noise laser system generating 27-fs pulse duration, 30-kW peak power, and tunability from 850 to 1250 nm for ultrafast spectroscopy and multiphoton microscopy, Bojan Resan, Felix Brunner, Andreas Rohrbacher, Hubert Ammann, Kurt J. Weingarten, Time-Bandwidth Products AG (Switzerland) . . . . . [8247-15]

Monday 23 January

SESSION 5 . . . . . Mon. 8:40 to 10:00 am

Ultrafast Laser Systems and Measurements

Session Chair: **Michael M. Mielke,** Raydiance, Inc. (USA)

High Q laser femtoREGEN UC 8W for industrial micro-processing applications, Victor V. Matylitsky, Juerg Aus der Au, Heinz Huber, High Q Laser Innovation GmbH (Austria) . . . . . [8247-16]

Sub-picosecond laser amplifier with >1-mJ pulse energy and 33-W average power, Martin Delaigue, Sandrine Ricaud, Clemens Hoenninger, Eric Mottay, Amplitude Systemes (France) . . . . . [8247-17]

Measuring two ultrashort pulses simultaneously using a single device and on a single shot, Tsz Chun Wong, Justin Ratner, Peter M. Vaughan, Vikrant Chauhan, Rick Trebino, Georgia Institute of Technology (USA) . . . . . [8247-18]

Pulse repetition interval-based excess fraction method for an arbitrary and absolute distance measurement using a femtosecond optical frequency comb, Dong Wei, Kiyoshi Takamasu, Hirokazu Matsumoto, The Univ. of Tokyo (Japan) . . . . . [8247-19]

SESSION 6 . . . . . Mon. 10:30 am to 12:20 pm

Processing of Transparent Materials I

Session Chair: **Denise M. Krol,** Univ. of California, Davis (USA)

Femtosecond laser waveguide writing for integrated quantum optics *(Invited Paper)*, Andrea Crespi, Politecnico di Milano (Italy); Linda Sansoni, Giuseppe Vallone, Fabio Sciarrino, Univ. degli Studi di Roma La Sapienza (Italy); Roberta Ramponi, Politecnico di Milano (Italy); Paolo Mataloni, Univ. degli Studi di Roma La Sapienza (Italy); Roberto Osellame, Politecnico di Milano (Italy) . . . . . [8247-20]

Femtosecond laser writing of polarization devices for optical circuits in glass, Luis A. N. P. Fernandes, Univ. of Toronto (Canada) and INESC Porto (Portugal); Jason R. Grenier, Peter R. Herman, J. Stewart Aitchison, Univ. of Toronto (Canada); Paulo Marques, INESC Porto (Portugal) . . . . . [8247-21]

Enhanced formation of nanogratings inside fused silica due to the generation of self-trapped excitons induced by femtosecond laser pulses, Sören Richter, Fei Jia, Matthias Heinrich, Sven Döring, Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8247-22]

Bragg grating stopbands from nanogratings generated during femtosecond laser writing of optical waveguides, Jianzhao Li, Moez Haque, Stephen Ho, Peter R. Herman, Univ. of Toronto (Canada) . . . . . [8247-23]

Femtosecond laser processing of hybrid micro- and nano-structures in silicate glasses, Pavel Mardilovich, Neil Troy, Luke B. Fletcher, Univ. of California, Davis (USA); Lihmei Yang, Huan Huang, PolarOnyx, Inc. (USA); Subhash H. Risbud, Denise M. Krol, Univ. of California, Davis (USA) . . [8247-24]

Lunch Break . . . . . 12:20 to 1:40 pm

SESSION 7 . . . . . Mon. 1:40 to 3:30 pm

Processing of Transparent Materials II

Session Chair: **Craig B. Arnold,** Princeton Univ. (USA)

Formation dynamics of femtosecond laser-induced phase objects in transparent materials *(Invited Paper)*, Alexandre Mermillod-Blondin, Arkadi Rosenfeld, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Razvan Stoian, Eric Audouard, Lab. Hubert Curien (France) [8247-25]

Quantitative measurements of the densification observed in fused silica specimens exposed to low-energy femtosecond laser pulses, Audrey Champion, Yves Bellouard, Technische Univ. Eindhoven (Netherlands) [8247-26]

Long term reliability prediction of fluorescent silver nanoclusters embedded in glass for perennial optical recording, Arnaud Royon, Gautier Papon, Kevin Bourhis, Yannick Petit, Thierry Cardinal, Yannick Deshayes, Lionel Canioni, Univ. Bordeaux 1 (France) . . . . . [8247-27]

On the role of the scanning line density on the etching of fused silica specimens exposed to femtosecond lasers pulses, Yves Bellouard, Technische Univ. Eindhoven (Netherlands); Ali A. Said, Mark A. Dugan, Philippe Bado, Translume, Inc. (USA) . . . . . [8247-28]

Structural modification in Er-Yb doped zinc phosphate glasses with megahertz repetition rate femtosecond pulses, Neil Troy, Luke B. Fletcher, Univ. of California, Davis (USA); Signo T. Reis, Richard K. Brow, Missouri Univ. of Science and Technology (USA); Huan Huang, Lihmei Yang, Jian Liu, PolarOnyx, Inc. (USA); Denise M. Krol, Univ. of California, Davis (USA). [8247-29]

SESSION 8 . . . . . Mon. 4:00 to 5:50 pm

Processing of Transparent Materials III

Session Chair: **Alexandre Mermillod-Blondin,** Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany)

Present status and trend of femtosecond laser processing in display industry of Korea *(Invited Paper)*, Sung-Hak Cho, Korea Institute of Machinery & Materials (Korea, Republic of) . . . . . [8247-30]

Femtosecond direct writing of lab-on-a-fiber optofluidic sensors, Moez Haque, Jason R. Grenier, Stephen Ho, Univ. of Toronto (Canada); Luis A. Fernandes, Univ. do Porto (Portugal) and Univ. of Toronto (Canada); Peter R. Herman, Univ. of Toronto (Canada). . . . . [8247-31]

Rapid prototyping of biocompatible sensor chips by picoseconds laser structuring of a platinum/ tantalum pentoxide thin film layer system, Gerhard Heise, Daniel Trappendreher, Hochschule München für Angewandte Wissenschaften (Germany); Florian Ilchmann, Robin S. Weiss, Bernhard Wolf, Technische Univ. München (Germany); Heinz P. Huber, Hochschule München für Angewandte Wissenschaften (Germany) . . . . . [8247-32]

Femtosecond laser fabrication of optical sensing devices in the cladding of optical fibers, Jason R. Grenier, Univ. of Toronto (Canada); Luis A. Fernandes, Univ. do Porto (Portugal) and Univ.of Toronto (Canada); J. Stewart Aitchison, Univ. of Toronto (Canada); Paulo V. S. Marques, Univ. do Porto (Portugal); Peter R. Herman, Univ. of Toronto (Canada). . . . . [8247-33]

Mechanism of selective removal of transparent layers on semiconductors using ultrashort laser pulses, Tino Rublack, Stefan Hartnauer, Markus Muchow, Michael Mergner, Gerhard Seifert, Martin-Luther-Univ. Halle-Wittenberg (Germany) . . . . . [8247-34]

Tuesday 24 January

SESSION 9 . . . . . Tues. 8:00 to 10:10 am

Ultrafast Laser 3D-Fabrication

Joint Session with Conference 8243

Session Chairs: **Yoshiki Nakata,** Osaka Univ. (Japan);
Beat Neuenschwander, Berner Fachhochschule Technik und Informatik (Switzerland)

Applications of picosecond laser and pulse-burst in precision manufacturing *(Invited Paper)*, Ralf Knappe, LUMERA LASER GmbH (Germany) . . . . . [8243-18]

High sensitive concentration analysis of biochemical liquids using a microfluidic chip fabricated by femtosecond laser, Yasutaka Hanada, Koji Sugioka, Katsumi Midorikawa, RIKEN (Japan) . . . . . [8243-19]

Ultrahigh precision surface structuring by synchronizing a galvo scanner with an ultrashort pulsed laser system in MOPA arrangement, Beat Jaeggi, Beat Neuenschwander, Urs Hunziker, Thomas Meier, Markus Zimmermann, Karl-Heinz Selbmann, Ivan Gut, Berner Fachhochschule Technik und Informatik (Switzerland); Guido Hennig, Daetwyler Graphics AG (Switzerland). . . . [8243-20]

Micro-lens fiber inline Fabry-Perot interferometer fabricated by femtosecond laser, Yinan Zhang, Lei Yuan, Tao Wei, Qun Han, Hai Xiao, Missouri Univ. of Science and Technology (USA). . . . . [8243-21]

Three-dimensional silver nanostructure fabrication through multiphoton photoreduction, Kevin Vora, Seung-Yeon Kang, Shobha Shukla, Eric Mazur, Harvard Univ. (USA) . . . . . [8247-35]

Material specific effects and limitations during ps-laser generation of micro structures, Jens Hildenhagen, Klaus Dickmann, Uli Engelhardt, Fachhochschule Münster (Germany) . . . . . [8247-36]

SESSION 10 . . . . . Tues. 10:40 am to 12:10 pm

Ultrafast Laser-induced Modification of Glasses or Transparent Materials

Joint Session with Conference 8243

Session Chair: **Stefan Nolte,** Friedrich-Schiller-Univ. Jena (Germany)

Laser processing with ultrashort vortex pulses *(Invited Paper)*, Cyril Hnatovsky, Vladlen G. Shedov, Wieslaw Z. Krolikowski, Andrei V. Rode, The Australian National Univ. (Australia) . . . . . [8243-22]

Machining of glass and quartz using nanosecond and picosecond laser pulses, David Ashkenasi, Tristan Kaszemeikat, Norbert Mueller, Andreas Lemke, Laser- und Medizin-Technologie GmbH, Berlin (Germany); Hans Joachim Eichler, Technische Univ. Berlin (Germany) . . . . . [8243-23]

Water assisted microhole drilling in fused silica using burst-train femtosecond laser pulses, Takayuki Tamaki, Nara National College of Technology (Japan); Saeid Rezaei, Jianzhao Li, Peter R. Herman, Univ. of Toronto (Canada). . . . . [8247-37]

Fabrication of photo-induced microstructure embedded inside ZnO crystal, Yuichiro Ishikawa, Yasuhiko Shimotsuma, Akio Kaneta, Masaaki Sakakura, Masayuki Nishi, Kiyotaka Miura, Kazuyuki Hirao, Yoichi Kawakami, Kyoto Univ. (Japan). . . . . [8243-24]

Lunch/Exhibition Break . . . . . 12:10 to 1:20 pm

SESSION 11 . . . . . Tues. 1:20 to 3:00 pm

Ultrafast Laser Surface Processing

Joint Session with Conference 8243

Session Chairs: **Beat Neuenschwander,**
Berner Fachhochschule Technik und Informatik (Switzerland);
Yoshiki Nakata, Osaka Univ. (Japan)

Comparison of picosecond and femtosecond laser ablation for surface engraving of metals and semiconductor, John Lopez, Rémi Torres, Anne Lidolff, Charly Loumena, ALPhANOV (France); Martin Delaigue, Clemens Hönninger, Eric Mottay, Sylvain Ricaud, Amplitude Systemes (France). [8243-25]

Correlating texturing, milling, and scribing of ceramics and metals using ns and fs pulsed fiber lasers, Sami T. Hendow, Multiwave Photonics (USA); Arzu M. Ozkan, Lumyn Technologies LLC (USA); Eric P. Mottay, Amplitude Systemes (France) . . . . . [8243-26]

Sub-wavelength multi-period ripple phenomena on stainless steel irradiated with high repetition rate femtosecond laser pulses, Ladan E. Abolghasemi, Univ. of Toronto (Canada); Abbas Hosseini, FiLaser Inc. (Canada); Peter R. Herman, Univ. of Toronto (Canada). . . . . [8247-38]

Structural changes of copper induced by high repetition rate femtosecond laser pulses, Stéphane Valette, David Bruneel, Ecole Centrale de Lyon (France); Eric Audouard, Univ. Jean Monnet Saint-Etienne (France); Ronan Le Harzic, Fraunhofer-Institut für Biomedizinische Technik (Germany); Stéphane Benayoun, Ecole Centrale de Lyon (France) . . . . . [8247-39]

Femtosecond-laser-induced nanowires with very high aspect ratios at the surface fused silica, Arnaud Royon, Gautier Papon, Mathieu Dumergue, Jean-Christophe Delagnes, Kevin Bourhis, Yannick Petit, Thierry Cardinal, Yannick Deshayes, Lionel Canioni, Univ. Bordeaux 1 (France) . . . . . [8247-40]

SESSION 12 . . . . . Tues. 3:30 to 6:00 pm

Fundamentals and Diagnostics in Ultrafast Laser Processing

Joint Session with Conference 8243

Session Chair: **Michel Meunier,**
Ecole Polytechnique de Montréal (Canada)

Probing ultrafast laser-matter interactions with fs x-rays *(Invited Paper)*, Klaus Sokolowski-Tinten, Univ. Duisburg-Essen (Germany). . . . . [8243-27]

In and out of resonance plasmonics enhanced ultrafast laser nanoablation of surfaces, Alexandre Robitaille, Étienne Boulais, Michel Meunier, Ecole Polytechnique de Montréal (Canada) . . . . . [8247-41]

Raman spectroscopy as a diagnostic means of sapphire dicing using ultrashort pulsed lasers, Jiyeon Choi, Dongsig Shin, Yongkwon Cho, Jeong Suh, Korea Institute of Machinery & Materials (Korea, Republic of) . . . . [8243-28]

Influence of pulse duration on the hole formation during short and ultrashort pulse laser deep drilling, Sven Doering, Soeren Richter, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tuennermann, Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer Institute for Applied Optics and Precision Engineering (Germany) . . . . . [8247-42]

Direct investigation of the ablation rate evolution during laser drilling of high aspect ratio micro-holes, Francesco P. Mezzapesa, Univ. degli Studi di Bari (Italy) and CNR-IFN UOS Bari (Italy); Teresa Sibillano, Lorenzo L. Columbo, CNR-IFN UOS Bari (Italy); Francesca Di Niso, Univ. degli Studi di Bari (Italy); Antonio Ancona, CNR-IFN UOS Bari (Italy); Maurizio Dabbicco, Univ. degli Studi di Bari (Italy) and CNR-IFN UOS Bari (Italy); Francesco De Lucia, Univ. degli Studi di Bari (Italy); Pietro M. Lugarà, Gaetano Scamarcio, Univ. degli Studi di Bari (Italy) and CNR-IFN UOS Bari (Italy) . . . . . [8243-29]

Real-time automatic depth control of laser processing at kilohertz rates, Paul J. Webster, Kevin D. Mortimer, Joe X. Z. Yu, James M. Fraser, Queen's Univ. (Canada). . . . . [8243-30]

Two-photon laser-assisted device alteration for silicon integrated-circuit debug, Keith A. Serrels, Dmitry Skvortsov, Praveen K. Vedagarbha, DCG Systems, Inc. (USA). . . . . [8247-43]

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Ultrafast second-order optical differentiator based on a fiber coupler with dissimilar waveguides, Tae-Jung Ahn, Hoe Seok Jeong, Chosun Univ. (Korea, Republic of). . . . . [8247-44]

Supercontinuum emission from water using fs pulses in the external tight focusing limit, Sreeja S. Pillai, Venugopal Rao Soma, Univ. of Hyderabad (India); Padmanabhan Radhakrishnan, Cochin Univ. of Science & Technology (India); Surya P. Tewari, Prem Kiran Paturi, Univ. of Hyderabad (India) . [8247-45]

Increase the hydrophobicity of fused silica glass surface by femtosecond laser induced micro/nano-structuring, Md. S. Ahsan, Yeong G. Kim, Man Seop Lee, KAIST (Korea, Republic of) . . . . . [8247-46]

Compact laser pulser for TOF SPAD application, Lauri W. Hallman, Univ. of Oulu (Finland); Boris S. Ryvkin, Ioffe Physico-Technical Institute (Russian Federation); Tomi Leinonen, Kimmo Haring, Tampere Univ. of Technology (Finland); Juha T. Kostamovaara, Univ. of Oulu (Finland) . . . . . [8247-47]

Combined time-resolved GASMAS spectroscopy for the nondestructive optical characterization of wood: application to the study of archeological Swedish ships, Ilaria Bargigia, Politecnico di Milano (Italy); Patrik Lundin, Lund Univ. (Sweden); Andrea Farina, Austin Nevin, Cosimo D'Andrea, Politecnico di Milano (Italy); Marco Orlandi, Univ. degli Studi di Milano-Bicocca (Italy); Marcus Karlsson, Stefan Andersson-Engels, Gabriel Somesfalean, Lund Univ. (Sweden); Antonio Pifferi, Politecnico di Milano (Italy); Sune Svanberg, Lund Univ. (Sweden); Rinaldo Cubeddu, Politecnico di Milano (Italy). . . . . [8247-48]

Directly diode-pumped femtosecond laser based on an Yb:KYW crystal, Guang-Hoon Kim, Juhee Yang, Uk-Song Kang, Andrey Kulik, Elena G. Sall, Sergey Chizhov, Korea Electrotechnology Research Institute (Korea, Republic of). . . . . [8247-49]

Development of an automatics joint-area-measurement system after ultrafast laser microwelding, Yuta Nonogaki, Kohei Okusu, Takayuki Tamaki, Nara National College of Technology (Japan). . . . . [8247-50]

Wednesday 25 January

Student Competition

Wed. 8:00 to 9:00 am

Session Chairs: **Alexander Heisterkamp,** Laser Zentrum Hannover e.V. (Germany); **Michel Meunier,** Ecole Polytechnique de Montréal (Canada); **Stefan Nolte,** Friedrich-Schiller-Univ. Jena (Germany)

Papers submitted to this conference by *graduate and undergraduate students* are eligible (both poster and oral papers considered). In order to ensure a fair evaluation, the conference chairs and the program committee will judge the students during this special student competition session. Here students will present a brief *5-minute summary* of their original talk or poster presented at the conference.

Following the student competition, the judges will meet and decide on the winner. The winner and runner-up will be announced at 9:30 am and awarded a *cash prize*.

Award Ceremony

Wed. 9:30 to 9:50 am

Session Chairs: **Alexander Heisterkamp,** Laser Zentrum Hannover e.V. (Germany); **Michel Meunier,** Ecole Polytechnique de Montréal (Canada); **Stefan Nolte,** Friedrich-Schiller-Univ. Jena (Germany)

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LASE Plenary Session

Wed. 10:20 am to 12:30 pm

Session Chairs: **Friedhelm Dorsch,** TRUMPF GmbH & Co. KG (Germany); **Alberto Piqué,** U.S. Naval Research Lab. (USA)

10:20 am: **Welcome and Opening Remarks,** Friedhelm Dorsch, TRUMPF GmbH & Co. KG (Germany); Alberto Piqué, U.S. Naval Research Lab. (USA)

10:25 am: **Announcement of the Green Photonics Award**, Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

10:30 am: **Plasmonics for Beam Shaping and Wavefront Engineering,** Federico Capasso, Harvard Univ. (USA)

11:10 am: **The National Ignition Facility and Progress Towards Inertial Fusion Ignition,** Edward I. Moses, Lawrence Livermore National Lab. (USA)

11:50 am: **Successful Technology Approach for Lasers in Manufacturing,** Peter Leibinger, TRUMPF GmbH & Co. KG (Germany)

See p. 16 for details.

Courses of Related Interest

SC746 Introduction to Ultrafast Technology (Trebino) Tuesday, 1:30 to 5:30 pm
SC1053 Ultrafast Laser Pulse Shaping and Adaptive Pulse Compression (Dantus) Tuesday, 1:30 to 5:30 pm
SC744 Ultrafast Fiber Lasers (Fermann) Sunday, 1:30 to 5:30 pm
SC818 Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

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Jet Propulsion Lab. (USA)

Micro/Nanofabrication

Devices/Applications/Reliability

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Micro/Nanofabrication					
			8248 **Micromachining and Microfabrication Process Technology XVII** *(Maher, Resnick)* p. 178		
			8249 **Advanced Fabrication Technologies for Micro/Nano Optics and Photonics V** *(Schoenfeld, Rumpf, von Freymann)* p. 179		
		8243 **Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XVII** *(Hennig, Xu, Gu, Nakata)* p. 163			
			8244 **Laser-based Micro- and Nanopackaging and Assembly VI** *(Bachmann, Pfleging, Washio)* p. 166		
Devices/Applications/Reliability					
		8250 **Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS and Nanodevices XI** *(García-Blanco, Ramesham)* p. 182			
		8251 **Microfluidics, BioMEMS, and Medical Microsystems X** *(Becker)* p. 184			
			8252 **MOEMS and Miniaturized Systems XI** *(Schenk, Piyawattanametha, Noell)* p. 186		
			8253 **MEMS Adaptive Optics VI** *(Olivier, Bifano, Kubby)* p. 188		
		8254 **Emerging Digital Micromirror Device Based Systems and Applications IV** *(Douglass, Oden)* p. 190			

Conference 8248

Tuesday-Thursday 24-26 January 2012 • Proceedings of SPIE Vol. 8248

Micromachining and Microfabrication Process Technology XVII

Conference Chairs: **Mary Ann Maher,** SoftMEMS (USA); **Paul J. Resnick,** Sandia National Labs. (USA)

Program Committee: **Mu Chiao,** The Univ. of British Columbia (Canada); **Sanjay Krishna,** The Univ. of New Mexico (USA); **Tamal Mukherjee,** Carnegie Mellon Univ. (USA); **Metin Ozen,** Ozen Engineering, Inc. (USA); **Yu-Chuan Su,** National Tsing Hua Univ. (Taiwan); **T. C. Yih,** Oakland Univ. (USA)

Tuesday 24 January

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Resolution enhancement of EHD printing using hole-type electrode, Seungmi Lee, Jaewon Chung, Korea Univ. (Korea, Republic of) . . . . . [8248-18]

Laser-based microstructuring of material surfaces using low-cost microlens arrays, Daniel Nieto, CIDETEC (Spain) and National Univ. of Ireland Galway (Ireland); Gemma Vara, Rubén Creo, Jose Antonio Diez, CIDETEC (Spain); Gerard M. O`Connor, National Univ. of Ireland Galway (Ireland) . . . . . [8248-19]

Thermopower of various phases and states of Si at high pressure, Vladimir V. Shchennikov, Institute of Metal Physics (Russian Federation); Vsevolod Shchennikov, Jr., Institute of Engineering Sciences (Russian Federation); Sergey Streltsov, Igor Korobeynikov, Institute of Metal Physics (Russian Federation); Sergey Ovsyannikov, Univ. Bayreuth (Germany). . . . . [8248-20]

Thursday 26 January

SESSION 1 . . . . . Thurs. 8:40 to 10:20 am

Devices and Applications

Session Chair: **Mary Ann Maher,** SoftMEMS (USA)

Optically transparent, flexible pressure sensor array micromachined utilizing plasma assisted bonding, John Yan, Univ. of California, Davis (USA) . . . . . [8248-01]

Rotary MEMS comb-drive actuator with large deflection for photonic applications, Quamrul Huda, Fahim Amin, Univ. of Alberta (Canada); Yuebin Ning, Graham McKinnon, Norcada Inc. (Canada); Alexandre Lytkine, John Tulip, Wolfgang Jaeger, Univ. of Alberta (Canada) . . . . . [8248-02]

A photovoltaic retinal prosthesis for restoring sight to the blind: fabrication and optoelectronic performance, Lele Wang, Stanford Univ. (USA); Keith Mathieson, Stanford Univ. (USA) and Univ of California, Santa Cruz (USA); Theodore Kamins, James Loudin, Ludwig Galambos, James Harris, Daniel Palanker, Stanford Univ. (USA) . . . . . [8248-03]

Micromachined edge illuminated optically transparent automotive light guide panels, Rahima Afrose Ronny, George K. Knopf, The Univ. of Western Ontario (Canada); Evgueni V. Bordatchev, Mohammed Tauhiduzzaman, Suwas Nikumb, National Research Council Canada (Canada). . . . . [8248-04]

New developments in ink jet technology by gas injection during printing, Norbert Fabre, Veronique Conedera, Fabien Mesnilgrente, Lab. d'Analyse et d'Architecture des Systèmes (France) . . . . . [8248-05]

Courses of Related Interest

SC689	Precision Laser Micromachining (Schaeffer) Wednesday, 1:30 to 5:30 pm
SC743	Micromachining with Femtosecond Lasers (Nolte, Schaffer) Monday, 1:30 to 5:30 pm
SC454	Fabrication Technologies for Micro- and Nano-Optics (Suleski) Monday, 8:30 am to 12:30 pm
SC532	Micro- and Nanofluidics - Technology and Applications (Gärtner) Wednesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

SESSION 2 . . . . . Thurs. 10:50 am to 12:10 pm

Microstructure Engineering

Session Chair: **Paul J. Resnick,** Sandia National Labs. (USA)

Fabrication of micro structures with continuous surface profiles and very large sag heights by laser lithography, Jens Dunkel, Frank Wippermann, Andreas Bräuer, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8248-06]

Design of experiment for the optimisation of deep reactive ion etching of silicon inserts for micro-fabrication, Kirsty Wallis, Jeffrey R. Alcock, Cranfield Univ. (United Kingdom) . . . . . [8248-07]

Impact of initial micro-geometry on the final roughness of laser micro-polished surfaces, Michael Chow, The Univ. of Western Ontario (Canada); Evgueni V. Bordatchev, National Research Council Canada (Canada); George K. Knopf, The Univ. of Western Ontario (Canada) . . . . . [8248-08]

Sidewall roughness reduction techniques for MOEMS following DRIE, Dmitry A. Kozak, Univ. of California, Santa Cruz (USA); Silviu Velicu, EPIR Technologies, Inc. (USA); Joel Kubby, Univ. of California, Santa Cruz (USA) . . . . . [8248-09]

Lunch/Exhibition Break . . . . . 12:10 to 1:40 pm

SESSION 3 . . . . . Thurs. 1:40 to 3:20 pm

Laser Processing

Session Chair: **Paul J. Resnick,** Sandia National Labs. (USA)

Fabrication of microchannels in fused silica with femtosecond laser irradiation and hybrid chemical etching process, Sara Lo Turco, Istituto Italiano di Tecnologia (Italy) and Politecnico di Milano (Italy); Roberto Osellame, Politecnico di Milano (Italy); Roberta Ramponi, Istituto di Fotonica e Nanotecnologie (Italy); Guglielmo Lanzani, Politecnico di Milano (Italy); Krishna C. Vishnubhatla, Istituto Italiano di Tecnologia (Italy) . . . . . [8248-10]

High aspect ratio microfeatures with laser texturing in mixed ablative-melting regime, Pablo Romero, Nerea Otero, Asociación de Investigación Metalúrgica del Noroeste (Spain) . . . . . [8248-11]

Molten pool temperature measurement in YAG laser ablation using pyrometer, Hamid Farrokhi, Nanyang Technological Univ. (Singapore); Junzhan Hou, Northwestern Polytechnical Univ. (China); Wei Zhou, Nanyang Technological Univ. (Singapore); Hong Yu Zheng, Zhongli Li, A*STAR Singapore Institute of Manufacturing Technology (Singapore) . . . . . [8248-12]

Direct laser writing of 3D micro/nanostructures on opaque surfaces, Mangirdas Malinauskas, Sima Rek?tyte, Albertas ?ukauskas, Roaldas Gadonas, Vilnius Univ. (Lithuania); Saulius Juodkazis, Swinburne Univ. of Technology (Australia). . . . . [8248-13]

Fabrication qualities of micro-gratings encoding depend on laser parameters by two-beam femtosecond lasers interference, Xianhua Wang, Feng Chen, Hewei Liu, Hao Bian, Qing Yang, Jinhai Si, Xun Hou, Xi'an Jiaotong Univ. (China) . . . . . [8248-14]

SESSION 4 . . . . . Thurs. 3:50 to 4:50 pm

MEMS Fabrication

Session Chair: **Mary Ann Maher,** SoftMEMS (USA)

Bosch-like method for creating high aspect ratio poly(methyl methacrylate) (PMMA) structures, Marius Haiducu, Ash M. Parameswaran, Simon Fraser Univ. (Canada). . . . . [8248-15]

Stress engineering for free-standing SU-8 thin film devices, Kyle W. Oliver, Sarah J. Lukes, Mohammad J. Moghimi, David L. Dickensheets, Montana State Univ. (USA) . . . . . [8248-16]

Modeling of hot imprint process of periodical microstructure in to polycarbonate, Rimvydas Gaidys, Birute Narijauskaite, Arvydas Palevicius, Giedrius Janusas, Kaunas Univ. of Technology (Lithuania) . . . . . [8248-17]

Conference 8249

Tuesday-Wednesday 24-25 January 2012 • Proceedings of SPIE Vol. 8249

Advanced Fabrication Technologies for Micro/Nano Optics and Photonics V

Conference Chairs: **Winston V. Schoenfeld,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Raymond C. Rumpf,** The Univ. of Texas at El Paso (USA); **Georg von Freymann,** Technische Univ. Kaiserslautern (Germany)

Program Committee: **Stefano Cabrini,** Lawrence Berkeley National Lab. (USA); **Aaron R. Hawkins,** Brigham Young Univ. (USA); **Babak Heidari,** OBDUCAT AB (Sweden); **Saulius Juodkazis,** Swinburne Univ. of Technology (Australia); **Shanalyn A. Kemme,** Sandia National Labs. (USA); **Ernst-Bernhard Kley,** Friedrich-Schiller-Univ. Jena (Germany); **Stephen M. Kuebler,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Dwayne L. LaBrake,** Molecular Imprints, Inc. (USA); **Akhlesh Lakhtakia,** The Pennsylvania State Univ. (USA); **Uriel Levy,** The Hebrew Univ. of Jerusalem (Israel); **Wen Liu,** Accelink Technologies Co., Ltd. (China); **Marko Loncar,** Harvard Univ. (USA); **Robert R. McLeod,** Univ. of Colorado at Boulder (USA); **Yosuke Mizuyama,** Panasonic Boston Lab. (USA); **Patrick P. Naulleau,** Lawrence Berkeley National Lab. (USA); **Mahesh Pitchumani,** Ostendo Technologies, Inc. (USA); **Menelaos K. Poutous,** The Univ. of North Carolina at Charlotte (USA); **Dennis W. Prather,** Univ. of Delaware (USA); **John A. Rogers,** Univ. of Illinois at Urbana-Champaign (USA); **Pradeep Srinivasan,** Intel Corp. (USA); **Thomas J. Suleski,** The Univ. of North Carolina at Charlotte (USA); **Jian Jim Wang,** OmniPV Inc. (USA); **Michael P. Watts,** Impattern Solutions (USA)

Tuesday 24 January

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Use of ALD thin film Bragg mirror stacks in tuneable visible light MEMS Fabry-Perot interferometers, Anna Rissanen, VTT Technical Research Ctr. of Finland (Finland); Riikka L. Puurunen, VTT Technical Research Ctr. of Finland (USA) . . . . . [8249-44]

Optical characterization of subwavelength-scale solid immersion lenses, Myun-Sik Kim, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Mohammad Tahdiul Haq, Montana State Univ. (USA); Wataru Nakagawa, Univ. of Neuchâtel (Switzerland); Toralf Scharf, Hans Peter Herzig, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8249-45]

Performance evaluation of direct laser lithographic system for rotationally symmetric diffractive optical elements, Dong-Ik Kim, Korea Basic Science Institute (Korea, Republic of); Hyug-Gyo Rhee, Korea Research Institute of Standards and Science (Korea, Republic of); Gun-Hee Kim, Korea Basic Science Institute (Korea, Republic of) . . . . . [8249-46]

Energy-dependent temperature dynamics in femtosecond laser microprocessing clarified by Raman temperature measurement, Tomoki Yoshino, Masato Matsumoto, Yasuyuki Ozeki, Kazuyoshi Itoh, Osaka Univ. (Japan) . . . . . [8249-47]

Effect of reactive monomer on PS-b-P2VP film with UV irradiation, Ho Joong Kim, Dong Myung Shin, Hongik Univ. (Korea, Republic of) . . . . . [8249-48]

Spectral tuning of IR-resonant nanoantennas by nanogap engineering, Thomas Härtling, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); Daniel Weber, Ruprecht-Karls-Univ. Heidelberg (Germany); Julia Katzmann, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); Frank F. Neubrech, Annemarie Pucci, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [8249-49]

Effects of electric fields on the photonic crystal formation from block copolymers, Taekun Lee, Jin-wook Ju, Won S. Ryoo, Hongik Univ. (Korea, Republic of) . . . . . [8249-50]

Laser-written photonic crystal optofluidics for electrochromatography on a chip, Moez Haque, Stephen Ho, Peter R. Herman, Univ. of Toronto (Canada) . . . . . [8249-51]

Plasmon enhanced optical photodiodes based on MEH-PPV polymer and fullerene blend on ITO, Fred Semendy, U.S. Army Research Lab. (USA) . . . . . [8249-52]

InAs QD light emitting diodes on in-situ nano-patterned substrates using molecular beam epitaxy, Dongsheng Fan, Jiang Wu, Univ. of Arkansas (USA); Zhiming M. Wang, Univ. of Arkansas (USA) and Univ. of Electronic Science and Technology of China (China); Shui-Qing Yu, Gregory J. Salamo, Univ. of Arkansas (USA) . . . . . [8249-53]

Using a dwell-time increase to compensate for SLM pixelation-limited diffraction efficiency in DMHL, Daniel R. McAdams, Daniel G. Cole, Univ. of Pittsburgh (USA) . . . . . [8249-54]

Controlling the nanofabrication of metal structures in direct laser writing using various chemistries, SeungYeon Kang, Kevin Vora, Shobha Shukla, Eric Mazur, Harvard Univ. (USA) . . . . . [8249-55]

Photoresist roughness characterization in additive lithography processes for the fabrica2tion of phase-only optical vortices, Zahra Hosseinimakarem, Zachary A. Roth, Menelaos K. Poutous, Eric G. Johnson, The Univ. of North Carolina at Charlotte (USA) . . . . . [8249-56]

Gallium nitride-based logpile photonic crystals for visible lighting (Oral Standby), Ganapathi S. Subramania, Qiming Li, Yun-Ju Lee, Jeffrey J. Figiel, George T. Wang, Arthur J. Fischer, Sandia National Labs. (USA) . . . . . [8249-57]

SESSION 1 . . . . . Tues. 8:00 to 10:00 am

STED Lithography Focus Session

Session Chair: **Georg von Freymann,** Nanoscribe GmbH (Germany)

Recent advances in RAPID lithography *(Invited Paper)*, John T. Fourkas, Michael P. Stocker, Univ. of Maryland, College Park (USA) . . . . . [8249-01]

Recent progress on diffraction-unlimited three-dimensional direct-laser-writing optical lithography *(Invited Paper)*, Martin Wegener, Joachim Fischer, Tolga Ergin, Karlsruher Institut für Technologie (Germany) . . . . . [8249-02]

Development of a two-color photo-initiation/inhibition lithography system, Gerrit L. Heuvelman, Heidelberg Instruments Mikrotechnik GmbH (Germany) . . . . . [8249-03]

Polymerization inhibition dynamics for high resolution lithography, Benjamin Harke, Paolo Bianchini, Fernando Brandi, Alberto Diaspro, Istituto Italiano di Tecnologia (Italy) . . . . . [8249-04]

Time-resolved experiments on diffraction-unlimited 3D laser lithography, Joachim Fischer, Thomas J. Wolf, Andreas-Neil Unterreiner, Martin Wegener, Karlsruher Institut für Technologie (Germany) . . . . . [8249-05]

SESSION 2 . . . . . Tues. 10:30 am to 12:30 pm

Laser-Based Fabrication I

Session Chair: **John T. Fourkas,** Univ. of Maryland, College Park (USA)

Nanophotonic laser direct fabrication *(Invited Paper)*, Min Gu, Swinburne Univ. of Technology (Australia) . . . . . [8249-06]

Towards visible-wavelength titania-based three-dimensional photonic-band-gap materials via direct laser writing, Andreas Frölich, Joachim Fischer, Thomas Zebrowski, Isabelle Staude, Kurt Busch, Martin Wegener, Karlsruher Institut für Technologie (Germany) . . . . . [8249-07]

Scanning laser holographic lithography: toward flexible ultra-large-size 3D photonic crystal microsystems, Liang Yuan, Peter R. Herman, Univ. of Toronto (Canada). . . . . [8249-08]

Synthesis of super-dense phase of aluminum under extreme pressure and temperature conditions created by femtosecond laser pulses in sapphire *(Invited Paper)*, Vygantas Mizeikis, Shizuoka Univ. (Japan); Arturas Vailionis, Stanford Univ. (USA); Eugene G. Gamaly, The Australian National Univ. (Australia); Wenge Yang, Carnegie Institution (USA); Andrei V. Rode, The Australian National Univ. (Australia); Saulius Juodkazis, Swinburne Univ. of Technology (Australia) . . . . . [8249-09]

Effect of configuration of the microchannels fabricated by femtosecond laser micromachining on topological defects in confined liquid crystals, Krishna C. Vishnubhatla, Politecnico di Milano (Italy); Francesca Serra, Univ. degli Studi di Milano (Italy); Roberto Osellame, Giulio Cerullo, Politecnico di Milano (Italy); Roberto Cerbino, Marco Buscaglia, Tommaso Bellini, Univ. degli Studi di Milano (Italy) . . . . . [8249-10]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 3 . . . . . Tues. 1:30 to 3:30 pm

Micro and Nano Optics

Session Chair: **Thomas J. Suleski,**
The Univ. of North Carolina at Charlotte (USA)

High precision fabrication of polarization insensitive resonant subwavelength gratings, Robert R. Boye, David W. Peters, Joel R. Wendt, Jeffrey O. Stevens, Rick A. Kellogg, Sally Samora, Sandia National Labs. (USA) . . . . . [8249-11]

Monolithic fabrication and performance control of multilayered, polarization sensitive, guided-mode resonance filters, Menelaos K. Poutous, Indumathi Raghu Srimathi, Eric G. Johnson, The Univ. of North Carolina at Charlotte (USA) . . . . . [8249-12]

Ultra-fast diffractive optical micro-trap arrays for neutral atom quantum computing, Shanalyn A. Kemme, Gregory Brady, Robert S. Ellis, Joel R. Wendt, David W. Peters, Grant Biedermann, Tony R. Carter, Sally Samora, Sandia National Labs. (USA); Joshua Isaacs, Vladyslav Ivanov, Mark E. Saffman, Univ. of Wisconsin-Madison (USA). . . . . [8249-13]

Fabrication of uniform index material guided-mode resonance filters, Aaron J. Pung, Menelaos K. Poutous, Zachary A. Roth, Eric G. Johnson, The Univ. of North Carolina at Charlotte (USA); Raymond C. Rumpf, The Univ. of Texas at El Paso (USA) . . . . . [8249-14]

HSQ resist for replication stamp in polymers, Muhammad Rizwan Saleem, Petri A. Stenberg, Univ. of Eastern Finland (Finland); Muhammad Bilal Khan, Zaffar Muhammad Khan, National Univ. of Sciences and Technology (Pakistan); Seppo K. Honkanen, Aalto Univ. School of Electrical Engineering (Finland); Jari Turunen, Pasi Vahimaa, Univ. of Eastern Finland (Finland). . . . . [8249-15]

Spatially and spectrally varying guided mode resonant filter by modifying the waveguide layer, Zachary A. Roth, Menelaos K. Poutous, Eric G. Johnsons, The Univ. of North Carolina at Charlotte (USA) . . . . . [8249-16]

SESSION 4 . . . . . Tues. 4:00 to 6:10 pm

3D Lithography

Session Chair: **Menelaos K. Poutous,**
The Univ. of North Carolina at Charlotte (USA)

3D photonic band gap crystals: islands of tranquility in a fluctuating vacuum *(Invited Paper)*, Willem L. Vos, Univ. Twente (Netherlands) . . . [8249-17]

Adaptive amplitude filters for smaller feature sizes in direct laser writing, Erik H. Waller, Michael Renner, Georg von Freymann, Technische Univ. Kaiserslautern (Germany) . . . . . [8249-18]

Calorimetric study of fs-laser polymerizable sol-gel resists, Saulius Juodkazis, Swinburne Univ. of Technology (Australia); Junko Morikawa, Toshiyuki Suzuki, Tokyo Institute of Technology (Japan); Ricardas Buividas, Gediminas Gervinskas, Swinburne Univ. of Technology (Australia); Domas Paipulas, Mangirdas Malinauskas, Vilnius Univ. (Lithuania); Vygantas Mizeikis, Shizuoka Univ. (Japan); Toshimasa Hashimoto, Tokyo Institute of Technology (Japan). . . . . [8249-19]

3D inclined structures fabricated by prism assisted inclined UV lithography, Guomin Jiang, Sarfaraz Baig, Michael R. Wang, Univ. of Miami (USA) . [8249-20]

Active and adaptive optical methods for rapid fabrication of 3D photonic structures, Martin Booth, Univ. of Oxford (United Kingdom). . . . . [8249-21]

Material processing with 12 femtosecond picojoule laser pulses, Karsten König, Martin Licht, Martin H. Straub, Huijing Zang, Aisada Uchugonova, Univ. des Saarlandes (Germany) . . . . . [8249-22]

Wednesday 25 January

SESSION 5 . . . . . Wed. 8:00 to 9:50 am

Advanced Lithography I

Session Chair: **Raymond C. Rumpf,**
The Univ. of Texas at El Paso (USA)

Rolling mask nanolithography: the pathway to large area and low cost nanofabrication *(Invited Paper)*, Boris Kobrin, Edward S. Barnard, Mark L. Brongersma, Rolith, Inc. (USA); Moon-Kyu Kwak, L. Jay Guo, Univ. of Michigan (USA) . . . . . [8249-23]

Fabrication of 8-channel array single-mode waveguides via vacuum assisted microfluidics, Sarfaraz Baig, Guomin Jiang, Univ. of Miami (USA); Qunhui Sun, New Span Opto-Technology Inc. (USA); Michael R. Wang, Univ. of Miami (USA). . . . . [8249-24]

Sub-micrometer pattern generation by diffractive mask-aligner lithography, Uwe D. Zeitner, Lorenz Stuerzebecher, Torsten Harzendorf, Frank Fuchs, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8249-25]

Wafer scale fabrication of submicron chessboard gratings using phase masks in proximity lithography, Lorenz Stuerzebecher, Friedrich-Schiller-Univ. Jena (Germany); Torsten Harzendorf, Frank Fuchs, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Uwe D. Zeitner, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany). . . . . [8249-26]

Nano-scale multiple-axis photoelectron source using focused helium ion beam fabricated C-aperture nano-tip, Yao-Te Cheng, Yuzuru Takashima, Juan R. Maldonado, Stanford Univ. (USA); Chuong T. Huynh, Larry Scipioni, Carl Zeiss SMT Inc. (USA); Roger Fabian W. Pease, Lambertus Hesselink, Stanford Univ. (USA) . . . . . [8249-27]

SESSION 6 . . . . . Wed. 10:20 am to 12:20 pm

Photonic Device Fabrication

Session Chair: **Winston V. Schoenfeld,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Tuning of random rough surface statistics for optoelectronics, Vincent Brissonneau, Thales Optronique S.A. (France) and Institut Matériaux Microélectronique Nanosciences de Provence (France); Ludovic Escoubas, Institut Matériaux Microélectronique Nanosciences de Provence (France) and Aix Marseille Univ. (France); François Flory, Institut Matériaux Microélectronique Nanosciences de Provence (France) and Ecole Centrale Marseille (France); Gérard Berginc, Thales Optronique S.A. (France) . . . . . [8249-28]

High precision geometrical characterization and alignment of miniaturized optics, Josef Heinisch, Patrik Langehanenberg, TRIOPTICS GmbH (Germany) . . . . . [8249-29]

Photoresistor made by two single junctions between multiwalled carbon nanotubes, Raffaele Di Giacomo, Heinz C. Neitzert, Univ. degli Studi di Salerno (Italy); Christian Boit, Helmut Wegner, Technische Univ. Berlin (Germany) . . . . . [8249-30]

Programmed resist sidewall profiles using sub-resolution binary gray-scale masks for Si-photonics applications, Ofir Gan, Micron Israel (Israel); Paul C. Allen, Toppan Photomasks, Inc. (USA); Assia Barkai, Micron Israel (Israel); Peter D. Buck, Toppan Photomasks, Inc. (USA); Brid Connolly, Toppan Photomasks, Inc. (Germany); Harel Frish, Micron Israel (Israel); Massimiliano Pindo, Toppan Photomasks, Inc. (France) . . . . . [8249-31]

Fabrication of diffraction imaging elements for continued terahertz waves, Jianfeng Liu, Jinhui Gong, Kan Liu, Xinyu Zhang, Changsheng Xie, Huazhong Univ. of Science and Technology (China) . . . . . [8249-32]

Economic silicon nanowire fabrication using nano-crack lithography, Meng-Che Tsai, Po-Hsiang Chang, Yun-Chorng Chang, National Cheng Kung Univ. (Taiwan) . . . . . [8249-33]

Lunch/Exhibition Break . . . . . 12:20 to 1:50 pm

SESSION 7 . . . . . Wed. 1:50 to 3:40 pm

Laser-Based Fabrication II

Session Chair: **Shanalyn A. Kemme,** Sandia National Labs. (USA)

Three-dimensional Dip-in Laser Lithography (DiLL) *(Invited Paper)*, Michael Thiel, Julian Ott, Holger Fischer, Nanoscribe GmbH (Germany); Georg von Freymann, Nanoscribe GmbH (Germany) and Technische Univ. Kaiserslautern (Germany) . . . . . [8249-34]

Hybrid optics for three-dimensional microstructuring of polymers via direct laser writing, Frank Burmeister, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany); Uwe D. Zeitner, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8249-35]

Electro-optic effect in femtosecond laser written MZIs via microchannel electrodes, Jason C. Ng, Peter R. Herman, Li Qian, Univ. of Toronto (Canada) . . . . . [8249-36]

Generating high DOF light by using tapered hollow tube in a lithography system, Chun-Yen Chen, Yu-Hsun Lee, Chih-Jen Chien, Yuh-Yan Yu, National Taiwan Univ. (Taiwan); Chih-Kung Lee, National Taiwan Univ. (Taiwan) and Institute for Information Industry (Taiwan) . . . . . [8249-37]

Photonic crystal waveguide fabricated by a combination lithography of laser holography and focused ion beam deposition, Sungmo Ahn, Hanbit Kim, Sihan Kim, Heonsu Jeon, Seoul National Univ. (Korea, Republic of); Hyojin Kim, Korea Photonics Technology Institute (Korea, Republic of) . . . . . [8249-38]

SESSION 8 . . . . . Wed. 4:10 to 6:00 pm

Advanced Lithography II

Session Chair: **Michael Thiel,** Nanoscribe GmbH (Germany)

Dynamic membrane projection lithography *(Invited Paper)*, D. Bruce Burckel, Sandia National Labs. (USA) . . . . . [8249-39]

Fabrication of large arrays of plasmonic nanostructures via double casting, Joanne Lo, Sandia National Labs., California (USA); David A. Horsley, Univ. of California, Davis (USA); Jack L. Skinner, Sandia National Labs., California (USA) . . . . . [8249-40]

Selective electroless Ag coating of three dimensional SU-8 microstructures for metamaterials applications, Andrew A. Bettiol, Yuanjun Yan, National Univ. of Singapore (Singapore); Ee Jin Teo, Hendrix Tanoto, Jinghua Teng, A*STAR Institute of Materials Research and Engineering (Singapore) . . . . . [8249-41]

Exposure controlled projection lithography for microlens fabrication, Amit S. Jariwala, David W. Rosen, Georgia Institute of Technology (USA) . . . [8249-42]

Optical micro cavities fabricated using direct proton beam writing, Sudheer Vanga, Prashant Shuvan, National Univ. of Singapore (Singapore); Ee Jin Teo, A*STAR Institute of Materials Research and Engineering (Singapore); Andrew A. Bettiol, National Univ. of Singapore (Singapore) . . . . . [8249-43]

Courses of Related Interest

SC454	Fabrication Technologies for Micro- and Nano-Optics (Suleski) Monday, 8:30 am to 12:30 pm
SC689	Precision Laser Micromachining (Schaeffer) Wednesday, 1:30 to 5:30 pm
SC743	Micromachining with Femtosecond Lasers (Nolte, Schaffer) Monday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8250

Monday-Tuesday 23-24 January 2012 • Proceedings of SPIE Vol. 8250

Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS and Nanodevices XI

Conference Chairs: **Sonia M. García-Blanco,** Univ. Twente (Netherlands); **Rajeshuni Ramesham,** Jet Propulsion Lab. (USA)

Program Committee: **Paul Bierden,** Boston Micromachines Corp. (USA); **Christopher K. Harrison,** Schlumberger-Doll Research Ctr. (USA); **Allyson Hartzell,** Lilliputian Systems Inc. (USA); **Albert K. Henning,** NanoInk, Inc. (USA); **Maurice S. Karpman,** Draper Lab. (USA); **Kee-Keun Lee,** Ajou Univ. (Korea, Republic of); **Richard C. Kullberg,** Vacuum Energy, Inc. (USA); **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Tolga Tekin,** Technische Univ. Berlin (Germany); **Yanzhu Zhao,** Medtronic, Inc. (USA)

Cooperating Organization:

Fraunhofer IZM

Monday 23 January

MOEMS-MEMS Plenary Session

Mon. 9:00 am to 12:00 pm

Session Chairs: **Harald Schenk,** Fraunhofer Institute for Photonic Microsystems (Germany), **David L. Dickensheets,** Montana State Univ. (USA)

9:00 am: **Welcome and Announcement of MOEMS-MEMS Best Paper Award and Best Student Paper Award,** Harald Schenk, Fraunhofer Institute for Photonic Microsystems (Germany), David L. Dickensheets, Montana State Univ. (USA)

9:15 am: **Large-Scale Integration of Nanosystems,** Michael Roukes, California Institute of Technology

Coffee Break 10:00 to 10:30 am

10:30 am: **Powering the Wireless World with MEMS,** Samuel B. Schaevitz, Lilliputian Systems, Inc. (USA)

11:15 am: **New Optical, Acoustic, and Electrical Technologies for Developing World Diagnostics,** Jonathan Cooper, Univ. of Glasgow (United Kingdom)

For details see p. 18

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 1 . . . . . Mon. 1:30 to 3:10 pm

Reliability and Packaging

Session Chair: **Rajeshuni Ramesham,** Jet Propulsion Lab. (USA)

Assembly and interconnect formation in MEMS/MOEMS application, Hermann Oppermann, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) . . . . . [8250-01]

Effects of releasing process parameters and induced in-plane stress on MEMS yield, Patricia M. Nieva, Univ. of Waterloo (Canada) . . . . . [8250-02]

Optoelectronic properties and interfacial coating durability of CNT and ITO on PET substrates with nano- and hetero-structural aspects *(Invited Paper)*, Joung-Man Park, Gyeongsang National Univ. (Korea, Republic of) and The Univ. of Utah (USA); Dong-Jun Kwon, Zuo-Jia Wang, Ga-Young Gu, Gyeongsang National Univ. (Korea, Republic of); Lawrence K. DeVries, The Univ. of Utah (USA) . . . . . [8250-03]

Usage induced changes to surface topography and material properties in polysilicon MEMS electrothermal structures, Sahil Oak, Tim Dallas, Texas Tech Univ. (USA) . . . . . [8250-04]

High fill-factor polymer refractive microlens array fabricated by stamping replica technique, Minwoo Nam, Sang Sik Yang, Kee-Keun Lee, Ajou Univ. (Korea, Republic of) . . . . . [8250-05]

SESSION 2 . . . . . Mon. 4:00 to 5:00 pm

MEMS Testing I

Session Chair: **Sonia M. García-Blanco,** Univ. Twente (Netherlands)

Axial phase measurements of light interacting with microstructures *(Invited Paper)*, Myun-Sik Kim, Toralf Scharf, Hans Peter Herzig, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8250-06]

Non destructive static and dynamic MEMS characterization using supercontinuum scanning white light interferometry *(Invited Paper)*, Ville Heikkinen, Kalle Hanhijärvi, Juha Aaltonen, Univ. of Helsinki (Finland); Kestas Grigoras, Aalto Univ. School of Science and Technology (Finland); Ivan Kassamakov, Univ. of Helsinki (Finland); Sami Franssila, Aalto Univ. School of Science and Technology (Finland); Edward Haeggström, Univ. of Helsinki (Finland) . . . . . [8250-07]

Low coherence interferometry, spectroscopically resolved reflectance, and hyperspectral imaging methods for novel high resolution pressure sensors membrane thickness and MEMS metrology, Wojciech Walecki, Fanny Szondy, Peter Walecki, Sunrise Optical LLC (USA) . . . . . [8250-08]

Tuesday 24 January

SESSION 3 . . . . . Tues. 9:00 to 10:00 am

MEMS Testing II

Session Chair: **Sonia M. García-Blanco,** Univ. Twente (Netherlands)

Reliability of high I/O high density CCGA interconnect electronic packages under extreme temperatures, Rajeshuni Ramesham, Jet Propulsion Lab. (USA) . . . . . [8250-09]

Characterization of a flourocarbon SAM coated MEMS tribogauge, Ashwin Vijayasai, Tim E. Dallas, Ganapathy Sivakumar, Charlie Anderson, Richard Gale, Jr., Texas Tech Univ. (USA) . . . . . [8250-10]

Characterization of a nanocoating using a MEMS tribogauge, Ashwin Vijayasai, Tim E. Dallas, Ganapathy Sivakumar, Charlie Anderson, Richard Gale, Jr., Texas Tech Univ. (USA) . . . . . [8250-11]

SESSION 4 . . . . . Tues. 10:30 to 11:50 am

Special Session: Hot Industrial Topics in MEMS

Session Chair: **Rajeshuni Ramesham,** Jet Propulsion Lab. (USA)

Wide angle wafer level camera module for mobile applications, Jacques Bismuth, Mhamed Salmi, Nabil Khantouri, Zouhair Sbiaa, Nemotek Technologie (Morocco) . . . . . [8250-12]

Development of a new deformable mirror towards AO commercialization, Xingtao Wu, Microscale, Inc. (USA) . . . . . [8250-13]

MEMS deformable mirrors for laser applications, Michael A. Helmbrecht, Min He, Iris AO, Inc. (USA) . . . . . [8250-14]

Custom bolometric detector arrays: from MWIR to THz, Hubert Jerominek, Christine Alain, Alain Bergeron, INO (Canada) . . . . . [8250-15]

Lunch/Exhibition Break . . . . . 11:30 am to 1:30 pm

SESSION 5 . . . . . Tues. 1:30 to 3:30 pm

MEMS for Space

Joint Session with Conference 8252

Session Chair: **Sonia M. García-Blanco,** Univ. Twente (Netherlands)

MEMS technology for miniaturized space systems: needs, status and perspectives, Jian Guo, Eberhard Gill, Technische Univ. Delft (Netherlands) . . . . . [8250-16]

MOEMS devices designed and tested for astronomical instrumentation in space, Frederic Zamkotsian, Observatoire Astronomique de Marseille-Provence (France); Wilfried Noell, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8250-17]

Net flux sensors for the measurement of Mars surface radiation budget, Linh Ngo Phong, Alazzam Anas, Canadian Space Agency (Canada); Michael Daly, York Univ. (Canada); Francois Chateauneuf, INO (Canada) . . . . . [8252-08]

Large MEMS-based programmable reflective slit mask for multi-object spectroscopy fabricated using multiple wafer-level bonding, Michael D. Canonica, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Frederic Zamkotsian, Patrick Lanzoni, Observatoire Astronomique de Marseille-Provence (France); Wilfried Noell, Nico de Rooij, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8252-09]

Performance prediction and characterization of highly insulated microbolometers for space applications, Zhiqiang Xu, Canadian Space Agency (Canada) and INO (Canada); Linh Ngo Phong, Canadian Space Agency (Canada); Timothy Pope, INO (Canada) . . . . . [8250-18]

Courses of Related Interest

SC689 Precision Laser Micromachining (Schaeffer) Wednesday, 1:30 to 5:30 pm

SC743 Micromachining with Femtosecond Lasers (Nolte, Schaffer) Monday, 1:30 to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8251

Monday-Tuesday 23-24 January 2012 • Proceedings of SPIE Vol. 8251

Microfluidics, BioMEMS, and Medical Microsystems X

Conference Chair: **Holger Becker,** microfluidic ChipShop GmbH (Germany)

Conference Co-Chair: **Bonnie L. Gray,** Simon Fraser Univ. (Canada)

Program Committee: **Brian W. Anthony,** Massachusetts Institute of Technology (USA); **Bruce K. Gale,** The Univ. of Utah (USA); **Albert K. Henning,** NanoInk, Inc. (USA); **Yu-Cheng Lin,** National Cheng Kung Univ. (Taiwan); **Yuehe Lin,** Pacific Northwest National Lab. (USA); **Ciara K. O'Sullivan,** Univ. Rovira i Virgili (Spain); **Ian Papautsky,** Univ. of Cincinnati (USA); **Thomas Stieglitz,** Albert-Ludwigs-Univ. Freiburg (Germany); **Albert van den Berg,** Univ. Twente (Netherlands); **Wanjun Wang,** Louisiana State Univ. (USA); **Bernhard H. Weigl,** PATH (USA)

Monday 23 January

MOEMS-MEMS Plenary Session

Mon. 9:00 am to 12:00 pm

Session Chairs: **Harald Schenk,** Fraunhofer Institute for Photonic Microsystems (Germany), **David L. Dickensheets,** Montana State Univ. (USA)

9:00 am: **Welcome and Announcement of MOEMS-MEMS Best Paper Award and Best Student Paper Award,** Harald Schenk, Fraunhofer Institute for Photonic Microsystems (Germany), David L. Dickensheets, Montana State Univ. (USA)

9:15 am: **Large-Scale Integration of Nanosystems,** Michael Roukes, California Institute of Technology

Coffee Break 10:00 to 10:30 am

10:30 am: **Powering the Wireless World with MEMS,** Samuel B. Schaevitz, Lilliputian Systems, Inc. (USA)

11:15 am: **New Optical, Acoustic, and Electrical Technologies for Developing World Diagnostics,** Jonathan Cooper, Univ. of Glasgow (United Kingdom)

For details see p. 18

Lunch Break . . . . . 12:00 to 1:00 pm

SESSION 1 . . . . . Mon. 1:00 to 3:30 pm

Cell and Particle Based Systems

Session Chair: **Holger Becker,** microfluidic ChipShop GmbH (Germany)

Microfluidic cell culture systems with integrated sensors for drug screening *(Invited Paper)*, Karen C. Cheung, The Univ. of British Columbia (Canada) . . . . . [8251-01]

Optofluidic microdevice for algae size measurements and species classification, Allison Schaap, Yves Bellouard, Technische Univ. Eindhoven (Netherlands); Thomas Rohrlack, Norwegian Institute for Water Research (Norway) . . . . . [8251-02]

Probing the tumor microenvironment: collection and induction, James K. Williams, Michael R. Padgen, Univ. at Albany (USA); Frank Gertler, Massachusetts Institute of Technology (USA); Jeffrey Wyckoff, John Condeelis, Albert Einstein College of Medicine of Yeshiva Univ. (USA); James Castracane, College of Nanoscale Science & Engineering (USA) . . . . . [8251-03]

Mammosphere culture of cancer stem cells in a microfluidic device, Katayoon Saadin, Ian M. White, Univ. of Maryland, College Park (USA) [8251-04]

Fast self-assembly kinetics of alkanethiols on gold nano-particles via microfluidic localized surface plasmon resonance spectroscopy, Sasan Asiaei, Patricia M. Nieva, Matt Vijayan, Univ. of Waterloo (Canada) . . . . [8251-05]

Magnetic particle-based sample-prep and valveing in microfluidic devices, Richard Klemm, Nadine Hlawatsch, Thomas Hansen-Hagge, Holger Becker, Claudia Gärtner, microfluidic ChipShop GmbH (Germany). . . . . [8251-06]

A microfluidic device for studies of microrod flow dynamics, Yogeshwar N. Mishra, Cochin Univ. of Science & Technology (India); Oladiran A. John, Pontus Andersson, Jonas Einarsson, Bernhard Mehlig, Dag Hanstorp, Göteborg Univ. (Sweden) . . . . . [8251-07]

SESSION 2 . . . . . Mon. 4:00 to 5:30 pm

Medical and Diagnostic Applications

Session Chair: **Karen C. Cheung,** The Univ. of British Columbia (Canada)

Miniaturized neural interfaces and implants *(Invited Paper)*, Thomas Stieglitz, Albert-Ludwigs-Univ. Freiburg (Germany). . . . . [8251-08]

Integrated multi-sensing optrode for neural stimulation and recording, Wei-Chuan Shih, Szu-Te Lin, Univ. of Houston (USA) . . . . . [8251-09]

Point-of-care, portable microfluidic blood analyzer system, Teimour Maleki, Purdue Univ. (USA); Meggie Grafton, Univ. of Michigan (USA); Michael D. Zordan, iCyt Mission Technology (USA); Alan Jones, Paul Todd, Techshot, Inc. (USA); James F. Leary, Purdue Univ. (USA) . . . . . [8251-10]

A lab-on-a-chip system for the development of complex assays using modular microfluidic components, Cornelia Carstens, Nadine Hlawatsch, Holger Becker, microfluidic ChipShop GmbH (Germany); Thomas Brandstetter, Albert-Ludwigs-Univ. Freiburg (Germany); Rudi Elbracht, Laborärztepraxis Elbracht u Carstens (Germany); Claudia Gärtner, microfluidic ChipShop GmbH (Germany) . . . . . [8251-11]

Panel Discussion. . . . . Mon. 5:40 to 7:00 pm

Prospects and Future of Microfluidics

Moderator: **Holger Becker,** microfluidic ChipShop GmbH (Germany)

The commercialization of microfluidic devices and systems is rapidly progressing. However not all promising approaches have become an economic success and investor's payback often has not met initial expectations. The discussion will look upon experiences made in the product development and market introduction phase of microfluidics enabled devices and will present lessons learned from various perspectives, from device performance to commercial organization. It tries to identify trends and will present case studies from different applications.

Tuesday 24 January

SESSION 3 . . . . . Tues. 8:20 to 10:00 am

Manufacturing Technologies

Session Chair: **Ian Papautsky,** Univ. of Cincinnati (USA)

Two-component injection molding for micofluidic devices, Holger Becker, Claudia Gärtner, microfluidic ChipShop GmbH (Germany). . . . . [8251-12]

Femtosecond laser written 3D optofluidic microsystems for capillary electrophoresis and cytometry, Stephen Ho, Moez Haque, James J. Dou, Lu Chen, Peter R. Herman, J. Stewart Aitchison, Univ. of Toronto (Canada) . . . . . [8251-13]

Automation of a work cell for polymer microdevice production: precise alignment and visual quality inspection, Nadege Zarrouati, Mines ParisTech (France); Xian Du, Brian W. Anthony, Massachusetts Institute of Technology (USA) . . . . . [8251-14]

Polymer micromolds with near optical quality surface finishes, Pun-Pang Shiu, National Research Council Canada (Canada); George K. Knopf, The Univ. of Western Ontario (Canada); Suwas Nikumb, National Research Council Canada (Canada). . . . . [8251-15]

Manufacturing for lab-on-chip devices: variation analysis of flow rate delivered using a blister pack, Sivesh Selvakumar, St. Jude Medical, Inc. (USA); Rodrigo A. Linares, Natel Energy, Inc. (USA); Aaron Oppenheimer, Daktari Diagnostics, Inc. (USA); Brian W. Anthony, Massachusetts Institute of Technology (USA) . . . . . [8251-16]

SESSION 4 . . . . . Tues. 10:30 to 11:50 am

Sensors and Devices

Session Chair: **Thomas Stieglitz,** Albert-Ludwigs-Univ. Freiburg (Germany)

A simple single-detector system for simultaneous monitoring of O_2 and CO_2 gas concentration, Rahul Dixit, Binghamton Univ. (USA); Li Shen, Mike Ratterman, Ian Papautsky, Univ. of Cincinnati (USA); David J. Klotzkin, Binghamton Univ. (USA) . . . . . [8251-17]

Lab-on-a-chip sensor for measuring Zn and Mn by stripping voltammetry, Xing Pei, Wenjing Kang, Wei Yue, William Heineman, Ian Papautsky, Univ. of Cincinnati (USA) . . . . . [8251-18]

Optical sensing for on-chip digital microfluidics, Jacqueline A. Nichols, Emily L. Landry, Brandon Born, Michael Wiltshire, Christopher M. Collier, Jonathan F. Holzman, UBC Okanagan (Canada) . . . . . [8251-19]

Fluorescence and bright-field on-chip imaging system for continuous growth monitoring and tracking of biological samples, Seung Ah Lee, Guoan Zheng, Changhuei Yang, California Institute of Technology (USA). . . . . [8251-20]

Lunch/Exhibition Break . . . . . 11:50 am to 1:20 pm

SESSION 5 . . . . . Tues. 1:20 to 3:00 pm

Devices and Systems I

Session Chair: **Bonnie L. Gray,** Simon Fraser Univ. (Canada)

Highly accurate measurement of varying drug dosage for real-time analysis of chemo-mechanical response of cardiomyocytes, Avneet Bajwa, Behraad Bahreyni, Ash M. Parameswaran, Simon Fraser Univ. (Canada) . . . . . [8251-21]

Optofluidic backplane as a platform for modular system design, Marko Brammer, Christof Megnin, Marius Siegfarth, Shukhrat Sobich, Karlsruher Institut für Technologie (Germany) and Bürkert Technology Ctr. (Germany); Dominik G. Rabus, Univ. of California, Santa Cruz (USA); Timo Mappes, Karlsruher Institut für Technologie (Germany). . . . . [8251-22]

Polymer micro-grippers with compliant force sensing for tensile testing of biological matter, Ruth E. Mackay, Univ. of Dundee (United Kingdom); Huirong R. Le, Univ. of Plymouth (United Kingdom); Steven Clark, Liang Zhang, Univ. of Dundee (United Kingdom) . . . . . [8251-23]

Hybrid membrane-microfluidic components using a novel ceramic MEMS technology, Brent J. Lutz, Oleg Polyakov, Synkera Technologies, Inc. (USA) . . . . . [8251-24]

3D nanoporous optofluidic device for high sensitivity SERS detection, Yazdi Soroush, Ian M. White, Univ. of Maryland, College Park (USA) . . . . . [8251-25]

SESSION 6 . . . . . Tues. 3:30 to 5:00 pm

Devices and Systems II

Session Chair: **Holger Becker,** microfluidic ChipShop GmbH (Germany)

Spiral inertial microfluidic devices for continuous blood cell separation *(Invited Paper)*, Nivedita Nivedita, Ian Papautsky, Univ. of Cincinnati (USA) . . . . . [8251-26]

Multiplexed fluorescence detection for point-of-care, Li Shen, Mike Ratterman, Tyler Stites, Univ. of Cincinnati (USA); David J. Klotzkin, Binghamton Univ. (USA); Ian Papautsky, Univ. of Cincinnati (USA) . . . . [8251-27]

An active micro-mixer based on low frequency switching transverse electro-osmotic flow using 3D-symmetric planar electrodes, Ziliang Cai, Guocheng Shao, Louisiana State Univ. (USA); Hongjun Song, CFD Research Corp. (USA); Wanjun Wang, Louisiana State Univ. (USA). . . . . [8251-28]

Study of multiple streamflows of dissimilar polymeric solutions and its mixing in microfluidic converging/diverging geometries, Hiong Yap Gan, A*STAR Singapore Institute of Manufacturing Technology (Singapore); Yee Cheong Lam, Nanyang Technological Univ. (Saint Kitts and Nevis) [8251-29]

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Nonspherical optofluidic lenses, Sergio Calixto-Carrera, Ctr. de Investigaciones en Óptica, A.C. (Mexico); Martha Rosete-Aguilar, Univ. Nacional Autónoma de México (Mexico); Margarita Calixto-Solano, Instituto Tecnológico y de Estudios Superiores de Monterrey (Mexico) . . . . . [8251-30]

Biochemical liquid analysis using a microfludic chip fabricated by femtosecond laser, Yasutaka Hanada, Koji Sugioka, Katsumi Midorikawa, RIKEN (Japan) . . . . . [8251-31]

PDMS-based optofluidic sensor integrated with pedestal ARROW waveguides, Murilo Z. Mielli, Daniel Orquiza de Carvalho, Marco I. Alayo, Marcelo N. P. Carreño, Escola Politecnica da Univ. de São Paulo (Brazil) . . . . . [8251-32]

Design and analysis of a micromachined gyroscope, John D. Jones, Nilgoon Zarei, Simon Fraser Univ. (Canada). . . . . [8251-33]

Design of a micro-interdigitated electrode for impedance measurement performance in a biochemical assay, Linda M. Donoghue, Brian W. Anthony, Massachusetts Institute of Technology (USA) . . . . . [8251-34]

Fabrication and testing of hydrogel-based microvalves for lab-on-a-chip applications, Ang Li, Bonnie Gray, Jonathan Lee, Paul Li, Simon Fraser Univ. (Canada) . . . . . [8251-35]

Robustness and repeatability of interdigitated electrodes on a substrate tested in an aqueous environment, Jacklyn A. Holmes, Brian W. Anthony, Massachusetts Institute of Technology (USA) . . . . . [8251-36]

Design of subretinal implants with MEMS, Muzaffer Akyurek, Selçuk Univ. (Turkey) . . . . . [8251-37]

Courses of Related Interest

SC532 Micro- and Nanofluidics - Technology and Applications (Gärtner) Wednesday, 8:30 am to 12:30 pm

See pages 294-330 for course and workshop details.

Conference 8252

Tuesday-Wednesday 24-25 January 2012 • Proceedings of SPIE Vol. 8252

MOEMS and Miniaturized Systems XI

Conference Chairs: **Harald Schenk,** Fraunhofer Institute for Photonic Microsystems (Germany); **Wibool Piyawattanametha,** NECTEC (Thailand); **Wilfried Noell,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Program Committee: **Susanne Arney,** Alcatel-Lucent Bell Labs. (USA); **Wyatt O. Davis,** Microvision, Inc. (USA); **David L. Dickensheets,** Montana State Univ. (USA); **Jean-Christophe Eloy,** Yole Développement (France); **Sonia M. García-Blanco,** Univ. Twente (Netherlands); **Jason C. Heikenfeld,** Univ. of Cincinnati (USA); **Yong-Hwa Park,** Samsung Advanced Institute of Technology (Korea, Republic of); **Jason B. Stewart,** MIT Lincoln Lab. (USA); **Wanjun Wang,** Louisiana State Univ. (USA)

Awards Sponsor: BRIDGER PHOTONICS

Tuesday 24 January

SESSION 1 . . . . . Tues. 8:20 am to 12:00 pm

Picoprojectors: Systems and Components

Joint Session with Conference 8254

Session Chairs: **Paul Rancuret,** Texas Instruments Inc. (USA); **Yong-Hwa Park,** Samsung Advanced Institute of Technology (Korea, Republic of)

Trajectory precision of micromachined scanning mirrors for laser beam scanning pico-projector displays *(Invited Paper)*, Wyatt O. Davis, Michael Beard, Robert Jackson, Microvision, Inc. (USA) . . . . . [8252-01]

MEMS-based micro projection system with a 1.5cc optical engine *(Invited Paper)*, Lucio Kilcher, Nicolas Abele, Lemoptix SA (Switzerland) . . . . . [8252-02]

Laser projector solution based on two 1D resonant micro scanning mirrors assembled in a low vertical distortion scan head, Jan Grahmann, Michael Wildenhain, Thomas Grasshoff, Hans-Georg Dallmann, Christian Gerwig, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Alexander Wolter, HiperScan GmbH (Germany); Harald Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [8252-03]

Network based multi-sensor optical 3D acquisition of complex structures *(Invited Paper)*, Gottfried J. Frankowski, Christian Benderoth, Rolf Hainich, GFMesstechnik GmbH (Germany) . . . . . [8254-01]

Speckle reduction for laser-illuminated picoprojectors *(Invited Paper)*, Fergal P. Shevlin, Dyoptyka Ltd. (Ireland) . . . . . [8252-04]

Optotune focus tunable lens and laser speckle reduction based on electroactive polymers *(Invited Paper)*, Manuel Aschwanden, Optotune AG (Switzerland) . . . . . [8252-05]

Superluminescent light emitting diodes - the best out of two worlds *(Invited Paper)*, Christian Vélez, Uwe Achatz, Marco Rossetti, Marcus Duelk, Jerome Napierala, Exalos AG (Switzerland) . . . . . [8252-06]

Bi-resonant scanning mirror with Piezo-resistive position sensor for WVGA laser projection systems, Christian Drabe, David Kallweit, André Dreyhaupt, Jan Grahmann, Harald Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Wyatt O. Davis, MicroVision, Inc. (USA) . . . . [8252-07]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 2 . . . . . Tues. 1:30 to 3:30 pm

MEMS for Space

Joint Session with Conference 8250

Session Chair: **Sonia M. García-Blanco,** Univ. Twente (Netherlands)

MEMS technology for miniaturized space systems: needs, status and perspectives, Jian Guo, Eberhard Gill, Technische Univ. Delft (Netherlands) . . . . . [8250-16]

MOEMS devices designed and tested for astronomical instrumentation in space, Frederic Zamkotsian, Observatoire Astronomique de Marseille-Provence (France); Wilfried Noell, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8250-17]

Net flux sensors for the measurement of Mars surface radiation budget, Linh Ngo Phong, Alazzam Anas, Canadian Space Agency (Canada); Michael Daly, York Univ. (Canada); Francois Chateauneuf, INO (Canada) . . . . . [8252-08]

Large MEMS-based programmable reflective slit mask for multi-object spectroscopy fabricated using multiple wafer-level bonding, Michael D. Canonica, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Frederic Zamkotsian, Patrick Lanzoni, Observatoire Astronomique de Marseille-Provence (France); Wilfried Noell, Nico de Rooij, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8252-09]

Performance prediction and characterization of highly insulated microbolometers for space applications, Zhiqiang Xu, Canadian Space Agency (Canada) and INO (Canada); Linh Ngo Phong, Canadian Space Agency (Canada); Timothy Pope, INO (Canada) . . . . . [8250-18]

SESSION 3 . . . . . Tues. 4:00 to 5:40 pm

Microspectrometer and Optical Filters

Session Chair: **Frederic Zamkotsian,** Observatoire Astronomique de Marseille-Provence (France)

Translatory MEMS actuator and their system integration for miniaturized Fourier transform spectrometers, Thilo Sandner, Thomas Grasshoff, Harald Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Andreas Kenda, Carinthian Tech Research AG (Austria) . . . . . [8252-10]

Advances in performance and miniaturization of a FT-IR spectrometer system based on a large stroke MOEMS piston mirror device, Andreas Kenda, Carinthian Tech Research AG (Austria); Thilo Sandner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Stephan Lüttjohann, Bruker Optik GmbH (Germany) . . . . . [8252-11]

Spectral imaging characterization of MOEM tunable Fabry-Perot filter, Neelam Gupta, U.S. Army Research Lab. (USA) . . . . . [8252-12]

Widely tunable 1D photonic crystal microcavity with integrated waveguides in silicon-on-insulator wafer, Renil M. Kumar, Prita Nair, Sri Sivasubramaniya Nadar College of Engineering (India) . . . . . [8252-13]

Modulator for a micro Mach-Zhender spectrometer, Armando G. Rojas Hernández, Alejandro Garcia-Juarez, Univ. de Sonora (Mexico) . . . . . [8252-14]

Wednesday 25 January

SESSION 4 . . . . . Wed. 8:10 to 10:00 am

MOEM Components and Systems I

Session Chair: **David L. Dickensheets,** Montana State Univ. (USA)

Shared shuttles for integrated silicon optoelectronics *(Invited Paper)*, Michael Hochberg, Univ. of Washington (USA). . . . . [8252-15]

One dimensional light modulator, Steffen Sinning, Ingo Wullinger, Ulrike Dauderstädt, Steffen Wolschke, Thomas Hughes, Mathias Krellmann, Michael Wagner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany). [8252-16]

Detection of resonant cantilevers using the evanescent fields of silicon nanophotonic waveguides, Vincent T. K. Sauer, National Institute for Nanotechnology (Canada); Zhu Diao, National Institute for Nanotechnology (Canada) and Univ. of Alberta (Canada); Mark R. Freeman, Wayne K. Hiebert, National Institute for Nanotechnology (Canada) . . . . . [8252-17]

Low voltage vertical flaps arrays as optical modulating elements for reflective display and switchable gratings, Fabio Jutzi, Wilfried Noell, Nico de Rooij, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8252-18]

Dynamically deformable reflective membrane for laser beam shaping and smoothing, Jonathan Masson, Roland Bitterli, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Andreas Bich, Suss MicroOptics SA (Switzerland); Wilfried Noell, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Reinhard Voelkel, Kenneth J. Weible, Suss MicroOptics SA (Switzerland); Nico F. de Rooij, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . [8252-19]

SESSION 5 . . . . . Wed. 10:30 to 11:30 am

MOEM Components and Systems II

Session Chair: **Wibool Piyawattanametha,**
National Electronics and Computer Technology Ctr. (Thailand)

Compact read head with MEMS focus control and spherical aberration correction for multi-layer optical disks, Sarah J. Lukes, David L. Dickensheets, Montana State Univ. (USA) . . . . . [8252-20]

Deformable mirror with controlled damping for fast focus tracking and scanning, Mohammad J. Moghimi, Krishna N. Chattergoon, Montana State Univ. (USA); Christopher R. Wilson, Bridger Photonics, Inc. (USA); David L. Dickensheets, Montana State Univ. (USA) . . . . . [8252-21]

Miniature non-mechanical zoom camera using deformable MOEMS mirrors, Brant M. Kaylor, Christopher R. Wilson, Nathan J. Greenfield, Peter A. Roos, Eric M. Seger, Bridger Photonics, Inc. (USA); Mohammad J. Moghimi, David L. Dickensheets, Montana State Univ. (USA) . . . . . [8252-22]

Lunch/Exhibition Break . . . . . 11:30 am to 1:00 pm

SESSION 6 . . . . . Wed. 1:00 to 2:20 pm

Micro Lenses and Micro Lens Arrays

Session Chair: **Jan Grahmann,**
Fraunhofer-Institut für Photonische Mikrosysteme (Germany)

Microelectrofluidic iris for variable aperture, Jong-hyeon Chang, Kyu-Dong Jung, Eunsung Lee, Minseog Choi, Seung Wan Lee, Samsung Advanced Institute of Technology (Korea, Republic of) . . . . . [8252-23]

Thin varifocal liquid lenses actuated below 10V for mobile phone cameras, Arnaud Pouydebasque, Sébastien Bolis, Fabrice Jacquet, Claudine Bridoux, Laëtitia Zavattoni, Sofiane Soulimane, Stéphane Moreau, Damien Saint-Patrice, Christophe Bouvier, Christophe Kopp, Stéphane Fanget, CEA-LETI (France) . . . . . [8252-24]

Novel resistive electrodes structure for liquid crystal modal lens shifting, Nicolas Fraval, Frédéric Berier, Evosens (France); Olivier Castany, TELECOM Bretagne (France) . . . . . [8252-25]

Modeling and simulation of the surface profile forming process for optimum control of the lithographically fabricated microlenses and lens arrays, Zhengyu Miao, Wanjun Wang, Louisiana State Univ. (USA) . . . [8252-26]

SESSION 7 . . . . . Wed. 2:25 to 4:35 pm

Microscanner

Session Chair: **Wyatt O. Davis,** MicroVision, Inc. (USA)

Optical position feedback for electrostatically driven MOEMS-scanners, Andreas Tortschanoff, Albert Frank, Carinthian Tech Research AG (Austria); Michael Wildenhain, Thilo Sandner, Harald Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Andreas Kenda, Carinthian Tech Research AG (Austria) . . . . . [8252-27]

Closed-loop control for quasi-static MOEMS mirrors, Andreas Tortschanoff, Dominik Holzmann, Martin Lenzhofer, Carinthian Tech Research AG (Austria) . . . . . [8252-28]

Vertical comb drive microscanners for beam steering, linear scanning and laser projection applications, Denis Jung, Thilo Sandner, David Kallweit, Thomas Grasshoff, Harald Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany). . . . . [8252-29]

A high-speed, bimodal, CMOS-MEMS resonant scanner driven by temperature-gradient actuators, Sergio Camacho-Leon, Instituto Tecnológico y de Estudios Superiores de Monterrey (Mexico); Peter J. Gilgunn, Carnegie Mellon Univ. (USA); Sergio O. Martinez-Chapa, Instituto Tecnológico y de Estudios Superiores de Monterrey (Mexico); Gary K. Fedder, Carnegie Mellon Univ. (USA) . . . . . [8252-30]

Self-sustained oscillation of MEMS-based micromirrors, Deepkishore Mukhopadhyay, Dario Antonio, Il Woong Jung, Daniel Lopez, Argonne National Lab. (USA) . . . . . [8252-31]

SESSION 8 . . . . . Wed. 4:40 to 6:10 pm

Imaging

Session Chair: **Wilfried Noell,**
Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Micro optical system based 3D imaging for full HD depth image capturing *(Invited Paper)*, Yong-Hwa Park, Yong-Chul Cho, Jang-Woo You, Chang-Young Park, Heesun Yoon, Sang-Hun Lee, Jong-Oh Kwon, Seung-Wan Lee, Samsung Advanced Institute of Technology (Korea, Republic of) . . . . . [8252-32]

Fabrication and characterization of wavelength selective microbolometers using a planar self-aligned process for low deformation membranes, Jong Yeon Park, Dean P. Neikirk, The Univ. of Texas at Austin (USA) . . [8252-33]

Microscopy using water droplets, Faqrul A. Chowdhury, Kenneth J. Chau, UBC Okanagan (Canada) . . . . . [8252-34]

Microbolometers, a market perspective, Eric Mounier, Yole Développement (France) . . . . . [8252-35]

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MEMS Adaptive Optics VI

Conference Chairs: **Scot S. Olivier,** Lawrence Livermore National Lab. (USA); **Thomas G. Bifano,** Boston Univ. (USA); **Joel Kubby,** Univ. of California, Santa Cruz (USA)

Program Committee: **William D. Cowan,** Sandia National Labs. (USA); **Christopher Dainty,** National Univ. of Ireland, Galway (Ireland); **Donald T. Gavel,** Univ. of California Observatories (USA); **Andreas Gehner,** Fraunhofer-Institut für Photonische Mikrosysteme (Germany); **Wen-Han Jiang,** Institute of Optics and Electronics (China); **Peter A. Kner,** The Univ. of Georgia (USA); **Alexis V. Kudryashov,** Moscow State Open Univ. (Russian Federation); **Sergio R. Restaino,** U.S. Naval Research Lab. (USA); **Ulrich Wittrock,** Fachhochschule Münster (Germany)

Tuesday 24 January

POSTERS-TUESDAY . . . . . Tues. 6:00 to 8:00 pm

Conference attendees are invited to attend the LASE & MOEMS-MEMS poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Aberration correction for improving the performance of a DMHL system, Daniel R. McAdams, Daniel G. Cole, Univ. of Pittsburgh (USA) . . . . . [8253-23]

Biomimetic accommodating lens with implementation in MEMS *(Oral Standby)*, Alexander Hogan, Brian Baker, The Univ. of Utah (USA); Charles Fisher, Utah Nanofab (USA); Stephen Naylor, The Univ. of Utah (USA); Doug Fettig, Aptina Imaging Corp. (USA); Ian R. Harvey, The Univ. of Utah (USA) . . . . . [8253-24]

Thursday 26 January

SESSION 1 . . . . . Thurs. 8:00 to 9:15 am

Astronomy

Session Chair: **Scot S. Olivier,** Lawrence Livermore National Lab. (USA)

MEMS adaptive optics in the Gemini Planet Imager *(Invited Paper)*, Bruce A. Macintosh, Lawrence Livermore National Lab. (USA). . . . . [8253-01]

Space-based planet detection concept using two MEMS DM's and a shaped pupil *(Invited Paper)*, N. Jeremy Kasdin, Tyler Groff, Alexis Carlotti, Princeton Univ. (USA) . . . . . [8253-02]

MEMS practice, from the lab to the telescope *(Invited Paper)*, Katie M. Morzinski, Don Gavel, Daren Dillon, Andrew P. Norton, Marc Reinig, Univ. of California, Santa Cruz (USA); Steven Cornelissen, Boston Micromachines Corp. (USA) . . . . . [8253-03]

SESSION 2 . . . . . Thurs. 9:15 to 10:30 am

Deformable Mirrors I

Session Chair: **Thomas G. Bifano,** Boston Univ. (USA)

Push-pull deformable mirror: characterization and close loop operations *(Invited Paper)*, Tommaso Occhipinti, Alberto Acciari, Adaptica S.r.l. (Italy); Stefano Bonora, Univ. degli Studi di Padova (Italy) and Adaptica S.r.l. (Italy); Ivan Capraro, Adaptica S.r.l. (Italy); Fabio Frassetto, Consiglio Nazionale delle Ricerche (Italy); Cosmo Trestino, Gianluigi Meneghini, Villi Scalzotto, Adaptica S.r.l. (Italy) . . . . . [8253-04]

Advances in MEMS deformable mirror development for astronomical adaptive optics *(Invited Paper)*, Steven Cornelissen, Boston Micromachines Corp. (USA); Thomas Bifano, Boston Univ. (USA) . . . . . [8253-05]

Development of high-order segmented MEMS deformable mirrors *(Invited Paper)*, Michael A. Helmbrecht, Min He, Iris AO, Inc. (USA). . . . [8253-06]

SESSION 3 . . . . . Thurs. 11:00 to 11:55 am

Deformable Mirrors II

Session Chair: **Thomas G. Bifano,** Boston Univ. (USA)

Large stroke actuators and mirror devices for ocular adaptive optics *(Invited Paper)*, Xingtao Wu, Haijiang Ou, Li Yao, Microscale, Inc. (USA)[8253-07]

Characterization of a miniaturized unimorph deformable mirror for high power CW-solid state lasers, Sven Verpoort, Peter Rausch, Ulrich Wittrock, Fachhochschule Münster (Germany) . . . . . [8253-08]

Novel hierarchically-dimensioned deformable mirrors with integrated ASIC driver electronics, Xingtao Wu, Haijiang Ou, Li Yao, Microscale, Inc. (USA) . . . . . [8253-09]

Lunch/Exhibition Break . . . . . 11:55 am to 1:00 pm

SESSION 4 . . . . . Thurs. 1:00 to 1:45 pm

Deformable Mirrors III

Session Chair: **Joel Kubby,** Univ. of California, Santa Cruz (USA)

Finite element modeling for a thin-shelled composite mirror for use with a MEMS active optical system, Christopher C. Wilcox, U.S. Naval Research Lab. (USA); Michael S. Baker, David V. Wick, Sandia National Labs. (USA); Robert Romeo, Robert Martin, Composite Mirror Applications, Inc. (USA); Brian Clark, Nicole L. Breivik, Brad Boyce, Sandia National Labs. (USA) . . . . . [8253-10]

Monolithic fabrication and packaging of gold MEMS deformable mirrors, Bautista R. Fernandez, Joel Kubby, Univ. of California, Santa Cruz (USA) . . . . . [8253-11]

Thermo-mechanical properties of a deformable mirror with screen printed actuator, Claudia Bruchmann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany); Michael Appelfelder, Erik Beckert, Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8253-12]

SESSION 5 . . . . . Thurs. 1:45 to 3:20 pm

Microscopy I

Session Chair: **Joel Kubby,** Univ. of California, Santa Cruz (USA)

Coherence-gated phase-shifting wavefront measurements *(Invited Paper)*, Tim van Werkhoven, Hans C. Gerritsen, Utrecht Univ. (Netherlands); Jacopo Antonello, Technische Univ. Delft (Netherlands); Rufus Fraanje, Technische Univ. Delft (Netherlands) and TNO Science and Industry (Netherlands); Michel Verhaegen, Technische Univ. Delft (Netherlands); Christoph Keller, Utrecht Univ. (Netherlands) . . . . . [8253-13]

Assessing correction accuracy in image-based adaptive optics, Delphine Débarre, Aurélie Facomprez, Emmanuel Beaurepaire, Ecole Polytechnique (France) . . . . . [8253-14]

Adaptive optics for biological microscopy using phase retrieval and phase diversity *(Invited Paper)*, Peter A. Kner, Benjamin Thomas, Andrew Herrington, The Univ. of Georgia (USA) . . . . . [8253-15]

Critical considerations of pupil alignment to achieve open-loop control of MEMS deformable mirror in nonlinear laser scanning fluorescence microscopy, Wei Sun, Wellman Ctr. for Photomedicine (USA) and Boston Univ. (USA) and Massachusetts General Hospital (USA); Yang Lu, Thomas G. Bifano, Boston Univ. (USA); Charles P. Lin, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA) and Massachusetts General Hospital (USA) . . . . . [8253-16]

Adaptive optics for high-resolution microscopy and three-dimensional photonic fabrication, Martin Booth, Univ. of Oxford (United Kingdom) [8253-17]

SESSION 6 . . . . . Thurs. 3:50 to 5:45 pm

Microscopy II

Session Chair: **Joel Kubby,** Univ. of California, Santa Cruz (USA)

Adaptive optics for biological light microscopy *(Invited Paper)*, Christopher D. Saunter, Cyril J. T. Bourgenot, John M. Girkin, Gordon D. Love, Jonathan M. Taylor, Durham Univ. (United Kingdom). . . . . [8253-18]

Improving spatial resolution in photoacoustic imaging with adaptive optics *(Invited Paper)*, Hao F. Zhang, Northwestern Univ. (USA); Shuliang Jiao, The Univ. of Southern California (USA) . . . . . [8253-19]

MEMS spatial light modulators for controlled optical transmission through nearly opaque materials, Thomas G. Bifano, Yang Lu, Christopher Stockbridge, Aaron Berliner, Boston Univ. (USA); Richard G. Paxman, Paxman Consulting (USA); Santosh Tripathi, Kimani C. Toussaint, Jr., Univ. of Illinois at Urbana Champaign (USA) . . . . . [8253-20]

Adaptive optics confocal microscopy using fluorescent protein guide-stars for brain tissue imaging *(Invited Paper)*, Xiaodong Tao, Oscar A. Azucena, Jr., Min Fu, Yi Zuo, Univ. of California, Santa Cruz (USA); Diana C. Chen, Lawrence Livermore National Lab. (USA); Joel Kubby, Univ. of California, Santa Cruz (USA) . . . . . [8253-21]

Adaptive optics applied to super resolution localization microscopy: the practical results *(Invited Paper)*, Jerome Ballesta, Imagine Optic Inc. (USA); Jordi Andilla, Xavier Levecq, Imagine Optic SA (France) . . . . . [8253-22]

Courses of Related Interest

MF109 8254 Emerging Digital Micromirror Device Based Systems and Applications IV

See pages 294-330 for course and workshop details.

Conference 8254

Monday-Wednesday 23-25 January 2012 • Proceedings of SPIE Vol. 8254

Emerging Digital Micromirror Device Based Systems and Applications IV

Conference Chairs: **Michael R. Douglass,** Texas Instruments Inc. (USA); **Patrick I. Oden,** Texas Instruments Inc. (USA)

Program Committee: **Michael F. Becker,** The Univ. of Texas at Austin (USA); **Jonathan T. Fong,** Texas Instruments Inc. (USA); **Roland Höfling,** ViALUX GmbH (Germany); **Alfred Jacobsen,** Visitech AS (USA); **Paul Rancuret,** Texas Instruments Inc. (USA); **Joseph P. Rice,** National Institute of Standards and Technology (USA); **Karel J. Zuzak,** Digital Light Innovations (USA)

Conference Cosponsor:

DLP TEXAS INSTRUMENTS

Monday 23 January

MOEMS-MEMS Plenary Session

Mon. 9:00 am to 12:00 pm

Session Chairs: **Harald Schenk,** Fraunhofer Institute for Photonic Microsystems (Germany), **David L. Dickensheets,** Montana State Univ. (USA)

9:00 am: **Welcome and Announcement of MOEMS-MEMS Best Paper Award and Best Student Paper Award,** Harald Schenk, Fraunhofer Institute for Photonic Microsystems (Germany), David L. Dickensheets, Montana State Univ. (USA)

9:15 am: **Large-Scale Integration of Nanosystems,** Michael Roukes, California Institute of Technology

Coffee Break 10:00 to 10:30 am

10:30 am: **Powering the Wireless World with MEMS,** Samuel B. Schaevitz, Lilliputian Systems, Inc. (USA)

11:15 am: **New Optical, Acoustic, and Electrical Technologies for Developing World Diagnostics,** Jonathan Cooper, Univ. of Glasgow (United Kingdom)

For details see p. 18

SESSION 1 . . . . . Mon. 3:40 to 5:20 pm

Biomedical Imaging and Cell Manipulation using a Digital Micromirror Device I

Joint Session with Conference 8225

Multivariate optical computing using a digital micromirror device for Raman and fluorescence spectroscopy, Zachary J. Smith, Sven Strombom, Sebastian Wachsmann-Hogiu, UC Davis Medical Ctr. (USA) . . . . . [8225-55]

Realization of an endoscope equipped with microprojection system for optogenetics, Ramin Pashaie, ... [8225-56]

Design and development of a wide-field structured illumination fluorescence imaging system for breast tumor margin assessment, Henry L. Fu, Nimmi Ramanujam, J. Quincy Brown, Duke Univ. (USA) . . [8225-57]

Investigation of in situ fluorescence optical detection based on a programmable spatial light modulator, Jong-ryul Choi, Kyujung Kim, Donghyun Kim, Yonsei Univ. (Korea, Republic of) . . . . . [8225-58]

Distributed light delivery system (DLDS) for optogenetics, Ramin Pashaie, Univ. of Wisconsin-Milwaukee (USA) . . . . . [8225-59]

Tuesday 24 January

SESSION 2 . . . . . Tues. 8:20 am to 12:00 pm

Picoprojectors: Systems and Components

Joint Session with Conference 8252

Session Chairs: **Paul Rancuret,** Texas Instruments Inc. (USA); **Yong-Hwa Park,** Samsung Advanced Institute of Technology (Korea, Republic of)

Trajectory precision of micromachined scanning mirrors for laser beam scanning pico-projector displays *(Invited Paper)*, Wyatt O. Davis, Michael Beard, Robert Jackson, Microvision, Inc. (USA) . . . . . [8252-01]

MEMS-based micro projection system with a 1.5cc optical engine *(Invited Paper)*, Lucio Kilcher, Nicolas Abele, Lemoptix SA (Switzerland) . . . . . [8252-02]

Laser projector solution based on two 1D resonant micro scanning mirrors assembled in a low vertical distortion scan head, Jan Grahmann, Michael Wildenhain, Thomas Grasshoff, Hans-Georg Dallmann, Christian Gerwig, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Alexander Wolter, HiperScan GmbH (Germany); Harald Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [8252-03]

Network based multi-sensor optical 3D acquisition of complex structures *(Invited Paper)*, Gottfried J. Frankowski, Christian Benderoth, Rolf Hainich, GFMesstechnik GmbH (Germany) . . . . . [8254-01]

Speckle reduction for laser-illuminated picoprojectors *(Invited Paper)*, Fergal P. Shevlin, Dyoptyka Ltd. (Ireland) . . . . . [8252-04]

Optotune focus tunable lens and laser speckle reduction based on electroactive polymers *(Invited Paper)*, Manuel Aschwanden, Optotune AG (Switzerland) . . . . . [8252-05]

Superluminescent light emitting diodes - the best out of two worlds *(Invited Paper)*, Christian Vélez, Uwe Achatz, Marco Rossetti, Marcus Duelk, Jerome Napierala, Exalos AG (Switzerland) . . . . . [8252-06]

Bi-resonant scanning mirror with Piezo-resistive position sensor for WVGA laser projection systems, Christian Drabe, David Kallweit, André Dreyhaupt, Jan Grahmann, Harald Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Wyatt O. Davis, MicroVision, Inc. (USA) . . . . [8252-07]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Tues. 1:30 to 3:10 pm

Biomedical Imaging and Cell Manipulation using a Digital Micromirror Device II

Joint Session with Conference 8225

Session Chairs: **Karel J. Zuzak,** Digital Light Innovations (USA); **James F. Leary,** Purdue Univ. (USA)

Hyperspectral imaging in the operating room: what a surgeon wants *(Invited Paper)*, Sara L. Best, Univ. of Wisconsin School of Medicine and Public Health (USA) . . . . . [8254-02]

Evaluation of a novel laparoscopic camera for characterization of renal ischemia in a porcine model using DLP® hyperspectral imaging *(Invited Paper)*, Ephrem O. Olweny, Sara L. Best, Neil Jackson, Eleanor F. Wehner, Samuel K. Park, Yung K. Tan, Abhas Thapa, Jeffrey A. Cadeddu, Karel J. Zuzak, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA). . . . . [8254-03]

Instrument validation and applications of a clinic-friendly spatial frequency domain imaging (SFDI) device, David J. Cuccia, Modulated Imaging, Inc. (USA) . . . . . [8254-04]

Advances in optical tomography using spatial frequency domain imaging, Soren D. Konecky, Tyler B. Rice, Alexander Lin, Amaan Mazhar, Rolf B. Saager, Beckman Laser Institute and Medical Clinic (USA); David J. Cuccia, Modulated Imaging, Inc. (USA); Anthony J. Durkin, Bernard Choi, Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic (USA). . . . . [8254-05]

SESSION 4 . . . . . Tues. 3:40 to 5:20 pm

Biomedical Imaging and Cell Manipulation using a Digital Micromirror Device III

Joint Session with Conference 8225

Session Chairs: **Michael R. Douglass,** Texas Instruments Inc. (USA); **James F. Leary,** Purdue Univ. (USA)

Digital micromirror device based confocal 4D-microscopy *(Invited Paper)*, Walter Neu, Markus Schellenberg, Fachhochschule Oldenburg/Ostfriesland/Wilhelmshaven (Germany). . . . . [8254-06]

A pico projector source for confocal fluorescence and ophthalmic imaging *(Invited Paper)*, Matthew Muller, Aeon Imaging, LLC (USA) . . . . . [8254-07]

Medical devices in dermatology using DLP® technology from Texas Instruments, Friedrich Lüllau, Lüllau Engineering GmbH (Germany). . . [8254-08]

Implementation of an LED based clinical Spatial Frequency Domain Imaging (SFDI) system, Amaan Mazhar, Seyed A. Sharif, Beckman Laser Institute and Medical Clinic (USA); Steve Saggesse, David J. Cuccia, Modulated Imaging, Inc. (USA); Bernard Choi, Anthony J. Durkin, Beckman Laser Institute and Medical Clinic (USA). . . . . [8254-09]

Wednesday 25 January

Welcome. . . . . Wed. 8:30 to 8:40 am

Michael R. Douglass and **Patrick I. Oden,** Texas Instruments Inc.

SESSION 5 . . . . . Wed. 8:40 to 9:40 am

Holographic Implementation

Session Chairs: **Patrick I. Oden,** Texas Instruments Inc. (USA); **Alfred Jacobsen,** Visitech AS (Germany)

Realtime 3D holographic display, Luigi Loreti, Opto-electronics s.r.l. (Italy) . . . . . [8254-10]

Suppression of the zero-order diffraction beam from computer-generated holograms using a DLP® spatial light modulator, Sih-Ying Wu, Jinyang Liang, Michael F. Becker, The Univ. of Texas at Austin (USA) . . . . . [8254-11]

Application of DMD device in lithography system for security holograms production, Eugene V. Braginets, Svitlana Honcharuk, Volodymyr Girnyk, Kievgolografia Ltd. (Ukraine) . . . . . [8254-12]

SESSION 6 . . . . . Wed. 9:40 to 10:00 am

Rapid Prototyping

Session Chairs: **Patrick I. Oden,** Texas Instruments Inc. (USA); **Alfred Jacobsen,** Visitech AS (Germany)

DLP based light engines for additive manufacturing of ceramic parts, Jurgen Stampfl, Simon Gruber, Ruth Felzmann, Gerald Mitteramskogler, Robert Liska, Technische Univ. Wien (Austria) . . . . . [8254-13]

SESSION 7 . . . . . Wed. 10:30 am to 12:00 pm

3D Measurement Systems Using Structured Light

Session Chairs: **Paul Rancuret,** Texas Instruments Inc. (USA); **Joseph P. Rice,** National Institute of Standards and Technology (USA)

Use of DMD projectors for 3D digitizing and measuring applications *(Invited Paper)*, Erik Klaas, Breuckmann GmbH (Germany); William J. Mongon, Accurex Measurement Inc. (USA) . . . . . [8254-14]

Face recognition via a projective compressive sensing system, Brant M. Kaylor, Charlie J. Keith, Peter A. Roos, Randy R. Reibel, Bridger Photonics, Inc. (USA) . . . . . [8254-15]

Hi-speed 3D measurement system using DMD-based projector for industrial applications, Yasumoto Mori, Keisuke Saito, Kenji Homma, Yasuhiro Ohnishi, Daisuke Mitsumoto, Masaki Suwa, OMRON Corp. (Japan). . . . . [8254-16]

Volumetric 3D display using a DLP projection engine, Jason Geng, Xigen, LLC (USA). . . . . [8254-17]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 8 . . . . . Wed. 1:30 to 2:10 pm

Advanced Display

Session Chairs: **Roland Höfling,** ViALUX GmbH (Germany); **Michael F. Becker,** The Univ. of Texas at Austin (USA)

Considerations for DMDs operating in the infrared, Julia Rentz Dupuis, David J. Mansur, James R. Engel, OPTRA, Inc. (USA) . . . . . [8254-18]

Full color, high contrast front projection on black emissive display, Ted Sun, Sun Innovations Inc. (USA); Greg Pettitt, Nguyen T. Ho, Kurt Eckles, Texas Instruments Inc. (USA); Ben Clifton, Planar Systems, Inc. (USA); Botao Cheng, Sun Innovations Inc. (USA). . . . . [8254-19]

SESSION 9 . . . . . Wed. 2:10 to 3:10 pm

Laser Beam Shaping

Session Chairs: **Michael F. Becker,** The Univ. of Texas at Austin (USA); **Roland Höfling,** ViALUX GmbH (Germany)

Multimode fiber-based high-power laser distribution using DLP technology, Adèle Morisset, Elodie Durbize, Bruno Chassagne, Christophe Pierre, Arnaud Zoubir, Sébastien Ermeneux, ALPhANOV (France). . . . . [8254-20]

Band-limited image projection using a DMD-based beam shaper, Jinyang Liang, Sih-Ying Wu, Rudolph N. Kohn, Michael F. Becker, Daniel J. Heinzen, The Univ. of Texas at Austin (USA) . . . . . [8254-21]

Application of DMD: laser speckle control for rough surface photofabrication, Vincent Brissonneau, Thales Optronique S.A. (France) and IM2NP (France); Ludovic Escoubas, Institut Matériaux Microélectronique Nanosciences de Provence (France) and Aix Marseille Univ. (France); François Flory, Institut Matériaux Microélectronique Nanosciences de Provence (France) and Ecole Centrale Marseille (France); Gérard Berginc, Thales Optronique S.A. (France) . . . . . [8254-22]

SESSION 10 . . . . . Wed. 3:40 to 5:00 pm

Dynamic Spectral Imaging and Attentuation

Session Chairs: **Jonathan T. Fong,** Texas Instruments Inc. (USA); **Karel J. Zuzak,** Digital Light Innovations (USA)

Study of a near infrared digital micromirror device-based snapshot spectral imaging system, Yuehao Wu, Iftekhar O. Mirza, Gonzalo R. Arce, Dennis W. Prather, Univ. of Delaware (USA) . . . . . [8254-23]

Flat spectral response all-digital broadband variable fiber-optic attenuator, Mumtaz A. Sheikh, Lahore Univ. of Management Sciences (Pakistan) . [8254-24]

Demonstrator of a multi-object spectrograph based on the 2048x1080 DMD, Frederic Zamkotsian, Observatoire Astronomique de Marseille-Provence (France); Paolo Spano, INAF - Osservatorio Astronomico di Brera (Italy); William Bon, Patrick Lanzoni, Observatoire Astronomique de Marseille-Provence (France) . . . . . [8254-25]

Hyperspectral image projector applications, Joseph P. Rice, National Institute of Standards and Technology (USA). . . . . [8254-26]

OPTO

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Liang-Chy Chien
Kent State Univ. (USA)

Optoelectronic Materials and Devices

Program Chair: **James G. Grote,** Air Force Research Lab. (USA)

Photonic Integration

Program Chair: **Yakov Sidorin,** Quarles Brady LLP (USA)

Nanotechnologies in Photonics

Program Chair: **Ali Adibi,** Georgia Institute of Technology (USA)

Advanced Quantum and Optoelectronic Applications

Program Chair: **Zameer Ul Hasan,** Temple Univ. (USA)

This program is current as of 12 September 2011 Online Info

Semiconductor Lasers and LEDs

Program Chair: **Klaus P. Streubel,** OSRAM GmbH (Germany)

Displays and Holography

Program Chair: **Liang-Chy Chien,** Kent State Univ. (USA)

Optical Communications: Devices to Systems

Program Chair: **Benjamin Dingel,** Nasfine Photonics, Inc. (USA)

Executive Organizing Committee

OPTO Daily Conference Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Optoelectronic Materials and Devices		Program Chair: **James G. Grote,** Air Force Research Lab. (USA)			
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		8256 **Physics, Simulation, and Photonic Engineering of Photovoltaic Devices** *(Freundlich, Guillemoles)* p. 201			
				8257 **Optical Components and Materials IX** *(Jiang, Digonnet, Dries)* p. 205	
		8258 **Organic Photonic Materials and Devices XIV** *(Tabor, Kajzar, Kaino, Koike)* p. 207			
	8260 **Ultrafast Phenomena and Nanophotonics XVI** *(Betz, Elezzabi, Song, Tsen)* p. 211				
				8261 **Terahertz Technology and Applications V** *(Sadwick, O'Sullivan)* p. 215	
		8262 **Gallium Nitride Materials and Devices VII** *(Chyi, Nanishi, Morkoç)* p. 217			
	8263 **Oxide-based Materials and Devices III** *(Teherani, Look, Rogers)* p. 221				
Photonic Integration		Program Chair: **Yakov Sidorin,** Quarles Brandy LLP (USA)			
	8259 **RF and Millimeter-Wave Photonics II** *(Nelson, Prather, Schuetz)* p. 210	8264 **Integrated Optics: Devices, Materials, and Technologies XVI** *(Broquin, Nunzi Conti)* p. 224			
				8265 **Optoelectronic Integrated Circuits XIV** *(Eldada, Lee)* p. 227	
	8266 **Silicon Photonics VII** *(Kubby, Reed)* p. 229				
		8267 **Optoelectronic Interconnects XII** *(Glebov, Chen)* p. 231			
Nanotechnologies in Photonics		Program Chair: **Ali Adibi,** Georgia Institute of Technology (USA)			
			8249 **Advanced Fabrication Technologies for Micro/Nano Optics and Photonics V** *(Schoenfeld, Rumpf, von Freymann)* p. 179		
	8268 **Quantum Sensing and Nanophotonic Devices IX** *(Razeghi)* p. 234				
		8269 **Photonic and Phononic Properties of Engineered Nanostructures II** *(Adibi, Lin, Scherer)* p. 239			
	8270 **High Contrast Metastructures** *(Chang-Hasnain, Koyama, Willner, Zhou)* p. 243				
			8271 **Quantum Dots and Nanostructures: Synthesis, Characterization, and Modeling IX** *(Eyink, Szmulowicz, Huffaker)* p. 245		

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			8271 **Quantum Dots and Nanostructures: Synthesis, Characterization, and Modeling IX** *(Eyink, Szmulowicz, Huffaker)* p. 245		
		8272 **Advances in Photonics of Quantum Computing, Memory, and Communication V** *(Hasan, Hemmer, Lee, Santori)* p. 247			
	8273 **Advances in Slow and Fast Light V** *(Shahriar, Narducci)* p. 250			8274 **Complex Light and Optical Forces VI** *(Galvez, Andrews, Glückstad)* p. 252	
				8275 **Laser Refrigeration of Solids V** *(Epstein, Sheik-Bahae)* p. 254	
Semiconductor Lasers and LEDs	Program Chair: **Klaus P. Streubel,** OSRAM GmbH (Germany)				
	8241 **High-Power Diode Laser Technology and Applications X** *(Zediker)* p. 159			8276 **Vertical-Cavity Surface-Emitting Lasers XVI** *(Lei, Choquette)* p. 255	
		8242 **Vertical External Cavity Surface Emitting Lasers (VECSELs) II** *(Tropper)* p. 261			
		8255 **Physics and Simulation of Optoelectronic Devices XX** *(Witzigmann, Osiński, Henneberger, Arakawa)* p. 197			
		8262 **Gallium Nitride Materials and Devices VII** *(Chyi, Nanishi, Morkoç)* p. 217			
		8277 **Novel In-Plane Semiconductor Lasers XI** *(Belyanin, Smowton)* p. 257			
			8278 **Light-Emitting Diodes: Materials, Devices, and Applications for Solid State Lighting XVI** *(Streubel, Jeon, Tu)* p. 261		
Displays and Holography	Program Chair: **Liang-Chy Chien,** Kent State Univ. (USA)				
	8279 **Emerging Liquid Crystal Technologies VII** *(Chien)* p. 264			8280 **Advances in Display Technologies II** *(Chien, Lee, Wu)* p. 267	
	8281 **Practical Holography XXVI: Materials and Applications** *(Bjelkhagen, Bove)* p. 269				

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	8266 **Silicon Photonics VII** *(Kubby, Reed)* p. 229				
		8267 **Optoelectronic Interconnects XII** *(Glebov, Chen)* p. 231			
			8282 **Broadband Access Communication Technologies VI** *(Dingel, Jain, Tsukamoto)* p. 271		
			8283 **Optical Metro Networks and Short-Haul Systems IV** *(Weiershausen, Dingel, Dutta, Srivastava)* p. 273		
			8284 **Next-Generation Optical Communication: Components, Sub-Systems, and Systems** *(Li, Jäger)* p. 276		

Conference 8255

Monday-Thursday 23-26 January 2012 • Proceedings of SPIE Vol. 8255

Physics and Simulation of Optoelectronic Devices XX

Conference Chairs: **Bernd Witzigmann,** Univ. Kassel (Germany); **Marek Osiński,** The Univ. of New Mexico (USA); **Fritz Henneberger,** Humboldt-Univ. zu Berlin (Germany); **Yasuhiko Arakawa,** The Univ. of Tokyo (Japan)

Program Committee: **Hiroshi Amano,** Nagoya Univ. (Japan); **Toshihiko Baba,** Yokohama National Univ. (Japan); **Weng W. Chow,** Sandia National Labs. (USA); **Shun Lien Chuang,** Univ. of Illinois at Urbana-Champaign (USA); **Aldo Di Carlo,** Univ. degli Studi di Roma Tor Vergata (Italy); **Silvano Donati,** Univ. degli Studi di Pavia (Italy); **Keiichi Edamatsu,** Tohoku Univ. (Japan); **Nicholas J. Ekins-Daukes,** Imperial College London (United Kingdom); **Shanhui Fan,** Stanford Univ. (USA); **Alexandre Freundlich,** Univ. of Houston (USA); **Stephan W. Koch,** Philipps-Univ. Marburg (Germany); **Vassillios I. Kovanis,** Air Force Research Lab. (USA); **Nikolay N. Ledentsov,** VI Systems GmbH (Germany); **Cun-Zheng Ning,** Arizona State Univ. (USA); **Joachim Piprek,** NUSOD Institute LLC (USA); **Ikuo Suemune,** Hokkaido Univ. (Japan)

Monday 23 January

SESSION 1 . . . . . Mon. 8:00 to 10:20 am

Spontaneous Two-Photon Emission from Semiconductors

Spontaneous two-photon emission from semiconductors and its prospect, Ikuo Suemune, Hokkaido Univ. (Japan) . . . . . [8255-01]

Applications of quantum photonics for communications and metrology *(Invited Paper)*, Alex Hayat, Ardavan Darabi, Lee A. Rozema, Dylan Mahler, Yasaman Soudagar, Xingxing Xing, Amir Feizpour, Aephraim M. Steinberg, Univ. of Toronto (Canada) . . . . . [8255-02]

Spontaneous two photon emission from a single quantum dot coupled to photonic crystal nanocavity *(Invited Paper)*, Yasutomo Ota, Satoshi Iwamoto, Naoto Kumagai, Yasuhiko Arakawa, The Univ. of Tokyo (Japan) . . . . . [8255-03]

Generation of a two-photon state from a quantum dot in a microcavity *(Invited Paper)*, Elena del Valle, Technische Univ. München (Germany) . [8255-04]

Two-photon emission process with Cooper-pair injection into semiconductors *(Invited Paper)*, Hirotaka Sasakura, Ikuo Suemune, Hidekazu Kumano, Claus Hermannstaedter, Hokkaido Univ. (Japan) . . . . . [8255-05]

SESSION 2 . . . . . Mon. 10:50 am to 12:20 pm

Laser Dynamics: Optical Injection

Frequency chirp stabilization in semiconductor distributed feedback lasers with external control *(Invited Paper)*, Frederic Grillot, Telecom ParisTech (France) and Univ. Européenne de Bretagne, INSA (France); Jean-Guy Provost, III-V Lab. (France); Khalil Kechaou, Bruno J. Thedrez, Didier Erasme, Telecom ParisTech (France). . . . . [8255-06]

Rate equation analysis of dynamic response in strongly injection-locked cascaded semiconductor microring lasers, Gennady A. Smolyakov, Marek Osinski, The Univ. of New Mexico (USA) . . . . . [8255-07]

Optical spectral analysis of the nonlinear dynamics in long-wavelength single-mode VCSELs subject to orthogonal optical injection, Angel Valle, Ana Quirce, Pablo Perez, Luis Pesquera, Univ. de Cantabria (Spain) . . [8255-08]

Dynamics of polarization switching in a 1550-nm VCSEL subject to single and double polarized optical injection, Antonio Hurtado, Ian D. Henning, Michael J. Adams, Univ. of Essex (United Kingdom) . . . . . [8255-09]

Lunch Break . . . . . 12:20 to 1:40 pm

SESSION 3 . . . . . Mon. 1:40 to 3:00 pm

Quantum Dot Devices

Free carrier effects in 1.3-μm quantum dot lasers leading to a negative differential gain, Hifsa Shahid, David T. D. Childs, Benjamin J. Stevens, Richard A. Hogg, The Univ. of Sheffield (United Kingdom). . . . . [8255-10]

Temperature effects on the characterization of new quantum dot dual mode lasers for terahertz generation, Bruno Gonzalez Izquierdo, Horacio Lamela Rivera, Univ. Carlos III de Madrid (Spain); Vitalii Sichkovskyi, Johann Peter Reithmaier, Univ. Kassel (Germany) . . . . . [8255-11]

Numerical simulation of nonlinear mode interactions in ridge-waveguide semiconductor lasers, HemaShilpa Kalagara, Petr G. Eliseev, Marek Osinski, The Univ. of New Mexico (USA) . . . . . [8255-12]

Hybrid quantum well/dot structures for broad spectral bandwidth devices, Siming C. Chen, Kejia J. Zhou, Ziyang Zhang, David T. D. Childs, Andrew J. Ramsay, Richard A. Hogg, The Univ. of Sheffield (United Kingdom) . . . [8255-13]

SESSION 4 . . . . . Mon. 3:30 to 5:20 pm

Light Emitting Diodes

Bandstructure influences on InGaN light-emitting diode efficiency *(Invited Paper)*, Weng W. Chow, Sandia National Labs. (USA) . . . . . [8255-14]

Computational study of white InGaN/GaN nanowire LEDs with continuously varied indium composition, Marcus Deppner, Friedhard Roemer, Bernd Witzigmann, Univ. Kassel (Germany) . . . . . [8255-15]

Enhancing the luminescence and efficiency of InGaN/GaN core-shell nanowire LEDs by numerical modelling, Friedhard Roemer, Marcus Deppner, Bernd Witzigmann, Univ. of Kassel (Germany) . . . . . [8255-16]

The effect of exciton dimensionality on resonance energy transfer: advances for organic color converters in hybrid inorganic/organic LEDs, Jan Junis Rindermann, Univ. of Southampton (United Kingdom); Galia R. Pozina, Bo Monemar, Lars Hultman, Linköping Univ. (Sweden); Hiroshi Amano, Nagoya Univ. (Japan); Pavlos G. Lagoudakis, Univ. of Southampton (United Kingdom) . . . . . [8255-17]

Optimizing software simulation of particulate down-converting phosphor blends for warm white high CRI LED illumination, Jonathan H. Melman, Intematix Corp. (USA); William J. Cassarly, Synopsys, Inc. (USA); Haitao Yang, Gang Wang, Intematix Corp. (USA); Thomas L. R. Davenport, Synopsys, Inc. (USA) . . . . . [8255-18]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 5 . . . . . Tues. 10:30 am to 12:10 pm

Electromagnetics I

Numerical method for precise simulation of optical modes in VCSELs, Sven Burger, Maria Rozova, Konrad-Zuse-Zentrum für Informationstechnik Berlin (Germany); Jan Pomplun, Frank Schmidt, JCMwave GmbH (Germany) [8255-19]

A meshless based solution to vectorial mode fields in optical microstructured waveguides, Daniel Burke, Tom J. Smy, Carleton Univ. (Canada) . . . . . [8255-20]

On the performance of numerical modeling for diffractive grating using couple mode theory, Dong-Xue Wang, OSRAM SYLVANIA Inc. (USA) [8255-21]

Choice of the perfectly matched layer boundary condition for iterative solvers of the frequency-domain Maxwell's equations, Wonseok Shin, Shanhui Fan, Stanford Univ. (USA) . . . . . [8255-22]

The light path tree algorithm for non-sequential field tracing, Michael Kuhn, LightTrans GmbH (Germany); Frank Wyrowski, Friedrich-Schiller-Univ. Jena (Germany); Christian Hellmann, LightTrans GmbH (Germany) . . . . . [8255-23]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 6 . . . . . Tues. 1:30 to 2:50 pm

Plasmonics

Fundamentals of excitation and resonance of a near-field transducer in the presence of a conductive magnetic recording medium, Jessica R. Piper, Paul Hansen, Lambertus Hesselink, Stanford Univ. (USA) . . . . . [8255-24]

Investigations of deterministic IR surface plasmon properties in doped zinc oxides, Justin W. Cleary, Michael Snure, Joshua Hendrickson, Air Force Research Lab. (USA); Robert E. Peale, Univ. of Central Florida (USA); Walter R. Buchwald, Solid State Scientific Corp. (USA) . . . . . [8255-25]

Dispersion analysis of subwavelength square apertures at optical frequencies, Eli Lansey, The City College of New York (USA); Jonah N. Gollub, Phoebus Optoelectronics, LLC (USA); David T. Crouse, The City College of New York (USA) . . . . . [8255-26]

Tunable surface plasmon band-gap in an index-perturbed double-electrode waveguide structure, Yanyan Zhou, A*STAR Singapore Institute of Manufacturing Technology (Singapore) . . . . . [8255-27]

SESSION 7 . . . . . Tues. 3:20 to 5:30 pm

Electromagnetics II

Metamaterials based on polaritonic composites for THz and mid-IR *(Invited Paper)*, Stavroula Foteinopoulou, The Univ. of Exeter (United Kingdom) . . . . . [8255-28]

Design of Bragg gratings having negative group time delay for continuum generation, Grigore Adrian Iordachescu, Joel Jacquet, Supélec (France) . . . . . [8255-29]

Two-way coupling conditions for the simulation of internal reflections in large 3D domains using finite elements, Matthias Wohlmuth, Barbara Wohlmuth, Technische Univ. München (Germany) . . . . . [8255-30]

Optimization of nanophotonic devices with adjoint FDTD, Paul Hansen, Yuxin Zheng, Lambertus Hesselink, Stanford Univ. (USA) . . . . . [8255-31]

Efficient 3D FDTD analysis of arbitrary birefringent and dichroic media with obliquely incident sources, Matthew N. Miskiewicz, Patrick T. Bowen, Michael J. Escuti, North Carolina State Univ. (USA) . . . . . [8255-32]

Scattered light by refracting and reflecting surfaces, Romuald Pawluczyk, Arash Rohani, P&P Optica Inc. (Canada) . . . . . [8255-33]

Wednesday 25 January

SESSION 8 . . . . . Wed. 8:00 to 10:10 am

Semiconductor Lasers

Advances in quantum dot lasers for silicon photonics application *(Invited Paper)*, Yasuhiko Arakawa, The Univ. of Tokyo (Japan) . . . . . [8255-34]

Realization of a photonic crystal surface emitting laser through GaAs based overgrowth, David Williams, Kristian M. Groom, David T. D. Childs, Benjamin J. Stevens, Salam Khamas, Tim Roberts, Richard Taylor, Richard Hogg, The Univ. of Sheffield (United Kingdom); Naoki Ikeda, Yoshimasa Sugimoto, National Institute for Materials Science (Japan) . . . . . [8255-35]

Thermo-optical simulation of high-power diode lasers, Jan Pomplun, JCMwave GmbH (Germany); Sven Burger, Zuse Institute Berlin (Germany); Lin Zschiedrich, JCMwave GmbH (Germany); Maria Rozova, Frank Schmidt, Zuse Institute Berlin (Germany); Hans Wenzel, Paul Crump, Hossein Ekhteraei, Christoph M. Schultz, Götz Erbert, Ferdinand-Braun-Institut (Germany) [8255-36]

Bending losses and modal properties of serpentine and bent waveguides, Fei-Hung Chu, HemaShilpa Kalagara, Emmanuel Mercado Sotelo, Gennady A. Smolyakov, The Univ. of New Mexico (USA); Aaron V. Gin, Sandia National Labs. (USA); Marek Osinski, The Univ. of New Mexico (USA) . . . . . [8255-37]

Thermally tunable DFB dual mode laser diode by an external platinum thin-film heater for THz generation, Horacio Lamela Rivera, Ehsan Dadrasnia, Univ. Carlos III de Madrid (Spain); Kamen Kozhuharov, Johann Peter Reithmaier, Univ. Kassel (Germany) . . . . . [8255-38]

Comparison of linewidth enhanancement factor for compressively strained AlGaInAs and InGaAsP quantum well lasers, Durga P. Sapkota, Koichi Wakita, Madhu S. Kayastha, Chubu Univ. (Japan) . . . . . [8255-39]

SESSION 9 . . . . . Wed. 10:40 am to 12:20 pm

Photovoltaics Simulation

The solar cell physics required to approach the Shockley-Queisser efficiency limit *(Invited Paper)*, Eli Yablonovitch, Univ. of California, Berkeley (USA) . . . . . [8255-40]

Semiconductor nanowire solar cells: high efficiency concepts, Bernd Witzigmann, Shuqing Yu, Univ. Kassel (Germany); Jan Kupec, ETH Zurich (Switzerland) . . . . . [8255-41]

Carrier dynamics and defects in MOVPE-grown bulk InGaAs layers with metamorphic InGaAs and InGaPSb buffer layers for solar cells, Yongkun Sin, Stephen LaLumondiere, Brendan Foran, William T. Lotshaw, Steven C. Moss, The Aerospace Corp. (USA); Tae Wan Kim, Jeremy Kirch, Steven Ruder, Luke J. Mawst, Thomas F. Kuech, Univ. of Wisconsin-Madison (USA) . [8255-42]

Silicon solar cell double-triangular nano-gratings, Ashton Ellaboudy, Xiaomin Jin, California Polytechnic State Univ., San Luis Obispo (USA) . . . . . [8255-43]

Lunch/Exhibition Break . . . . . 12:20 to 1:50 pm

SESSION 10 . . . . . Wed. 1:50 to 3:30 pm

Passive Optics

Using the finite element method in the analysis of micro-size SOI MMI couplers with asymmetric tapers, Ali A. Hussein, Graduate Student (Canada); Sawsan A. Majid, Research Associate (Canada); Trevor J. Hall, Univ. of Ottawa (Canada) and Canada Research Chair in Photonic Network Technology (Canada) and Univ. of London (United Kingdom) . . . . . [8255-44]

Multi-helix chiral fiber gratings, Shengxi Li, Ming Zhao, Yuzhen Qin, Qianpeng Zhang, Zhenyu Yang, Wuhan National Lab. for Optoelectronics (China) [8255-45]

Modeling of a 2×2 multimode interference switch for wider optical window operation, Ghanshyam Singh, Abhishek Goyal, Vijay Janyani, R. P. Yadav, Malaviya National Institute of Technology (India) . . . . . [8255-46]

Estimation of coupling power parameters of 1×3 directional fused fiber coupler, Dedi Irawan, Univ. Teknologi Malaysia (Malaysia); Toto Saktioto, Univ. of Riau (Indonesia); Jalil Ali, Univ. Teknologi Malaysia (Malaysia); Iwantono Iwantono, Univ. of Riau (Indonesia) . . . . . [8255-47]

Parametrization of optical constants of anisotropic materials, Daniel Franta, David Necas, Ivan Ohlídal, Masaryk Univ. (Czech Republic) . . . . . [8255-48]

SESSION 11 . . . . . Wed. 4:00 to 5:50 pm

Microcavities and VECSELs

From an exciton laser to a polariton laser in a ZnO microcavity *(Invited Paper)*, Thierry Guillet, Stéphane Faure, Meletios Mexis, Christelle Brimont, Thierry Bretagnon, Bernard Gil, Univ. Montpellier 2 (France) and Ctr. National de la Recherche Scientifique (France); Jesus Zuniga-Perez, Fabrice Semond, Mathieu L. Leroux, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France); Sophie Bouchoule, Ctr. National de la Recherche Scientifique (France); François Médard, Martine Mihailovic, Pierre Disseix, Joel Leymarie, Univ. Blaise Pascal (France) . . . . . [8255-49]

VECSEL action and strong exciton-photon coupling in all-monolythic ZnO-based microcavities, Fritz Henneberger, Simon Halm, Sascha Kalusniak, Sergey Sadofev, Humboldt-Univ. zu Berlin (Germany) . . . . . [8255-50]

Exciton-polaritons study in ZnO-based hybrid microcavities, Yu-Pin Lan, Tien-Chang Lu, Ying-Yu Lai, Si-Wei Huang, Jun-Rong Chen, Yung-Chi Wu, Shiang-Chi Lin, Shing-Chung Wang, Wen-Feng Hsieh, National Chiao Tung Univ. (Taiwan); Hui Deng, Univ. of Michigan (USA) . . . . . [8255-51]

Universality in the quantum to classical transition of the one-atom laser, Fabrice P. Laussy, Elena del Valle, Jonathan J. Finley, Technische Univ. München (Germany) . . . . . [8255-52]

Narrow band high transmission mode in nanocavity self-assembly structure, Young Uk Jung, The City College of New York (USA); Jonah N. Gollub, Phoebus Optoelectronics, LLC (USA); David T. Crouse, The City College of New York (USA). . . . . [8255-53]

POSTERS-WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Circularly helical metamaterials can be made circular polarizers: Is it possible for elliptically helical metamaterials to be elliptical polarizers?, Zhenyu Yang, Lin Wu, Ming Zhao, Wuhan National Lab. for Optoelectronics (China) . . . . . [8255-63]

Optimization of complex optical and optoelectronic systems using fundamental optical science and six sigma mathematics, Ronian H. Siew, Qioptiq Singapore Pte Ltd. (Singapore) . . . . . [8255-64]

Application of anti-reflection structures on curved surfaces, Kazuya Yamamoto, Nalux Co., Ltd. (Japan) . . . . . [8255-65]

A novel single-transistor APS with high fill factor, Xin-Yan Liu, Peng-Fei Wang, Xi Lin, Cheng-Wei Cao, Qing-Qing Sun, Wei D. Zhang, Fudan Univ. (China); Paul-Chang Lin, Yi-Jun Bian, Cheng Xing, Semiconductor Manufacturing International Corp. (China) . . . . . [8255-66]

Two-dimensional cell parameters measurement of a twisted nematic liquid crystal device by using imaging ellipsometer, Chien Chou, Chih-Jen Yu, Chang Gung Univ. (Taiwan); Yao-Teng Tseng, National Central Univ. (Taiwan); Kuei-Chu Hsu, Unice E-O services Inc. (Taiwan) . . . . . [8255-67]

Non-equilibrium QW populations and internal efficiency of polar and nonpolar III-nitride light emitters, Mikhail V. Kisin, Natalie DeMille, Hussein S. El-Ghoroury, Ostendo Technologies, Inc. (USA). . . . . [8255-68]

Linewidth influenced by phase modulation and frequency modulation in optical feedback diode laser, Hongying Wang, Xi'an Univ. of Arts and Science (China); Kang Li, Jungang Huang, Ray Chaney, Nigel J. Copner, Univ. of Glamorgan (United Kingdom) . . . . . [8255-69]

Effect of reversed polarization on characteristics of N-face InGaN/GaN p-i-n solar cells, Yen-Kuang Kuo, Jih-Yuan Chang, National Changhua Univ. of Education (Taiwan) . . . . . [8255-70]

Enhancement in carrier-collection efficiency of Ga-face InGaN/GaN p-i-n solar cells by polarization-reduced InGaN interlayer, Shu-Hsuan Chang, Jih-Yuan Chang, National Changhua Univ. of Education (Taiwan) . . . . . [8255-71]

The effects of temperature and stress on the spectrum broadening in high power semiconductor laser arrays, Pu Zhang, Xi'an Institute of Optics and Precision Mechanics (China); Jingwei Wang, Xi'an Focuslight Technologies Co., Ltd. (China); Lingling Xiong, Xi'an Institute of Optics and Precision Mechanics (China); Xiaoning Li, Xiaochen Ding, Xi'an Jiaotong Univ. (China); Zhenfu Wang, Xingsheng Liu, Xi'an Institute of Optics and Precision Mechanics (China) . . . . . [8255-72]

Optical 90° hybrids based on silicon-on-insulator multimode interference couplers, Tingting Hong, Wei Yang, Peking Univ. (China) . . . . . [8255-73]

Biaxial strain effects on the electronic band structure of wurtzite $In_xGa_{1-x}N$ alloys using first-principles calculations, Bo-Ting Liou, Hsiuping Institute of Technology (Taiwan); Bang-Yenn Wu, De Lin Institute of Technology (Taiwan) . . . . . [8255-74]

Fast random-number generation using a diode laser's frequency noise characteristic, Hiroki Takamori, Kohei Doi, Shinya Maehara, Kohei Kawakami, Takashi Sato, Masashi Ohkawa, Yasuo Ohdaira, Shuichi Sakamoto, Niigata Univ. (Japan) . . . . . [8255-75]

Oscillation wavelength shifts of vertical cavity surface emitting lasers exposed to magnetic fields, Yuki Yamagishi, Takashi Sato, Masashi Okawa, Shinichi Tabira, Niigata Univ. (Japan) . . . . . [8255-76]

Self-pulsation in two-section laser with an air gap, Chien Chung Lin, Chih Wei Lin, Hao Chung Kuo, National Chiao Tung Univ. (Taiwan). . . . . [8255-77]

Reduction of back scattered light in sub-wavelength apertures through coupled cavity effects, Amarachukwu Enemuo, David T. Crouse, The City College of New York (USA) . . . . . [8255-78]

A new approach for implementation of associative memory using volume holographic materials, Ramin Pashaie, Univ. of Wisconsin-Milwaukee (USA) . . . . . [8255-79]

Nonlinear pulse reshaping in passive optical fibers towards quasi-parabolic waveforms, Sergii O. Iakushev, Kharkov National Univ. of Radio Electronics (Ukraine); Igor A. Sukhoivanov, Univ. de Guanajuato (Mexico); Oleksiy V. Shulika, Kharkov National Univ. of Radio Electronics (Ukraine) . . . . . [8255-80]

Thermal and optical properties of both ridge and buried structures laser including waveguide layer, Joël Jacquet, Abdessamad Ou-Sair, Mickael Faugeron, Emeric Mercier, Jad Taki, Harmonie Sakala, Mathieu Jeanin, Thomas Molines, Supélec (France) . . . . . [8255-81]

Analysis of 1D photonic crystal microcavity sensor using surface plasmon resonance effect, Hong-Seung Kim, Tae-Kyeong Lee, Geum-Yoon Oh, Byeong-Hyeon Lee, Chung-Ang Univ. (Korea, Republic of); Doo-Gun Kim, Korea Photonics Technology Institute (Korea, Republic of); Young-Wan Choi, Chung-Ang Univ. (Korea, Republic of) . . . . . [8255-82]

Oscillation frequency stabilization and narrowing of a laser diode by using an external cavity, Minoru Iwahori, Kohei Doi, Hideaki Arai, Takashi Sato, Masashi Ohkawa, Yoshihiko Matsumoto, Niigata Univ. (Japan). . . . . [8255-83]

Graphene: an exciting two-dimensional material for science and technology, Saroj S. Hole, Shankar D. Hole, Yogita Deshmukh, Modern College (India). . . . . [8255-84]

Optical properties of Sm^{3+} ions in phosphate glasses modified with ZnF_2 and LiF, C. K. Jayasankar, N. Vijaya, Sri Venkateswara Univ. (India). . . [8255-85]

Polarization splitter based on a porous silicon waveguide, Yajun Liu, Xinjiang Univ. (China). . . . . [8255-86]

Geometric and material modeling environment for the finite-difference time-domain method, Yong-Gu Lee, Gwangju Institute of Science and Technology (Korea, Republic of) . . . . . [8255-87]

Thursday 26 January

SESSION 12 . . . . . Thurs. 8:00 to 10:10 am

Laser Dynamics: Modulation and Feedback

Novel modulation approaches for directly and electro-optically modulated vertical-cavity surface-emitting lasers *(Invited Paper)*, Jonathan D. Ingham, Zihad Qureshi, Michael J. Crisp, Richard V. Penty, Ian H. White, Univ. of Cambridge (United Kingdom); Petter Westbergh, Johan Gustavsson, Asa Haglund, Anders Larsson, Chalmers Univ. of Technology (Sweden); James A. Lott, Nikolay N. Ledentsov, VI Systems GmbH (Germany) . . . . . [8255-55]

Novel picosecond optical sources based on gain switched diode lasers and nonlinear pulse reshaping *(Invited Paper)*, Horacio Lamela, Cristina de Dios, Univ. Carlos III de Madrid (Spain) . . . . . [8255-56]

Delay differential equation-based modeling of passively mode-locked quantum dot lasers using measured gain and loss spectra, Ravi Raghunathan, Mark T. Crowley, The Univ. of New Mexico (USA); Frédéric Grillot, Univ. Européenne de Bretagne (France) and Institut TELECOM/Telecom Paristech (France); Vassilios I. Kovanis, Air Force Research Lab. (USA); Luke F. Lester, The Univ. of New Mexico (USA) . . . . . [8255-57]

THz wave generation using frequency stabilized laser diodes, Yasuhito Minamisawa, Tkashi Sato, Masashi Ohkawa, Kennji Nakano, Toshiya Nimonji, Niigata Univ. (Japan) . . . . . [8255-58]

Physics, design, and modeling of passive vertical cavity surface emitting lasers *(Invited Paper)*, Vitaly A. Shchukin, James A. Lott, Nikolay N. Ledentsov, VI Systems GmbH (Germany) . . . . . [8255-54]

SESSION 13 . . . . . Thurs. 10:40 am to 12:20 pm

Nonlinear Fibers and Laser Systems

Potentials and challenges for the optoelectronic oscillator *(Invited Paper)*, Weimin Zhou, Olukayode K. Okusaga, James Cahill, U.S. Army Research Lab. (USA); Andrew Docherty, Curtis R. Menyuk, Gary Cater, Univ. of Maryland, Baltimore County (USA); Moshe Horowitz, Technion-Israel Institute of Technology (Israel) . . . . . [8255-59]

System modeling of passive millimeter wave imager based on optical up-conversion *(Invited Paper)*, Shouyuan Shi, Univ. of Delaware (USA); Christopher A. Schuetz, Richard D. Martin, Thomas E. Dillon, Phase Sensitive Innovations, Inc. (USA); Peng Yao, Janusz Murakowski, Garrett J. Schneider, Dennis W. Prather, Univ. of Delaware (USA) . . . . . [8255-60]

Speckle noise reduction of a dual-frequency laser Doppler velocimeter based on an optically injected semiconductor laser, Chih-Hao Cheng, Jia-Wei Lee, Tze-Wei Lin, Fan-Yi Lin, National Tsing Hua Univ. (Taiwan) . . [8255-61]

Simulation of the evolution of spectrum-managed optical pulse propagation in active fibers with programmable gain spectral profile, Tianxin Yang, Zifei Wang, Delin Yang, Dongfang Jia, Mei Sang, Tianjin Univ. (China) . . . . . [8255-62]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8256

Monday-Thursday 23-26 January 2012 • Proceedings of SPIE Vol. 8256

Physics, Simulation, and Photonic Engineering of Photovoltaic Devices

Conference Chairs: **Alexandre Freundlich,** Univ. of Houston (USA); **Jean-Francois F. Guillemoles,** Institut de Recherche et Développement sur l'Energie Photovoltaïque (France)

Program Committee: **Harry A. Atwater,** California Institute of Technology (USA); **Sheila G. Bailey,** NASA Glenn Research Ctr. (USA); **Nicholas J. Ekins-Daukes,** Imperial College London (United Kingdom); **Christiana B. Honsberg,** Arizona State Univ. (USA); **Seth M. Hubbard,** Rochester Institute of Technology (USA); **Daniel Lincot,** Ecole Nationale Supérieure de Chimie de Paris (France); **Antonio Marti,** Univ. Politécnica de Madrid (Spain); **Marek Osinski,** The Univ. of New Mexico (USA); **Mike Scarpulla,** The Univ. of Utah (USA); **Masakazu Sugiyama,** The Univ. of Tokyo (Japan); **Robert J. Walters,** U.S. Naval Research Lab. (USA); **Peichen Yu,** National Chiao Tung Univ. (Taiwan)

Monday 23 January

SESSION 1 . . . . . Mon. 8:30 to 10:10 am

Advanced Light Management and Spectral Shaping

Session Chair: **Gavin J. Conibeer,**
The Univ. of New South Wales (Australia)

Increasing upconversion by metal and dielectric nanostructures *(Invited Paper)*, Jan Christoph Goldschmidt, Stefan Fischer, Heiko Steinkemper, Barbara Herter, Benedikt Bläsi, Fraunhofer-Institut für Solare Energiesysteme (Germany); Florian Hallermann, Gero von Plessen, RWTH Aachen (Germany); Karl W. Krämer, Daniel Biner, Univ. Bern (Switzerland); Martin Hermle, Fraunhofer-Institut für Solare Energiesysteme (Germany) . . . . . [8256-01]

Simulations of solar cell enhancement using whispering-gallery modes of dielectric nanospheres *(Invited Paper)*, Jonathan Grandidier, Dennis M. Callahan, Jr., Michael G. Deceglie, Jeremy N. Munday, Harry A. Atwater, California Institute of Technology (USA) . . . . . [8256-02]

Inverse design for enhanced light management in photovoltaic cells, Serena Faruque, Stanford Univ. (USA); Benjamin Armbruster, Northwestern Univ. (USA); Peter Peumans, IMEC (Belgium); Shanhui Fan, Mark L. Brongersma, Stanford Univ. (USA) . . . . . [8256-03]

Exact field solution to guided wave propagation in lossy thin films, James R. Nagel, Steve Blair, Michael Scarpulla, The Univ. of Utah (USA) . . . . . [8256-04]

SESSION 2 . . . . . Mon. 10:30 am to 12:10 pm

Photonic and Plasmonics Designs for Photovoltaics

Session Chair: **Nicholas J. Ekins-Daukes,**
Imperial College London (United Kingdom)

Plasmonic photovoltaics: combination of electromagnetic and carrier-transport modeling reveals performance windows for nanoplasmonics (Keynote Presentation), Stefan A. Maier, Imperial College London (United Kingdom) . . . . . [8256-05]

Plasmonic enhancement of up-conversion in ultrathin Y_2O_3:Er layers, Christian Andriamiadamanana, Jean-François Guillemoles, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France); Fabienne Pelle, Ecole Nationale Supérieure de Chimie de Paris (France); Stéphane S. Collin, Petru V. Ghenuche, Nathalie Bardou, Jean-Luc Pellouard, Ctr. National de la Recherche Scientifique (France); Alban Ferrier, Ecole Nationale Supérieure de Chimie de Paris (France); Laurent Lombez, Anne-Laure Joudrier, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France). . . [8256-06]

Improved efficiency for nanopillar array of c-Si photovoltaic by down-conversion and anti-reflection of quantum dots, Chien-chung Lin, Hsin-Chu Chen, H. W. Han, Y. L. Tsai, C. H. Chang, Min-An Tsai, Hao-Chung Kuo, Peichen Yu, National Chiao Tung Univ. (Taiwan) . . . . . [8256-07]

Scattering analysis of the indium-tin-oxide (ITO) nanowhiskers on ITO film substrate for a-Si solar cell, Hsiao-Wei Liu, Chia-Hua Chang, Cheng-Chung Lin, Peichen Yu, National Chiao Tung Univ. (Taiwan) . . . . . [8256-08]

Lunch Break . . . . . 12:10 to 1:30 am

SESSION 3 . . . . . Mon. 1:30 to 3:10 pm

Quantum Well and Superlattice Solar Cells

Session Chair: **Seth M. Hubbard,**
Rochester Institute of Technology (USA)

Improving photo-generated carrier escape in quantum well solar cells *(Invited Paper)*, Andenet Alemu, Alexandre Freundlich, Univ. of Houston (USA) . . . . . [8256-09]

Exploring the radiative limits of InGaAs quantum well solar cells *(Invited Paper)*, Roger E. Welser, Magnolia Solar, Inc. (USA) . . . . . [8256-10]

Exploring the potential of quantum wells for efficiency enhancement in photovoltaic cells, Masakazu Sugiyama, The Univ. ot Tokyo (Japan); Yunpeng Wang, Yu Wen, Kentaroh Watanabe, Yoshiaki Nakano, The Univ. of Tokyo (Japan) . . . . . [8256-11]

Minority carrier contacts for high efficiency tandem solar cells, Christiana B. Honsberg, Stephen M. Goodnick, Arizona State Univ. (USA) . . . . . [8256-12]

SESSION 4 . . . . . Mon. 3:30 to 5:00 pm

Quantum Dot Based Solar Cells

Session Chair: **Masakazu Sugiyama,** The Univ. of Tokyo (Japan)

Efficiency improvement of InAs/GaAs quantum dot solar cells through VOC loss mitigation *(Invited Paper)*, Christopher G. Bailey, David V. Forbes, Ryne P. Raffaelle, Seth M. Hubbard, Rochester Institute of Technology (USA). . [8256-13]

Photovoltaic properties of silicon quantum dots in dielectric matrices, Philipp Löper, Anke Witzky, Fraunhofer-Institut für Solare Energiesysteme (Germany); Andreas Hartel, Sebastian Gutsch, Daniel Hiller, Albert-Ludwigs-Univ. Freiburg (Germany); Jan Christoph Goldschmidt, Stefan Janz, Stefan W. Glunz, Fraunhofer-Institut für Solare Energiesysteme (Germany); Margit Zacharias, Albert-Ludwigs-Univ. Freiburg (Germany) . . . . . [8256-14]

Achieve more than 5% PbS quantum dot solar cells, Jianbo Gao, National Renewable Energy Lab. (USA); So-Hee Jeong, Korea Institute of Machinery and Materials (Korea, Republic of); Octavi E. Semonin, Joseph M. Luther, National Renewable Energy Lab. (USA); Randy J. Ellingson, The Univ. of Toledo (USA); Arthur J. Nozik, Matthew C. Beard, National Renewable Energy Lab. (USA) . . . . . [8256-15]

Numerical simulation of QD-intermediate band solar cells: effect of dot size on performance, Alexandre I. Fedoseyev, Timothy Bald, CFD Research Corp. (USA) . . . . . [8256-16]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 5 . . . . . Tues. 10:30 am to 12:10 pm

Novel Thin Film Materials and Devices

Session Chair: **Alexandre Freundlich,** Univ. of Houston (USA)

Screening of next-generation thin film PV absorbers from thousands of candidates (Keynote Presentation), Alex Zunger, Univ. of Colorado, Boulder (USA); Liping Yu, National Renewable Energy Lab. (USA) . . . . . [8256-17]

Thin Cu(In,Ga)Se $_2$ photovoltaic microcells: high efficiency with reduced material usage, Myriam Paire, Laurent Lombez, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) and Ctr. National de la Recherche Scientifique (France) and Ecole Nationale Supérieure de Chimie de Paris (France); Nicolas Péré-Laperne, Ctr. National de la Recherche Scientifique (France); Zacharie Jehl, Marie Jubault, Frédérique Donsanti, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) and Ctr. National de la Recherche Scientifique (France) and Ecole Nationale Supérieure de Chimie de Paris (France); Stéphane S. Collin, Alain Dollet, Jean-Luc Pelouard, Ctr. National de la Recherche Scientifique (France); Jean-François Guillemoles, Daniel Lincot, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) and Ctr. National de la Recherche Scientifique (France) and Ecole Nationale Supérieure de Chimie de Paris (France). . [8256-18]

Highly surface textured tin oxide thin films fabricated by nozzle spraying process in photovoltaic devices, Liwei Chou, Yangyi Lin, Alber T. Wu, National Central Univ. (Taiwan) . . . . . [8256-19]

Optimal optical designs for GaAs single-junction solar cells, Shi Liu, Ding Ding, Shane R. Johnson, Yong-Hang Zhang, Arizona State Univ. (USA) [8256-20]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 6 . . . . . Tues. 1:30 to 3:10 pm

Intermediate Band Solar Cells

Session Chair: **Antonio Marti,** Univ. Politécnica de Madrid (Spain)

Impurities versus quantum dots for the intermediate band solar cell *(Invited Paper)*, Elisa Antolín, Antonio Martí, Antonio Luque, Univ. Politécnica de Madrid (Spain) . . . . . [8256-21]

Demonstration of a multiband solar cell *(Invited Paper)*, Nair López Martínez, Lawrence Berkeley National Lab. (USA); Lothar A. Reichertz, Lawrence Berkeley National Lab. (USA) and RoseStreet Labs. Energy (USA); Kin Man Yu, Lawrence Berkeley National Lab. (USA); Kenneth Campman, Sumika Electronic Materials, Inc. (USA); Wladek Walukiewicz, Lawrence Berkeley National Lab. (USA) and RoseStreet Labs. Energy (USA) . . . . . [8256-22]

Device simulation of intermediate band solar cells, Katsuhisa Yoshida, Yoshitaka Okada, The Univ. of Tokyo (Japan); Nobuyuki Sano, Univ. of Tsukuba (Japan). . . . . [8256-23]

Detailed balance calculations for quantum dot intermediate band solar cells with realistic absorption coefficients, Alexander Mellor, Antonio Luque, Ignacio Tobías, Antonio Martí, Univ. Politécnica de Madrid (Spain) . . . . [8256-24]

SESSION 7 . . . . . Tues. 3:30 to 5:00 pm

Advanced Tandem Solar Cells

Session Chair: **David Wilt,** Air Force Research Lab. (USA)

Spectrum-optimized Si-based III-V multijunction photovoltaics *(Invited Paper)*, Steven A. Ringel, Tyler Grassman, Javier Grandal, Andrew Carlin, Christopher Ratcliff, Limei Yang, Michael Mills, The Ohio State Univ. (USA) . . . . . [8256-25]

Simulation of novel InAlAsSb solar cells, Matthew P. Lumb, U.S. Naval Research Lab. (USA) and George Washington Univ. (USA); Maria Gonzalez, Global Defense Technology & Systems, Inc. (USA); Igor Vurgaftman, Jerry R. Meyer, Joshua Abell, Michael K. Yakes, U.S. Naval Research Lab. (USA); Raymond Hoheisel, U.S. Naval Research Lab. (USA) and George Washington Univ. (USA); Joseph G. Tischler, Philip P. Jenkins, U.S. Naval Research Lab. (USA); Paul N. Stavrinou, Markus F. Fuhrer, Nicholas J. Ekins-Daukes, Imperial College London (United Kingdom); Robert J. Walters, U.S. Naval Research Lab. (USA) . . . . . [8256-26]

Two-dimensional modeling of CdZnTe/Si based dual and triple junction solar cells, Yegao Xiao, Zhiqiang Li, Michel Lestrade, Zhanming S. Li, Crosslight Software Inc. (Canada). . . . . [8256-27]

The Therdomymic Limits of Tandem Photovoltaic Devices with Intermediate Band, Jongwon Lee, Christiana B. Honsberg, Arizona State Univ. (USA) . . . . . [8256-28]

Wednesday 25 January

SESSION 8 . . . . . Wed. 8:30 to 10:10 am

Carrier Relaxations and Hot Carrier Solar Cells

Session Chair: **Christiana B. Honsberg,** Arizona State Univ. (USA)

Electron confinement and phonon effects in semiconductor quantum dots *(Invited Paper)*, Robson Ferreira, Ecole Normale Supérieure (France) . . [8256-29]

Modeling carrier relaxation in hot carrier solar cells *(Invited Paper)*, Stephen M. Goodnick, Christiana B. Honsberg, Arizona State Univ. (USA) . . . . . [8256-30]

InGaAs/GaAsP quantum wells for hot carrier solar cells, Louise C. Hirst, Markus Furher, Daniel J. Farrell, Imperial College London (United Kingdom); Arthur Le Bris, Jean-François Guillemoles, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France); Murad J. Y. Tayebjee, Raphael Clady, Timothy W. Schmidt, The Univ. of Sydney (Australia); Masakazu Sugiyama, Yunpeng Wang, The Univ. of Tokyo (Japan); Nicholas J. Ekins-Daukes, Imperial College London (United Kingdom) . . . . . [8256-31]

Anitmonide based heterostructures for hot carrier solar cells, Arthur Le Bris, Md. Mokerrobin Mannan, Laurent Lombez, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France); Philippe Christol, Guilhem Boissier, Jean-Philippe Perez, Univ. Montpellier 2 (France); Jean-François Guillemoles, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) . . . . . [8256-32]

SESSION 9 . . . . . Wed. 10:30 am to 12:10 pm

Nanostructures and Emerging Photovoltaic Approaches

Session Chair: **Jean-Francois Guillemoles,** Institut de Recherche et Développement sur l'Energie Photovoltaïque (France)

Third generation photovoltaics: high efficiency at low cost to drive large scale PV implementation (Keynote Presentation), Gavin J. Conibeer, The Univ. of New South Wales (Australia) . . . . . [8256-33]

Multiple exciton generation in PbSe nanorods, Paul D. Cunningham, U.S Naval Research Lab. (USA); Janice E. Boercker, Edward E. Foos, U.S. Naval Research Lab. (USA); Matthew P. Lumb, U.S. Naval Research Lab. (USA) and The George Washington Univ. (USA); Anthony R. Smith, Joseph G. Tischler, Joseph S. Melinger, U.S. Naval Research Lab. (USA) . . . . . [8256-34]

Recycling carrier thermalization losses for improving efficiency of dilute nitride multi quantum well solar cells, Gopi Krishna Vijaya, Andenet Alemu, Alexandre Freundlich, Univ. of Houston (USA) . . . . . [8256-35]

The use of nanostructures for meeting the terawatt photovoltaic challenge, Christiana B. Honsberg, Stephen M. Goodnick, Stuart G. Boweden, Arizona State Univ. (USA). . . . . [8256-36]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 10 . . . . . Wed. 1:30 to 3:10 pm

Advanced Device Characterization

Session Chair: **Steven Ringel,** The Ohio State Univ. (USA)

Spectroscopic ellipsometry: metrology for photovoltaics from the nano to the giga *(Invited Paper)*, Sylvain Marsillac, Old Dominion Univ. (USA); Robert W. Collins, Jr., The Univ. of Toledo (USA) . . . . . [8256-37]

Quantitative luminescence imaging of solar cells using hyperspectral imager *(Invited Paper)*, Amaury Delamarre, Laurent Lombez, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France); Brice Bourgoin, Marc Verhaegen, Photon etc. Inc. (France); Jean-Françoise Guillemoles, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) . . . . . [8256-38]

Spectroscopic analysis of InAs quantum dot solar cells, Stephen J. Polly, Christopher G. Bailey, Zachary S. Bittner, Yushuai Dai, Elias G. Fernandez, Seth M. Hubbard, Rochester Institute of Technology (USA) . . . . . [8256-39]

A novel method to eliminate the artifacts in external quantum efficiency measurements on multi-junction solar cell, Jing-Jing Li, Shi Liu, Swee H. Lim, Charles R. Allen, Yong-Hang Zhang, Arizona State Univ. (USA). . . [8256-40]

SESSION 11 . . . . . Wed. 3:30 to 5:00 pm

Advanced Light Concentration and Light Trapping for Photovoltaics

Session Chair: **Peichen Yu,** National Chiao Tung Univ. (Taiwan)

Toward high efficiency ultra-thin CIGSe based solar cells using light management techniques *(Invited Paper)*, Negar Naghavi, Zacharie Jehl, Frédérique Donsanti, Jean-François Guillemoles, Ecole Nationale Supérieure de Chimie de Paris (France); Isabelle Gérard, Arnaud Etcheberry, Muriel Bouttemy, Univ. de Versailles Saint-Quentin-en Yvelines (France); Jean-Luc Pelouard, Stéphane S. Collin, Clement Colin, Ctr. National de la Recherche Scientifique (France); Nir Dahan, Jean-Jacques Greffet, Institut d'Optique (France); Georg Voorwinden, Wuerth Elektronik Research GmbH (Germany); Micheal Powalla, Wuerth Elektronik Research GmbH (France); Daniel Lincot, Ecole Nationale Supérieure de Chimie de Paris (France) . . . . . [8256-41]

Trackfree planar solar concentrator system, Volker Zagolla, Christophe Moser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8256-42]

A cascadable circular concentrator with confocal structure for increasing the energy density, Nai-Lun Ku, Yi-Yung Chen, Jong-Woei A. Whang, National Taiwan Univ. of Science and Technology (Taiwan) . . . . . [8256-43]

Minimizing solar cell reflection loss through surface texturing and implementation of 1D and 2D subwavelength dielectric gratings, Wei Wang, Akhil Mehrotra, Andenet Alemu, Alex Freundlich, Univ. of Houston (USA) . . . . . [8256-44]

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Sub-ns luminescence lifetime measurements and imaging for characterization and quality control of thin film solar cells, Felix Koberling, Volker Buschmann, Peter Kapusta, Rainer Erdmann, Uwe Ortmann, PicoQuant GmbH (Germany). . . . . [8256-58]

Energy conversion materials for photovoltaic application, Madhab Pokhrel, Ajith K. Gangadharan, Dhiraj K. Sardar, The Univ. of Texas at San Antonio (USA) . . . . . [8256-59]

Low surface recombination velocity on p-type B-Si by atmosphere pressure metal-organic chemical vapor deposition grown aluminum oxide, Sheng Chun Hung, National Central Univ. (Taiwan); C. F. Lin, Chung-Yuan Christian Univ. (Taiwan); S. M. Lan, Chung Yuan Christian Univ. (Taiwan); T. N. Yang, Institute of Nuclear Energy Atomic Energy Council (Taiwan); Gou-Chung Chi, National Chiao Tung Univ. (Taiwan) . . . . . [8256-60]

Near-field optical beam induced current (NOBIC) characteristics of a GaAs solar cell with biomimetic antireflective structures, ChengYing Yang, MinAn Tsai, Peichen Yu, National Chiao Tung Univ. (Taiwan) . . . . . [8256-61]

Efficiency prediction and interface effects of organic/crystalline silicon hybrid solar cells, Bo-Yu Huang, Ting-Gang Chen, Peichen Yu, National Chiao Tung Univ. (Taiwan). . . . . [8256-62]

Theoretical study of solar cells based on a semiconductor with spatially varying band-gap, Bogdan S. Sokolovsky, Ivan Franko National Univ. of L'viv (Ukraine) . . . . . [8256-63]

Optimum concentration factor analysis using dynamic thermal model for a concentrated photovoltaic system, John T. Avrett, Air Force Institute of Technology (USA) . . . . . [8256-64]

First principle investigation of optoelectronic properties of (S-Ta)-doped TiO_2: an approach for solar energy harvesting, Shermin Arab, Roger K. Lake, Univ. of California, Riverside (USA) . . . . . [8256-65]

Analysis of radiation hardness and subcell I-V characteristics of GaInP/GaInAs/Ge solar cells using electroluminescence measurements, Raymond Hoheisel, George Washington Univ. (USA) . . . . . [8256-66]

Performance analysis of acid texturization for multi-crystalline silicon solar cells, Jyh-Jier J. Ho, Sheng-Shih Wang, National Taiwan Ocean Univ. (Taiwan); William J. Lee, Industrial Technology Research Institute (Taiwan); Jia-Show Ho, Kang L. Wang, Univ. of California, Los Angeles (USA) . . . . . [8256-67]

The role of Sb compositions on the properties of InAs/GaAsSb quantum dots, Keun-Yong Ban, Arizona State Univ. (USA); Stephen P. Bremner, The Univ.of New South Wales (Australia); Darius Kuciauskas, National Renewable Energy Lab. (USA); Som N. Dahal, Christiana B. Honsberg, Arizona State Univ. (USA) . . . . . [8256-68]

Numerical analysis of triangular micro-optical array for enhancement of incident power of photovoltaic panels, Rajat Dey, Evgueni V. Bordatchev, Mohammed Tauhiduzzaman, Hugo W. Reshef, National Research Council Canada (Canada). . . . . [8256-69]

Thursday 26 January

SESSION 12 . . . . . Thurs. 8:30 to 10:10 am

Epitaxy and Characterization of III-V Photovoltaic Materials

Session Chair: **Michael Scarpulla,** The Univ. of Utah (USA)

Interface quality enhancement of the epitaxial regrowth process for nipi photovoltaic devices, Michael A. Slocum, Rochester Institute of Technology (USA); Jeremiah S. McNatt, NASA Glenn Research Ctr. (USA); Christopher G. Bailey, Seth M. Hubbard, Rochester Institute of Technology (USA). . . . [8256-45]

Development of emerging III-V bismide semiconductors for photonics and optoelectronics, Mohamed Henini, The Univ. of Nottingham (United Kingdom) . . . . . [8256-46]

Characteristics of bulk InGaAsN and InGaAsSbN material grown by metal organic vapor phase epitaxy (MOVPE) for solar cell application, TaeWan Kim, Toby J. Garrod, Luke J. Mawst, Thomas F. Kuech, Univ. of Wisconsin-Madison (USA). . . . . [8256-47]

Dilute nitride GaInNAs and GaInNAsSb for solar cell applications, Siew Li Tan, Wai Mun Soong, The Univ. of Sheffield (United Kingdom); Matthew J. Steer, Univ. of Glasgow (United Kingdom); Shiyong Zhang, Jo Shien Ng, John P. David, The Univ. of Sheffield (United Kingdom) . . . . . [8256-48]

Intersubband and intrasubband transition in InGaN quantum dot for solar cell application, Kuang-Chung Wang, Yuh-Renn Wu, National Taiwan Univ. (Taiwan) . . . . . [8256-49]

SESSION 13 . . . . . Thurs. 10:30 am to 12:10 pm

Space Photovoltaics

Session Chair: **Robert J. Walters,** U.S. Naval Research Lab. (USA)

Advanced photovoltaic development at Air Force Research Laboratory (Keynote Presentation), David Wilt, Air Force Research Lab. (USA) . . [8256-50]

Modeling of defect-tolerant thin multi-junction solar cells for space application, Akhil Mehrotra, Andenet Alemu, Alexandre Freundlich, Univ. of Houston (USA). . . . . [8256-51]

Radiation effects on quantum dot enhanced solar cells, Christopher Kerestes, Seth M. Hubbard, Rochester Institute of Technology (USA) . [8256-52]

High efficiency laser power converters for space-based laser power transfer applications, Jayanta Mukherjee, Stephen Sweeney, Univ. of Surrey (United Kingdom); Matthew Perren, EADS Astrium (France) . . . . . [8256-53]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 14 . . . . . Thurs. 1:30 to 3:00 pm

Hybrid Photovoltaic Approaches

Session Chairs: **Alexandre Freundlich,** Univ. of Houston (USA); **Jean-Francois Guillemoles,** Institut de Recherche et Développement sur l'Energie Photovoltaïque (France)

Closing Remarks . . . . . Thurs. 3:00 to 3:05 pm

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Wednesday-Thursday 25-26 January 2012 • Proceedings of SPIE Vol. 8257

Optical Components and Materials IX

Conference Chairs: **Shibin Jiang,** AdValue Photonics, Inc. (USA); **Michel J. F. Digonnet,** Stanford Univ. (USA); **J. Christopher Dries,** United Silicon Carbide, Inc. (USA)

Program Committee: **Jean-Luc Adam,** Univ. de Rennes 1 (France); **Norman C. Anheier, Jr.,** Pacific Northwest National Lab. (USA); **Rolindes Balda,** Univ. del País Vasco (Spain); **Robert P. Dahlgren,** Silicon Valley Photonics, Ltd. (USA) and Univ. of California, Santa Cruz (USA); **Leonid B. Glebov,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Min Gu,** Swinburne Univ. of Technology (Australia); **Seppo K. Honkanen,** Aalto Univ. School of Science and Technology (Finland); **Lili Hu,** Shanghai Institute of Optics and Fine Mechanics (China); **Jacques Lucas,** Univ. de Rennes 1 (France); **Yasutake Ohishi,** Toyota Technological Institute (Japan); **Aydogan Ozcan,** Univ. of California, Los Angeles (USA); **Giancarlo C. Righini,** Istituto di Fisica Applicata Nello Carrara (Italy); **Feng Song,** Nankai Univ. (China); **Setsuhisa Tanabe,** Kyoto Univ. (Japan); **John M. Zavada,** National Science Foundation (USA)

Wednesday 25 January

SESSION 1 . . . . . Wed. 8:30 to 10:00 am

Material Spectroscopy I

SESSION 2 . . . . . Wed. 10:30 to 11:50 am

Material Spectroscopy II

Lunch/Exhibition Break . . . . . 11:50 am to 1:30 pm

SESSION 3 . . . . . Wed. 1:30 to 3:00 pm

Laser Materials

SESSION 4 . . . . . Wed. 3:30 to 5:20 pm

Microstructured Fibers

POSTERS-WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Structure light with laser speckle for object contour reconstruction, Ting-Xuan Hua, Cheng-Huan Chen, National Tsing Hua Univ. (Taiwan); Augustine Tsai, Institute for Information Industry (Taiwan) . . . . . [8257-42]

Nonlinear optical testing of electron beam sterilization results, Thomas Haertling, Manuela Reitzig, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); Anton Mayer, Gigatag GmbH (Germany); Christiane Wetzel, Fraunhofer-Institut für Elektronenstrahl- und Plasmatechnik (Germany); Olaf Röder, Jürgen Schreiber, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); Alexander Eychmüller, Technische Univ. Dresden (Germany); Jörg Opitz, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany) . . . . . [8257-43]

Low losses volume Bragg gratings recorded in photo-thermo-refractive glass, Leonid B. Glebov, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Larissa Glebova, OptiGrate Corp. (USA); Julien Lumeau, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Vadim Smirnov, OptiGrate Corp. (USA) . . . . . [8257-44]

All-fiber optical modulator, Vladimir I. Denisov, Natalya Koliada, Boris Nyushkov, Victor Pivtsov, Dmitriy Primakov, Institute of Laser Physics (Russian Federation) . . . . . [8257-45]

Optical humidity sensor using polypyrrole (PPy), Maria E. Armas Alvarado, Daniel Orquiza de Carvalho, Escola Politecnica da Univ. de São Paulo (Brazil); Gustavo P. Rehder, Jonas Gruber, Rosamaria W. C. Li, Univ. de São Paulo (Brazil); Marco I. Alayo Chávez, Escola Politecnica da Univ. de São Paulo (Brazil) . . . . . [8257-46]

Refractive-index insensitive long-period fiber gratings point-by-point inscribed by CO_2 laser for fiber sensors and lasers, Qun Han, Tianjin Univ. (China) and Missouri Univ. of Science and Technology (USA); Xinwei Lan, Jie Huang, Hai Xiao, Missouri Univ. of Science and Technology (USA) . . . . [8257-47]

Multi-element superconducting nanowire photon detector for photon-number resolution, Labao Zhang, Lin Kang, Jian Chen, Peiheng Wu, Nanjing Univ. (China) . . . . . [8257-49]

Time-of-flight 3D ranging through SPAD arrays with in-pixel time-to-digital conversion, Federica A. Villa, Bojan Markovic, Simone Bellisai, Politecnico di Milano (Italy); Simone Tisa, Micro Photon Devices S.r.l. (Italy); Franco Zappa, Politecnico di Milano (Italy) . . . . . [8257-50]

Impact of threading dislocation density on metamorphic $In_xGa_{1-x}As$ and $InzGa_{1-z}P$ p-i-n photodetectors on GaAs, Krishna Swaminathan, Tyler Grassman, Limei Yang, Michael Mills, Steven Ringel, The Ohio State Univ. (USA) . . . . . [8257-51]

Bend loss insensitive all-solid optical fiber, Luiz C. Barbosa, Enver F. Chillcce, Univ. Estadual de Campinas (Brazil). . . . . [8257-52]

Development of nanostructure based antireflection coatings for EO/IR sensor applications, Ashok K. Sood, Magnolia Optical Technologies, Inc. (USA); Roger E. Welser, Magnolia Solar, Inc. (USA); Nibir K. Dhar, Defense Advanced Research Projects Agency (USA). . . . . [8257-53]

Optical switch using polymer functionalized clad etched fiber Bragg grating, Shivananju B. Nanjunda, Gurusiddhappa R. Prashanth, Sundarrajan Asokan, Manoj M. Varma, Indian Institute of Science (India) . . . . . [8257-54]

Thursday 26 January

SESSION 5 . . . . . Thurs. 8:50 to 9:50 am

Fiber Lasers

The passively mode-locked and Q-switched operation in a fiber laser cavity with normal dispersion, Weiqing Gao, Meisong Liao, Xin Yan, Takenobu Suzuki, Yasutake Ohishi, Toyota Technological Institute (Japan). . . . . [8257-19]

Broad-band laser emission and optical mode-locking of a Fabry-Perot laser formed between two linearly chirped fiber Bragg gratings, Grigore Adrian Iordachescu, Xunqi Wu, Joel Jacquet, Supélec (France) . . . . . [8257-20]

Tunable and switchable multi-wavelength fiber laser based on semiconductor optical amplifier and twin-core photonic crystal fiber, Bongkyun Kim, Youngjoo Chung, Gwangju Institute of Science and Technology (Korea, Republic of). . . . . [8257-21]

SESSION 6 . . . . . Thurs. 10:30 to 11:50 am

Bragg Gratings

Recent developments in the fabrication of infrared fiber Bragg gratings, Lynda Busse, U.S. Naval Research Lab. (USA); Catalin Florea, Sotera Defense Solutions (USA); Brandon Shaw, Jas Sanghera, U.S. Naval Research Lab. (USA); Ishwar Aggarwal, Sotera Defense Solutions (USA) . . . . . [8257-22]

Temperature stability in silica based fiber Bragg gratings, Christopher W. Smelser, Stephen J. Mihailov, Dan Grobnic, Communications Research Ctr. Canada (Canada). . . . . [8257-23]

Single resonance monolithic Fabry-Perot filters formed by volume Bragg gratings and multilayer dielectric mirrors, Julien Lumeau, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Cihan Koc, Institut Fresnel (France); Oleksiy Mokhun, Vadim Smirnov, OptiGrate Corp. (USA); Michel Lequime, Institut Fresnel (France); Leonid B. Glebov, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8257-24]

High order mode long-period fiber grating refractive index sensor based on intensity measurement, Xinwei Lan, Missouri Univ. of Science and Technology (USA); Qun Han, Tianjin Univ. (China) and Missouri Univ. of Science and Technology (USA); Jie Huang, Xia Fang, Tao Wei, Zhan Gao, Hai Xiao, Missouri Univ. of Science and Technology (USA) . . . . . [8257-25]

Lunch/Exhibition Break . . . . . 11:50 am to 1:30 pm

SESSION 7 . . . . . Thurs. 1:30 to 3:10 pm

Optical Components I

Electro-adaptive multi-layer fluidic lens system of PDMS membranes, Hyunhwan Choi, Soo-a Yeo, Yong Hyub Won, KAIST (Korea, Republic of) . . . . . [8257-26]

Flexible fibre-addressable surface-plasmon-polariton chip, Faqrul A. Chowdhury, UBC Okanagan (Canada); Kenneth J. Chau, The Univ. of British Columbia (Canada) . . . . . [8257-27]

Optical attenuation across a metal grid, Michael M. Tilleman, Elbit Systems of America (USA) . . . . . [8257-28]

Laser fabrication of micro-optical components of hybrid polymers, Mangirdas Malinauskas, Albertas Žukauskas, Kristupas Tikuišis, Vytautas Purlys, Vilnius Univ. (Lithuania); Elmina Kabouraki, Stavros Pissadakis, Maria Farsari, Foundation for Research and Technology-Hellas (Greece); Roaldas Gadonas, Vilnius Univ. (Lithuania). . . . . [8257-29]

Numerical simulation of laser pulse propagation in rare-earth-doped materials, Karl W. Beeson, Evgueni Parilov, Mary Potasek, Simphotek Inc. (USA) . . . . . [8257-30]

SESSION 8 . . . . . Thurs. 3:40 to 5:20 pm

Optical Components II

Compact silica-on-silicon planar lightwave circuits for high speed optical signal processing, Claire L. Callender, Patrick Dumais, Chantal Blanchetiere, Sarkis Jacob, Christopher J. Ledderhof, Christopher W. Smelser, Communications Research Ctr. Canada (Canada); Ksenia Yadav, Jacques Albert, Carleton Univ. (Canada). . . . . [8257-31]

Influence of coating stress of diamond-like carbon coating on surface flatness of large germanium windows, Rao Yadagiri, Ronian Siew, Qioptiq Singapore Pte Ltd. (Singapore) . . . . . [8257-32]

Three-phase photoconductive elements for directional free-space optical sensing, Xian Jin, Daniel Guerrero, Jonathan F. Holzman, UBC Okanagan (Canada) . . . . . [8257-33]

Demonstration of all-optical two bit digital comparator using self-locked Fabry-Perot laser diode, Bikash Nakarmi, Mohammad Rakib-Uddin, Yong Hyub Won, KAIST (Korea, Republic of). . . . . [8257-34]

The focusing property of the spiral Fibonacci zone plate, HaiTao Dai, Tianjin Univ. (China); Yanjun Liu, A*STAR Institute of Materials Research and Engineering (Singapore); Xiaowei Sun, Tianjin Univ. (China). . . . . [8257-35]

Courses of Related Interest

SC931	Applied Nonlinear Frequency Conversion (Paschotta) Monday, 8:30 am to 5:30 pm
SC1060	Fundamentals of Nonlinear Optics (Powers) Sunday, 8:30 am to 12:30 pm
SC747	Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8258

Monday-Wednesday 23-25 January 2012 • Proceedings of SPIE Vol. 8258

Organic Photonic Materials and Devices XIV

Conference Chairs: **Christopher Tabor,** Air Force Research Lab. (USA); **François Kajzar,** Polytechnical Univ. of Bucharest (Romania); **Toshikuni Kaino,** Tohoku Univ. (Japan); **Yasuhiro Koike,** Keio Univ. (Japan)

Program Committee: **Chantal Andraud,** Ecole Normale Supérieure de Lyon (France); **Werner J. Blau,** Trinity College Dublin (Ireland); **Christoph Bubeck,** Max-Planck-Institut für Polymerforschung (Germany); **Fabrice Charra,** Commissariat à l'Énergie Atomique (France); **Darnell E. Diggs,** Air Force Research Lab. (USA); **Raluca Dinu,** GigOptix, Inc. (USA); **Alain F. Fort,** Institut de Physique et Chimie des Matériaux de Strasbourg (France); **James G. Grote,** Air Force Research Lab. (USA); **Frank Kenneth Hopkins,** Air Force Research Lab. (USA); **Alex K. Jen,** Univ. of Washington (USA); **Michael H. C. Jin,** The Univ. of Texas at Arlington (USA); **Eunkyoung Kim,** Yonsei Univ. (Korea, Republic of); **Jang-Joo Kim,** Seoul National Univ. (Korea, Republic of); **Nakjoong Kim,** Hanyang Univ. (Korea, Republic of); **Junya Kobayashi,** NTT Photonics Labs. (Japan); **Isabelle N. Ledoux-Rak,** École Normale Supérieure de Cachan (France); **Charles Y. C. Lee,** Air Force Office of Scientific Research (USA); **Kwang-Sup Lee,** Hannam Univ. (Korea, Republic of); **Emisoon Mah,** Air Force Research Lab. (USA); **Seth R. Marder,** Georgia Institute of Technology (USA); **Antoni C. Mitus,** Wroclaw Univ. of Technology (Poland); **Robert L. Nelson,** Air Force Research Lab. (USA); **Robert A. Norwood,** College of Optical Sciences, The Univ. of Arizona (USA); **Jean-Michel Nunzi,** Queen's Univ. (Canada); **Susanna Orlic,** Technische Univ. Berlin (Germany); **Ileana Rau,** Polytechnical Univ. of Bucharest (Romania); **Niyazi Serdar Sariciftci,** Johannes Kepler Univ. Linz (Austria); **Devanand K. Shenoy,** Defense Advanced Research Projects Agency (USA); **Kenneth D. Singer,** Case Western Reserve Univ. (USA); **Don J. Smith,** U.S. Air Force (United Kingdom); **Attila A. Szep,** Air Force Research Lab. (USA); **Rebecca E. Taylor,** Lockheed Martin Space Systems Co. (USA); **Toshiyuki Watanabe,** Tokyo Univ. of Agriculture and Technology (Japan); **Shiyoshi Yokoyama,** Kyushu Univ. (Japan); **Roberto Zamboni,** Consiglio Nazionale delle Ricerche (Italy)

Monday 23 January

SESSION 1 . . . . . Mon. 8:00 to 10:20 am

Photonic Materials

Session Chair: **François Kajzar,**
Polytechnical Univ. of Bucharest (Romania)

Photonics polymers for reconstructing Japan from the 11th March disaster (Keynote Presentation), Toshikuni Kaino, Tohoku Univ. (Japan); Yasuhiro Koike, Keio Univ. (Japan); Seizo Miyata, Tokyo Institute of Technology (Japan) . . . . . [8258-01]

Terahertz metamaterials for sensing nematic liquid crystals and carbon nanotubes *(Invited Paper)*, Jeong-Weon Wu, Ewha Womans Univ. (Korea, Republic of) . . . . . [8258-02]

Control of birefringence of styrene copolymers for optical devices, Takumi Kojo, Akihiro Tagaya, Yasuhiro Koike, Keio Univ. (Japan) . . . . . [8258-03]

Self-assembled functional thin films towards nanophotonics *(Invited Paper)*, André-Jean Attias, David Bléger, Antoine Colas, Amandine Bocheux, Fabrice Mathevet, Univ. Pierre et Marie Curie (France); Fabrice Charra, Commissariat à l'Énergie Atomique (France) . . . . . [8258-04]

Tuning the refractive index of blended polymer films by RIR-MAPLE deposition, Ryan D. McCormick, Duke Univ. (USA); Eric D. Cline, ZT Solar, Inc. (USA); Weidong Zhou, The Univ. of Texas at Arlington (USA); Adrienne D. Stiff-Roberts, Duke Univ. (USA) . . . . . [8258-05]

SESSION 2 . . . . . Mon. 10:50 am to 12:30 pm

Bio-photonics

Session Chair: **Toshikuni Kaino,** Tohoku Univ. (Japan)

Biphotonic chromophores for photodynamic therapy: molecular engineering and biological data *(Invited Paper)*, Chantal Andraud, Ecole Normale Supérieure de Lyon (France) . . . . . [8258-06]

Nanocrystalline cellulose for covert optical encryption, Mark P. Andrews, Yuping Zhang, Vamsy P. Chodavarapu, Andrew K. Kirk, McGill Univ. (Canada) . . . . . [8258-07]

Describing two-photon absorptivity of (Zwitter)ionic fluorochromes and fluorescent proteins with a new vibronic coupling mechanism, Mikhail Drobizhev, Montana State Univ. (USA); Nikolay S. Makarov, Georgia Institute of Technology (USA); Erich B. Beuerman, Montana State Univ. (USA); Shane E. Tillo, Oregon Health & Science Univ. (USA); Thomas E. Hughes, Aleksander K. Rebane, Montana State Univ. (USA) . . . . . [8258-08]

Additional donor modification by oxy groups for strengthening electro-optic response of molecules *(Invited Paper)*, Akira Otomo, Toshiki Yamada, National Institute of Information and Communications Technology (Japan) . . . . . [8258-09]

Lunch Break . . . . . 12:30 to 1:50 pm

SESSION 3 . . . . . Mon. 1:50 to 3:00 pm

Solar Cell and OLED I

Session Chair: **Michael F. Durstock,** Air Force Research Lab. (USA)

Conductive polymers as a hole transport materials in a solid state solar cell *(Invited Paper)*, Jeonghun Kim, Jong Kwan Koh, Byeonggwan Kim, Jungmok You, Jong Hak Kim, Eunkyoung Kim, Yonsei Univ. (Korea, Republic of) . . . . . [8258-10]

DNA for highly efficient phosphorescent organic light emitting diodes, Eliot F. Gomez, Hans Spaeth, Han You, Univ. of Cincinnati (USA); James G. Grote, Air Force Research Lab. (USA); Andrew J. Steckl, Univ. of Cincinnati (USA) . . . . . [8258-11]

Carrier mobility characterization of DNA-surfactant complexes, Ting-Yu Lin, Yu-Chueh Hung, National Tsing Hua Univ. (Taiwan) . . . . . [8258-13]

SESSION 4 . . . . . Mon. 3:30 to 5:00 pm

Solar Cell and OLED II

Session Chair: **Eunkyoung Kim,** Yonsei Univ. (Korea, Republic of)

Nanoscale templating and assembly in dye-sensitized and polymer solar cells *(Invited Paper)*, Michael F. Durstock, Giorgio Bazzan, James R. Deneault, Tae-Sik Kang, Christopher Tabor, Barney E. Taylor, Christopher A. Bailey, Air Force Research Lab. (USA) . . . . . [8258-14]

Phase sensitive optical coherence tomography for organic solar cell characterization, Barry Cense, Hitoyuki Ito, Utsunomiya Univ. (Japan); Chulmin Joo, Yonsei Univ. (Korea, Republic of); Yiheng Lim, Tatsuya Nagamori, Kazuhiro Marumoto, Yoshiaki Yasuno, Univ. of Tsukuba (Japan); Toyohiko Yatagai, Utsunomiya Univ. (Japan) . . . . . [8258-15]

Characterization of water-based thiophene polymers for organic photovoltaics, Tze Chien Sum, Michael Kurniawan, Kong Fai Tai, Cheng Hon A. Huan, Nanyang Technological Univ. (Singapore) . . . . . [8258-16]

White organic light-emitting diodes with ultra-thin mixed emitting layer, Taewoo Jeon, Ecole Polytechnique (France); Bernard Geffroy, Ecole Polytechnique (France) and CEA (France); Yvan Bonnassieux, Denis Tondelier, Ecole Polytechnique (France); Eléna Ishow, Univ. de Nantes (France); Sébastien V. Chenais, Sébastien Forget, Univ. Paris 13 (France) and CNRS (France) . . . . . [8258-17]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 5 . . . . . Tues. 10:30 am to 12:10 pm

Organic Transistors and Lasers

Session Chair: **Christopher Tabor,** Air Force Research Lab. (USA)

Frontiers in organic semiconductor optoelectronics (Keynote Presentation), Ifor D. W. Samuel, Yue Wang, Georgios Tsiminis, Graham A. Turnbull, Univ. of St. Andrews (United Kingdom); Andrew McNeill, Ambicare Health Ltd. (United Kingdom); James Ferguson, Ninewells Hospital and Medical School (United Kingdom) . . . . . [8258-18]

Emission from strongly coupled exciton-waveguide modes in thin film organic semiconductor, Tal Ellenbogen, Kenneth Crozier, Harvard Univ. (USA) . . . . . [8258-19]

Reconfigurable visible quantum dot microlasers integrated on a silicon chip, Simin Mehrabani, The Univ. of Southern California (USA); Heather K. Hunt, Univ. of Missouri-Columbia (USA); Andrea M. Armani, The Univ. of Southern California (USA) . . . . . [8258-20]

Towards the control of polarization of organic microlasers, Iryna Gozhyk, Mélanie Lebental, Ecole Normale Supérieure de Cachan (France); Sébastien Forget, Sébastien V. Chenais, Univ. Paris 13 (France); Christian Ulysse, Ctr. National de la Recherche Scientifique (France); Arnaud Brosseau, Rachel Méallet-Renault, Gilles Clavier, Robert B. Pansu, Joseph Zyss, Ecole Normale Supérieure de Cachan (France). . . . . [8258-21]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 6 . . . . . Tues. 1:30 to 3:30 pm

Miscellaneous

Session Chair: **Ifor D. Samuel,** Univ. of St. Andrews (United Kingdom)

Photonic applications of photochromic molecules *(Invited Paper)*, Jaroslaw Mysliwiec, Maciej Czajkowski, Stanislaw Bartkiewicz, Andrzej Miniewicz, Wroclaw Univ. of Technology (Poland); Krystian Zygadlo, Zbigniew Galewski, Univ. of Wroclaw (Poland); Ileana Rau, Francois Kajzar, Polytechnical Univ. of Bucharest (Romania); Bouchta Sahraoui, Univ. d'Angers (France). . . . . [8258-22]

Metal and quantum dot containing patterns by two-photon lithography *(Invited Paper)*, Prem Prabhakaran, Kyung Kook Jang, Sung Yeoun Park, Su-Min Jeon, Kwang-Sup Lee, Hannam Univ. (Korea, Republic of); Jong-Jin Park, Samsung Advanced Institute of Technology (Korea, Republic of); Yong Son, Dong-Yol Yang, KAIST (Korea, Republic of) . . . . . [8258-23]

Reversible multi-color electrofluorescence switching, Seogjae Seo, Yuna Kim, Jungmok You, Yonsei Univ. (Korea, Republic of); Pierre Audebert, Ecole Normale Supérieure de Cachan (France); Eunkyoung Kim, Yonsei Univ. (Korea, Republic of) . . . . . [8258-24]

Organic nanofibers from squarylium dyes: local morphology, optical, and electrical properties, Frank Balzer, Manuela Schiek, Horst-Günter Rubahn, Univ. of Southern Denmark (Denmark) . . . . . [8258-25]

All-printed touchless human-machine interface based on only five functional materials, Martin Zirkl, Anurak Sawatdee, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria); Uta Helbig, Fraunhofer-Institut für Silicatforschung (Germany); Markus Krause, Johannes Kepler Univ. Linz (Austria); Gregor Scheipl, Elke Kraker, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria); Peter Andersson Ersman, David Nilsson, Duncan Platt, Peter Bodö, Acreo AB (Sweden); Siegfried G. Bauer, Johannes Kepler Univ. Linz (Austria); Gerhard Domann, Fraunhofer-Institut für Silicatforschung (Germany); Barbara Stadlober, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria) . . . . . [8258-26]

SESSION 7 . . . . . Tues. 4:00 to 5:30 pm

Electro-Optics

Session Chair: **Shiyoshi Yokoyama,** Kyushu Univ. (Japan)

High performance photorefractive polymer composite and organic glass based on diphenylhydrazone *(Invited Paper)*, Nakjoong Kim, Hanyang Univ. (Korea, Republic of). . . . . [8258-27]

Fabry-Perot resonant switch using electro-optic polymer, Katherine L. Drain, UES, Inc. (USA); Wen Cheng, Univ. of Dayton (USA); Robert L. Nelson, Air Force Research Lab. (USA); Qiwen Zhan, Univ. of Dayton (USA). . . . . [8258-28]

Organic single crystalline electro-optic films for hybrid integration with silicon photonic wires, Mojca Jazbinsek, Blanca Ruiz, Peter Günter, Rainbow Photonics AG (Switzerland). . . . . [8258-29]

Solution phase assisted reorientation of chromophores: a modern approach to electro optic materials processing, Stephen Kozacik, David L. Eng, Michael Roman, Benjamin C. Olbricht, Dennis W. Prather, Univ. of Delaware (USA) . . . . . [8258-30]

Wednesday 25 January

SESSION 8 . . . . . Wed. 8:30 to 10:20 am

Nonlinear Optics

Session Chair: **Yasuhiro Koike,** Keio Univ. (Japan)

Advances in third-order nonlinear optical materials *(Keynote Presentation)*, Seth R. Marder, Stephen Barlow, Jean-Luc Bredas, San-Hui Chi, Georgia Institute of Technology (USA); David J. Hagan, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Joel M. Hales, Yesudas Kada, Hsin-Chieh Lin, Jonathan Matichak, Shino Ohira, Georgia Institute of Technology (USA); Lazaro Padilha, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Joseph W. Perry, Yanrong Shi, Georgia Institute of Technology (USA); Eric W. Van Stryland, Scott Webster, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8258-31]

Nonlinear absorption and nonlinear refraction: maximizing the merit factors *(Invited Paper)*, Marek J. Samoc, Katarzyna Matczyszyn, Marcin Nyk, Joanna Olesiak-Banska, Dominika Wawrzynczyk, Piotr Hanczyc, Janusz Szeremeta, Malgorzata Wielgus, Marta Gordel, Radoslaw Kolkowski, Bartlomiej Straszak, Wroclaw Univ. of Technology (Poland); Marie P. Cifuentes, Mark G. Humphrey, The Australian National Univ. (Australia) . . . . . [8258-32]

In vivo polarization-resolved second harmonic generation imaging of collagenous tissues, Gaël Latour, Ivan Gusachenko, Laura Kowalczuk, Isabelle Lamarre, Marie-Claire Schanne-Klein, Ecole Polytechnique (France) . . [8258-33]

Proposal of cyano-group containing polymers as new host materials of the NLO polymers, Atsushi Sugita, Yasuaki Tamaki, Nobuyuki Mase, Yoshimasa Kawata, Shigeru Tasaka, Shizuoka Univ. (Japan). . . . . [8258-34]

SESSION 9 . . . . . Wed. 10:50 am to 12:20 pm

Optical Fiber and Waveguide Devices I

Session Chair: **Seth R. Marder,** Georgia Institute of Technology (USA)

EO-polymer waveguide based high dynamic range EM wave sensors *(Invited Paper)*, Che-Yun Lin, The Univ. of Texas at Austin (USA); Alan X. Wang, Oregon State Univ. (USA); Xingyu Zhang, Beomsuk Lee, Ray T. Chen, The Univ. of Texas at Austin (USA) . . . . . [8258-35]

Two-photon absorption of the nonlinear optical chromophore/polymer on SiN slot waveguide, Shiyoshi Yokoyama, Feng Yu, Kazuhiro Yamamoto, Kyushu Univ. (Japan). . . . . [8258-36]

Development of fibre Bragg grating based strain/temperature sensing system, Sebastiampillai G. Raymond, Matthaues Panczyk, Grant Williams, Industrial Research Ltd. (New Zealand); Kevin Stevens, QUEST Integrity Group, LLC (New Zealand) . . . . . [8258-37]

Design and characterization of poly(styrene)-based GI-POF with high bandwidth and high thermal stability for home networks, Yoshihisa Akimoto, Keio Univ. (Japan); Makoto Asai, The Univ. of Tokyo (Japan); Kotaro Koike, Astushi Kondo, Kenji Makino, Azusa Inoue, Yasuhiro Koike, Keio Univ. (Japan). . . . . [8258-38]

Lunch/Exhibition Break . . . . . 12:20 to 1:50 pm

SESSION 10 . . . . . Wed. 1:50 to 3:20 pm

Optical Fiber and Waveguide Devices II

Session Chair: **Ray T. Chen,** The Univ. of Texas at Austin (USA)

Photopolymer-based three-dimensional optical waveguide devices *(Invited Paper)*, Manabu Kagami, Tatsuya Yamashita, Masatoshi Yonemura, Akari Kawasaki, Osamu Watanabe, Toyota Central R&D Labs., Inc. (Japan). . . . . [8258-39]

Fabrication of low loss binary amorphous copolymers for graded-index plastic optical fiber, Toshimitsu Araki, Saori Nishino, Takahiro Kado, Kotaro Koike, Atsushi Kondo, Yasuhiro Koike, Keio Univ. (Japan). . . . . [8258-40]

Critical angle in fluorescent polymer optical fibers, Inaki Bikandi, María Asunción Illarramendi, Joseba Zubia-Zaballa, Jon Arrue, Felipe Jimenez, Univ. del País Vasco (Spain); Luca Bazzana, Luceat S.p.A. (Italy) . . . . . [8258-41]

On-chip sensing of volatile organic compounds in water by hybrid polymer and silicon photonic-crystal slot-waveguide devices, Swapnajit Chakravarty, Omega Optics, Inc. (USA); Wei-Cheng Lai, Ray T. Chen, The Univ. of Texas at Austin (USA) . . . . . [8258-42]

SESSION 11 . . . . . Wed. 3:50 to 4:40 pm

Grating Formation

Session Chair: **Ileana Rau,** Polytechnical Univ. of Bucharest (Romania)

Quickly updatable hologram images with high performance photorefractive polymer composites *(Invited Paper)*, Naoto Tsutsumi, Kenji Kinashi, Asato Nonomura, Wataru Sakai, Kyoto Institute of Technology (Japan) . . . . . [8258-43]

Grating couplers in polymer with a thin Si_3N_4 layer embedded, Linghua Wang, Marco A. Garcia Porcel, Diedrik Vermeulen, Univ. Gent (Belgium); Xiuyou Han, Jinyan Wang, Xigao Jian, Mingshan Zhao, Dalian Univ. of Technology (China); Geert Morthier, Univ. Gent (Belgium). . . . . [8258-44]

POSTERS-WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Picosecond polarization spectroscopy of fluorescein attached to different molecular volume polymer influenced by rotational motion, Yang Pu, Wubao Wang, The City College of New York (USA); Richard B. Dorshow, Covidien (USA); Robert R. Alfano, The City College of New York (USA) . . . . . [8258-45]

A photo-aligned self-assembled monolayer for polymer transistors, Tatsuhiko Kawaguchi, Takehiro Okura, Yuusuke Suenaga, Tomonori Hanasaki, Ichiro Fujieda, Ritsumeikan Univ. (Japan) . . . . . [8258-46]

Vibration-induced mobility enhancement for a polymer transistor, Yuuki Kondo, Tomonori Hiraki, Yuusuke Suenaga, Tomonori Hanasaki, Ichiro Fujieda, Ritsumeikan Univ. (Japan). . . . . [8258-47]

Ultrafast nonlinear optical studies of 3,8,13,18-Tetrachloro-2,7,12,17-tetramethoxyporphyrin and its derivatives, Swain Debasis, Rana Anup, Pradeepta Kumar Panda, Soma Venugopal Rao, Univ. of Hyderabad (India). . . . . [8258-48]

Femtosecond and picosecond nonlinear optical studies of Corroles, Hamad Syed, Gopala Krishna Podagatlapalli, Univ. of Hyderabad (India); Giribabu Lingamallu, Indian Institute of Commerce and Trade (India); Surya P. Tewari, Soma Venugopal Rao, Univ. of Hyderabad (India) . . . . . [8258-49]

The effect of intramolecular charge transfer via biphenyl group on the optoelectronic properties of red fluorophore, Na Rae Park, Gweon Young Ryu, Dong Myung Shin, Hongik Univ. (Korea, Republic of) . . . . . [8258-50]

Influence of the polymer processing conditions on the performance of bulk heterojunction solar cells, Annie Ng, Yechuan Sun, Man Kin Fung, Man Ching Ng, Aleksandra B. Djurisic, Wai Kin Chan, The Univ. of Hong Kong (Hong Kong, China) . . . . . [8258-51]

Dependence on molecular stacking orientation of open-circuit voltage in organic solar cell based on pentacene and its derivatives, Chi-Ta Chou, Yian Tai, Chin-Hsin J. Liu, National Taiwan Univ. of Science and Technology (Taiwan); Li-Chyong Chen, National Taiwan Univ. (Taiwan); Kuei-Hsien Chen, Academia Sinica (Taiwan) . . . . . [8258-52]

Vertical external cavity surface-emitting organic lasers: a dynamical laser modeling towards optimized performance, Hadi Rabbani-Haghighi, Sébastien Forget, Alain Siove, Sébastien Chenais, Univ. Paris 13 (France) and CNRS (France). . . . . [8258-53]

Multi high-order anisotropic self-diffraction in Cerium doped $BaTiO_3$ crystal, Prathan Buranasiri, King Mongkut's Institute of Technology Ladkrabang (Thailand). . . . . [8258-54]

Fabrication of electronic device based on photonic gel films, Sung Woo Lee, Dong Myung Shin, Hongik Univ. (Korea, Republic of). . . . . [8258-55]

Charge dynamics of biopolymer exopolysaccharide (EPS), Jin Jung Kweon, Kyu-Won Lee, Gi-Wan Jeon, Hyojung Kim, Cheol Eui Lee, Korea Univ. (Korea, Republic of); Chanho Kwon, Seunho Jung, Konkuk Univ. (Korea, Republic of) . . . . . [8258-56]

Efficient configuration transition in a new azobenzene-LC polymer for updatable hologram, Weidong Mao, Univ. of Miami (USA); Qunhui Sun, New Span Opto-Technology Inc. (USA); Sarfaraz Baig, Hui Lu, Michael R. Wang, Univ. of Miami (USA) . . . . . [8258-57]

Optically tunable and switchable diffraction gratings in photochromic polymer thin films, Sebastiampillai G. Raymond, Grant Williams, My T. Do, Ayla P. Middleton, Mohamed M. Ashraf, M. Bhuiyan, Andrew Kay, Industrial Research Ltd. (New Zealand) . . . . . [8258-58]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8259

Sunday 22 January 2012 • Proceedings of SPIE Vol. 8259

RF and Millimeter-Wave Photonics II

Conference Chairs: **Robert L. Nelson,** Air Force Research Lab. (USA); **Dennis W. Prather,** Univ. of Delaware (USA); **Chris Schuetz,** Phase Sensitive Innovations, Inc. (USA)

Program Committee: **Glenn D. Boreman,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Ray T. Chen,** The Univ. of Texas at Austin (USA); **Charles H. Cox III,** Photonic Systems, Inc. (USA); **Larry R. Dalton,** Univ. of Washington (USA); **Ronald Esman,** Defense Advanced Research Projects Agency (USA); **Yeshaiahu Fainman,** Univ. of California, San Diego (USA); **Peter R. Herczfeld,** Drexel Univ. (USA); **Warren N. Herman,** Univ. of Maryland, College Park (USA); **Michael Hochberg,** Univ. of Washington (USA); **Yifei Li,** Univ. of Massachusetts Dartmouth (USA); **Joseph N. Mait,** U.S. Army Research Lab. (USA); **Mark S. Mirotznik,** Univ. of Delaware (USA); **Robert A. Norwood,** College of Optical Sciences, The Univ. of Arizona (USA); **Gernot S. Pomrenke,** Air Force Office of Scientific Research (USA); **Attila A. Szep,** Air Force Research Lab. (USA); **Keith I. Williams,** U.S. Naval Research Lab. (USA); **Qiwen Zhan,** Univ. of Dayton (USA)

Sunday 22 January

SESSION 1 . . . . . Sun. 9:00 to 11:50 am

System Concepts

Session Chair: **Christopher A. Schuetz,** Phase Sensitive Innovations, Inc. (USA)

Novel step-tunable wavelength-swept optical system based on a SSB modulator driven by a RF generator for fiber sensing networks, Tianxin Yang, Changren Qiu, Zhaoying Wang, Chunfeng Ge, Mei Sang, Tianjin Univ. (China) . . . . . [8259-01]

Passive millimeter-wave holography enabled by optical up-conversion, Janusz Murakowski, Garrett J. Schneider, Dennis W. Prather, Univ. of Delaware (USA) . . . . . [8259-02]

Wideband analog photonic links: some performance limits and considerations for multi-octave implementations *(Invited Paper)*, Vincent J. Urick, Jason D. McKinney, John F. Diehl, Keith J. Williams, U.S. Naval Research Lab. (USA) . . . . . [8259-03]

Widely tunable opto-electronics oscillators, Jeremy Maxin, Grégoire Pillet, Loic Morvan, Daniel Dolfi, Thales Research & Technology (France). . . . [8259-04]

Integrated silicon-photonic module for generating widely tunable, narrow-line RF using injection-locked lasers, Garrett J. Schneider, Garrett A. Ejzak, David W. Grund, Janusz Murakowski, Shouyuan Shi, Dennis W. Prather, Univ. of Delaware (USA) . . . . . [8259-05]

A wideband photonic and compressive sampling analog-to-digital converter: architecture, requirements and applications *(Invited Paper)*, Thomas R. Clark, Jr., Patrick T. Callahan, Michael L. Dennis, The Johns Hopkins Univ. Applied Physics Lab. (USA) . . . . . [8259-06]

SESSION 2 . . . . . Sun. 11:50 am to 12:50 pm

Materials and Components I

Session Chair: **Robert L. Nelson,** Air Force Research Lab. (USA)

DNA-based nanoparticle composite materials for EMI shielding, De-Yu Zang, IPITEK, Inc. (USA); James G. Grote, Air Force Research Lab. (USA) . . . . . [8259-07]

High bandwidth constant current modulation circuit for carrier lifetime measurements in semiconductor lasers, Umesh Singh, Univ. of Central Florida (USA) . . . . . [8259-08]

Direct modulation of injection-locked external-cavity laser, Janusz Murakowski, Garrett J. Schneider, Garrett A. Ejzak, David W. Grund, Dennis W. Prather, Univ. of Delaware (USA) . . . . . [8259-09]

Lunch Break . . . . . 12:50 to 1:50 pm

SESSION 3 . . . . . Sun. 1:50 to 3:10 pm

Materials and Components II

Session Chair: **Robert L. Nelson,** Air Force Research Lab. (USA)

Fabrication and characterization of hybrid 1x4 silicon slot optical modulator array built on silicon photonics and EO polymer photonics technologies for optical phase array antenna applications, Richard S. Kim, Attila A. Szep, Air Force Research Lab. (USA); Antao Chen, Haishan Sun, Univ. of Washington (USA); Shouyuan Shi, Univ. of Delaware (USA); Don C. Abeysinghe, Univ. of Cincinnati (USA); Larry R. Dalton, Univ. of Washington (USA) . . . . . [8259-10]

Broadband low-drive voltage electro-optic polymer modulator, David L. K. Eng, Stephen Kozacik, Benjamin C. Olbricht, Shouyuan Shi, Dennis Prather, Univ. of Delaware (USA) . . . . . [8259-11]

Vertical dual-slot modulator for mmW photonics, Stephen Kozacik, David L. K. Eng, Maciej Murakowski, Benjamin C. Olbricht, Shouyuan Shi, Dennis W. Prather, Univ. of Delaware (USA) . . . . . [8259-12]

Double mushroom 1.55 µm waveguide photodetectors for integrated E-band (60-90 GHz) wireless transmitter modules, Vitaly Rymanov, Univ. Duisburg-Essen (Germany); Tolga Tekin, Technische Univ. Berlin (Germany); Andreas Stöhr, Univ. Duisburg-Essen (Germany) . . . . . [8259-13]

SESSION 4 . . . . . Sun. 3:40 to 5:00 pm

Applications

Session Chair: **Janusz Murakowski,** Univ. of Delaware (USA)

Passive fully polarimetric W-band millimeter wave imaging *(Invited Paper)*, Bruce E. Bernacki, James F. Kelly, David M. Sheen, Douglas L. McMakin, Jonathan R. Tedeschi, Robert V. Harris, Jr., Albert Mendoza, Thomas E. Hall, Brian K. Hatchell, Patrick L. J. Valdez, Pacific Northwest National Lab. (USA) . . . . . [8259-14]

Advanced millimeter-wave security portal imaging techniques *(Invited Paper)*, David M. Sheen, Bruce E. Bernacki, Douglas L. McMakin, Pacific Northwest National Lab. (USA) . . . . . [8259-15]

Integration platform for 72 GHz photodiode-based wireless transmitter, Bouchaib Bouhlal, Sascha Lutzmann, Merih Palandöken, Technische Univ. Berlin (Germany); Vitaly Rymanov, Andreas Stöhr, Univ. Duisburg-Essen (Germany); Tolga Tekin, Technische Univ. Berlin (Germany) . . . . . [8259-16]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Sunday-Wednesday 22-25 January 2012 • Proceedings of SPIE Vol. 8260

Ultrafast Phenomena and Nanophotonics XVI

Conference Chairs: **Markus Betz,** Technische Univ. Dortmund (Germany); **Abdulhakem Y. Elezzabi,** Univ. of Alberta (Canada); **Jin-Joo Song,** Univ. of California, San Diego (USA); **Kong-Thon Tsen,** Arizona State Univ. (USA)

Program Committee: **Mischa Bonn,** FOM Institute for Atomic and Molecular Physics (Netherlands); **Yujie J. Ding,** Lehigh Univ. (USA); **Jan A. Gaj,** Univ. of Warsaw (Poland); **Kazuhiko Hirakawa,** The Univ. of Tokyo (Japan); **Rupert Huber,** Univ. Regensburg (Germany); **Robert A. Kaindl,** Lawrence Berkeley National Lab. (USA); **Dai-Sik Kim,** Seoul National Univ. (Korea, Republic of); **Torsten Meier,** Univ. Paderborn (Germany); **Walter Pfeiffer,** Univ. Bielefeld (Germany); **Mark I. Stockman,** Georgia State Univ. (USA); **Chi-Kuang Sun,** National Taiwan Univ. (Taiwan); **Fabrice Vallee,** Univ. Claude Bernard Lyon 1 (France); **Klaas Wynne,** Univ. of Strathclyde (United Kingdom); **Chih-Chung Yang,** National Taiwan Univ. (Taiwan)

Conference Cosponsor: FEMTO LASERS Femtolasers, Inc.

Sunday 22 January

SESSION 1 . . . . . Sun. 9:00 to 10:15 am

Dynamics in Dots and Wires I

Session Chair: **Markus Betz,** Technische Univ. Dortmund (Germany)

Ultrafast investigations of carrier and spin dynamics in an artificial molecule *(Invited Paper)*, Kai Müller, Alexander Bechtold, Walter Schottky Institut (Germany); Claudia Ruppert, Technische Univ. Dortmund (Germany); Hubert J. Krenner, Univ. Augsburg (Germany); José M. Villa-Boas, Univ. Federal de Uberlândia (Brazil); Markus Betz, Technische Univ. Dortmund (Germany); Gerhard Abstreiter, Jonathan J. Finley, Walter Schottky Institut (Germany) . . . . . [8260-01]

THz quantum-confined Stark effect in semiconductor quantum dots, Dmitry Turchinovich, Technical Univ. of Denmark (Denmark); Boris S. Monozon, State Marine Technical Univ. of St. Petersburg (Russian Federation); Daniil A. Livshits, Innolume GmbH (Germany); Edik U. Rafailov, Univ. of Dundee (United Kingdom); Matthias C. Hoffmann, Univ. Hamburg (Germany) . . . . . [8260-02]

Theory of phonon-assisted intraband transitions in semiconductor quantum dots, Sandra Kuhn, Franz Schulze, Marten Richter, Andreas Knorr, Alexander Carmele, Technische Univ. Berlin (Germany). . . . . [8260-03]

Theory of non-equilibrium phonon statistics and multi-phonon assisted light emission from semiconductor quantum dots, Julia Kabuss, Alexander Carmele, Marten Richter, Andreas Knorr, Technische Univ. Berlin (Germany) . . . . . [8260-04]

SESSION 2 . . . . . Sun. 10:45 am to 12:15 pm

Spins in Bulk Semiconductors

Session Chair: **Abdulhakem Y. Elezzabi,** Univ. of Alberta (Canada)

Ultrafast spin dynamics in wide-gap magnetic semiconductors *(Invited Paper)*, Rudolf Bratschitsch, Technische Univ. Chemnitz (Germany) . . . . . [8260-05]

One- and two-photon indirect injection of carriers and spins in silicon *(Invited Paper)*, John E. Sipe, Jin Luo Cheng, Julien Rioux, Univ. of Toronto (Canada); Jaroslav Fabian, Univ. Regensburg (Germany). . . . . [8260-06]

Optical orientation and coherent spin dynamics in bulk germanium *(Invited Paper)*, Christine Hautmann, Markus Betz, Technische Univ. Dortmund (Germany) . . . . . [8260-07]

Lunch Break . . . . . 12:15 to 1:30 pm

SESSION 3 . . . . . Sun. 1:30 to 3:00 pm

Dynamics in Dots and Wires II

Session Chair: **Rudolf Bratschitsch,** Technische Univ. Chemnitz (Germany)

Ultrafast optical control of interacting spins in coupled quantum dots *(Invited Paper)*, Sam G. Carter, U.S. Naval Research Lab. (USA); Danny Kim, U.S. Naval Research Lab. (USA) and Univ. of Michigan (USA); Alex Greilich, U.S. Naval Research Lab. (USA) and Univ. of Maryland, College Park (USA); Allan S. Bracker, Daniel G. Gammon, U.S. Naval Research Lab. (USA) . . . . . [8260-08]

Room temperature spin relaxation in quantum dot based spin-optoelectronic devices, Henning Soldat, Mingyuan Li, Arne Ludwig, Astrid Ebbing, Ruhr-Univ. Bochum (Germany); Frank Stromberg, Werner Keune, Heiko Wende, Univ. Duisburg-Essen (Germany); Dirk Reuter, Andreas D. Wieck, Nils C. Gerhardt, Martin R. Hofmann, Ruhr-Univ. Bochum (Germany). . . . . [8260-09]

Ultrafast charge transfer in Cu-doped ZnO nanowires, Tze Chien Sum, Guozhong Xing, Guichuan Xing, Edbert Jarvis Sie, Tao, Tom Wu, Cheng Hon Alfred Huan, Nanyang Technological Univ. (Singapore) . . . . . [8260-10]

Relationship of second order susceptibility to the dimensions of ZnO nanorods based on Lorentz local field, Guan-Yu Zhuo, Kuo-Jen Hsu, Tung-Yu Su, Nan-Hsun Huang, Yang-Fang Chen, Shi-Wei Chu, National Taiwan Univ. (Taiwan) . . . . . [8260-11]

Strong THz emission from low-energy acoustic-like surface plasmons in InAs nanowires, Denis V. Seletskiy, The Univ. of New Mexico (USA) and Air Force Research Lab. (USA); Chia-Yeh Li, Michael P. Hasselbeck, The Univ. of New Mexico (USA); Jeffrey G. Cederberg, Sandia National Labs. (USA); Aaron M. Katzenmeyer, Maria E. Toimil-Molares, Francois Léonard, Sandia National Labs., California (USA); A. Alec Talin, Sandia National Labs., California (USA) and National Institute of Standards and Technology (USA); Mansoor Sheik-Bahae, The Univ. of New Mexico (USA) . . . . . [8260-12]

SESSION 4 . . . . . Sun. 3:30 to 5:30 pm

Nonlinear Optical Phenomena

Session Chairs: **Jin-Joo Song,** Univ. of California, San Diego (USA); **Kong-Thon Tsen,** Arizona State Univ. (USA)

Ultrafast optical nonlinearities in a plasmonic nanorod metamaterial *(Invited Paper)*, Gregory A. Wurtz, King's College London (United Kingdom); Gary P. Wiederrecht, Argonne National Lab. (USA); Anatoly V. Zayats, King's College London (United Kingdom) . . . . . [8260-13]

Ultrafast polarization switching in plasmonic crystals with Fano-type spectral response, Maxim R. Shcherbakov, Polina P. Vabishchevich, Varvara V. Komarova, Maruan F. Al-Shedivat, Tatyana V. Dolgova, Andrey A. Fedyanin, Lomonosov Moscow State Univ. (Russian Federation) . . . . . [8260-14]

Giant AC Stark effect in germanium quantum wells, Sangam Chatterjee, Niko S. Köster, Benjamin Ewers, Kolja Kolata, Ronja Woscholski, Philipps-Univ. Marburg (Germany); Christoph Lange, Univ. of Toronto (Canada); Daniel Chrastina, Giovanni Isella, Politecnico di Milano (Italy); Hans von Känel, ETH Zurich (Switzerland). . . . . [8260-15]

Nonlinear propagation of strong-field THz pulses in doped semiconductors, Dmitry Turchinovich, Jørn M. Hvam, Technical Univ. of Denmark (Denmark); Matthias C. Hoffmann, Univ. Hamburg (Germany) . . . . . [8260-16]

Spatiotemporal dynamics of few-cycle optical pulses in nonlinear media: collapse vs bullet cast, Igor V. Melnikov, E.L.S. Co. (Russian Federation) . . . . . [8260-17]

Numerical analysis of multi-photon parameters from ultrafast laser measurements, Mary J. Potasek, Evgueni Parilov, Simphotek Inc. (USA) . . . . . [8260-18]

Chirped pulses sum frequency generation for deep-UV picosecond pulse shaping, Carlo Vicario, Alexandre Trisorio, Paul Scherrer Institut (Switzerland); Gunnar Arisholm, Norwegian Defence Research Establishment (Norway); Christoph P. Hauri, Paul Scherrer Institut (Switzerland) and Ecole Polytechnique Federale de Lausanne (Switzerland) . . . . . [8260-19]

Monday 23 January

SESSION 5 . . . . . Mon. 8:00 to 9:45 am

THz Spectroscopy I

Session Chair: **Sangam Chatterjee,** Philipps-Univ. Marburg (Germany)

Compact and portable terahertz source based on frequency mixing using dual-frequency solid-state laser *(Invited Paper)*, Yujie J. Ding, Lehigh Univ. (USA) . . . . . [8260-20]

Detection of ultrafast THz pulses via electro-absorption in coupled asymmetric quantum wells, Chia-Yeh Li, The Univ. of New Mexico (USA); Denis Seletskiy, The Univ. of New Mexico (USA) and Air Force Research Lab. (USA); Jeffrey G. Cederberg, Sandia National Labs. (USA); Mansoor Sheik-Bahae, The Univ. of New Mexico (USA) . . . . . [8260-21]

Nonlinear response of semiconductors driven by intense THz pulses *(Invited Paper)*, Alexej Pashkin, Bernhard Mayer, Friederike Junginger, Christian Schmidt, Univ. of Konstanz (Germany); Olaf Schubert, Univ. Regensburg (Germany); Sebastian Mährlein, Univ. of Konstanz (Germany); Alexander Sell, Univ. of Konstanz (Germany) and Massachusetts Institute of Technology (USA); Rupert Huber, Univ. Regensburg (Germany); Alfred Leitenstorfer, Univ. of Konstanz (Germany) . . . . . [8260-22]

Ultrafast nonlinear terahertz studies of high-field charge transport in semiconductors *(Invited Paper)*, Thomas Elsässer, Pamela Bowlan, Klaus Reimann, Michael Woerner, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Rudolf Hey, Paul-Drude-Institut für Festkörperelektronik (Germany); Christos Flytzanis, Ecole Normale Supérieure (France) . . . . . [8260-23]

SESSION 6 . . . . . Mon. 10:15 am to 12:00 pm

Dynamics in Microcavities

Session Chair: **Yujie J. Ding,** Lehigh Univ. (USA)

Coherence properties and excitation spectra of single and coupled microcavity polariton condensates *(Invited Paper)*, Marc Assmann, Franziska Veit, Jean-Sebastian Tempel, Manfred Bayer, Technische Univ. Dortmund (Germany); Arash Rahimi-Iman, Andreas Löffler, Christian Schneider, Sven Höfling, Stephan Reitzenstein, Lukas Worschech, Alfred Forchel, Julius-Maximilians-Univ. Würzburg (Germany) . . . . . [8260-24]

Ultrafast transition from a photon to a polariton Bose-Einstein condensate in a semiconductor microcavity, Elena Kammann, Maria Maragkou, Hamid Ohadi, Alastair J. D. Grundy, Alexey V. Kavokin, Pavlos G. Lagoudakis, Univ. of Southampton (United Kingdom) . . . . . [8260-25]

Phonon-driven resonantly enhanced polariton luminescence in organic microcavities, Niccolo Somaschi, Foundation for Research and Technology-Hellas (Greece); Leonidas Mouchliadis, Univ. of Crete (Greece); Dave Coles, The Univ. of Sheffield (United Kingdom); Ilias Perakis, Foundation for Research and Technology-Hellas (Greece); David Lidzey, The Univ. of Sheffield (United Kingdom); Pavlos G. Lagoudakis, Univ. of Southampton (Italy); Pavlos Savvidis, Univ. of Crete (Greece) . . . . . [8260-26]

The single quantum-dot laser-emission properties in weak and strong coupling *(Invited Paper)*, Christopher Gies, Matthias Florian, Paul Gartner, Frank Jahnke, Univ. Bremen (Germany) . . . . . [8260-27]

Addressing phonons in semiconductor quantum dot-QED: entanglement, non-equilibrium phonon, and photon distributions, Alexander Carmele, Julia Kabuss, Andreas Knorr, Technische Univ. Berlin (Germany) . . . . . [8260-28]

Lunch Break . . . . . 12:00 to 1:15 pm

SESSION 7 . . . . . Mon. 1:15 to 3:30 pm

Coherent Optical Phenomena

Session Chair: **Markus Betz,** Technische Univ. Dortmund (Germany)

Generation of coherent charge oscillations in the plane of GaAs quantum wells *(Invited Paper)*, Shekhar Priyadarshi, Klaus Pierz, Uwe Siegner, Physikalisch-Technische Bundesanstalt (Germany); Philip Dawson, The Univ. of Manchester (United Kingdom); Mark Bieler, Physikalisch-Technische Bundesanstalt (Germany) . . . . . [8260-29]

Quantum interference control of electrical currents: applications for ultrabroadband field-resolved spectroscopy *(Invited Paper)*, Claudia Ruppert, Sebastian Thunich, Elmar Sternemann, Technische Univ. Dortmund (Germany); Alexander Holleitner, Walter Schottky Institut (Germany); Markus Betz, Technische Univ. Dortmund (Germany) . . . . . [8260-30]

Revealing exciton dephasing and transport dynamics in semiconductor quantum well/quantum dot systems using optical 2D Fourier transform spectroscopy *(Invited Paper)*, Galan Moody, JILA (USA) and National Institute of Standards and Technology (USA) and Univ. of Colorado (USA); Mark E. Siemens, Univ. of Denver (USA) and JILA (USA); Alan D. Bristow, West Virginia Univ. (USA) and JILA (USA); Xingcan Dai, Tsinghua Univ. (China) and JILA (USA); Denis Karaiskaj, Univ. of South Florida (USA) and JILA (USA); Allan S. Bracker, Daniel Gammon, Naval Research Lab. (USA); Steven T. Cundiff, JILA (USA) and National Institute of Standards and Technology (USA) and Univ. of Colorado (USA) . . . . . [8260-31]

Coherent ultrafast Rabi oscillations in metal-j-aggregate hybrid nanostructures *(Invited Paper)*, Christoph Lienau, Carl von Ossietzky Univ. Oldenburg (Germany) . . . . . [8260-32]

THz control of matter states: coherent excitons beyond the Rabi-splitting, Benjamin Ewers, Niko S. Köster, Ronja Woscholski, Sangam Chatterjee, Martin Koch, Philipps Univ. Marburg (Germany); Hyatt M. Gibbs, Galina Khitrova, College of Optical Sciences, The Univ. of Arizona (USA); Andrea C. Klettke, Johannes T. Steiner, Mackillo Kira, Stephan W. Koch, Philipps Univ. Marburg (Germany) . . . . . [8260-33]

SESSION 8 . . . . . Mon. 4:00 to 5:45 pm

Ultrafast Processes in Carbon and Polymer Nanocomposites

Session Chairs: **Jin-Joo Song,** Univ. of California, San Diego (USA); **Kong-Thon Tsen,** Arizona State Univ. (USA)

Ultrafast carrier dynamics in graphite probed with time-resolved XUV photoemission *(Invited Paper)*, Michael Bauer, Christian-Albrechts-Univ. zu Kiel (Germany) . . . . . [8260-34]

Terahertz imaging and spectroscopy of large-area single-layer graphene, Yun-Shik Lee, Michael J. Paul, Joseph L. Tomaino, Andrew D. Jameson, Joshua W. Kevek, Ethan D. Minot, Oregon State Univ. (USA); Arend M. van der Zande, Robert A. Barton, Paul L. McEuen, Cornell Univ. (USA) . . . . . [8260-35]

Nanoscale imaging of interface dynamics in polymer blends by ultrafast confocal microscopy *(Invited Paper)*, Dario Polli, Giulio Cerullo, Giulia Grancini, Guglielmo Lanzani, Politecnico di Milano (Italy) . . . . . [8260-36]

Photoinduced dynamics in a terpyridine-based zinc(II) coordination polymer and their molecular fragements, Ronald Siebert, Andreas Winter, Ulrich S. Schubert, Friedrich-Schiller-Univ. Jena (Germany); Ivan Scheblykin, Lund Univ. (Sweden); Jürgen Popp, Institut für Photonische Technologien e.V. (Germany); Benjamin Dietzek, Friedrich-Schiller-Univ. Jena (Germany) . [8260-37]

Ultrafast optical analyses and characteristics of nanocomposite media, Christopher M. Collier, Xian Jin, Brandon Born, Jonathan F. Holzman, UBC Okanagan (Canada). . . . . [8260-38]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 9 . . . . . Tues. 10:30 am to 12:30 pm

Metamaterials

Session Chair: **Abdulhakem Y. Elezzabi,** Univ. of Alberta (Canada)

Ultrafast metatronics *(Keynote Presentation)*, Nader Engheta, Univ. of Pennsylvania (USA) . . . . . [8260-39]

High refractive index terahertz metamaterials *(Invited Paper)*, Bumki Min, KAIST (Korea, Republic of) . . . . . [8260-40]

Strong coupling of the cyclotron transition of a high mobility 2D electron in a THz metamaterial, Giacomo Scalari, Dana Turcinkova, Curdin Maissen, Christian Reichl, ETH Zurich (Switzerland); Dieter Schuh, Uni Regensburg (Germany); Werner Wegscheider, ETH Zurich (Switzerland); David Hagenmuller, Simone De Liberato, Cristiano Ciuti, Univ. Paris 7-Denis Diderot (France); Mattias Beck, Jérôme Faist, ETH Zurich (Switzerland) . . . . . [8260-41]

Adjusting the functionality of terahertz split-ring resonators through geometry *(Invited Paper)*, Hannes Merbold, Andreas Bitzer, Univ. Bern (Switzerland); Fabrizio Carbone, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Axel Murk, Univ. Bern (Switzerland); Jan Wallauer, Markus Walther, Univ. Freiburg (Germany); Thomas Feurer, Univ. Bern (Switzerland) . . . . . [8260-42]

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 10 . . . . . Tues. 2:00 to 3:15 pm

Plasmonics I

Session Chair: **Fabrice Vallee,** Univ. Claude Bernard Lyon 1 (France)

Closely coupled plasmons: real-space mapping and SERS *(Invited Paper)*, Zee Hwan Kim, Korea Univ. (Korea, Republic of) . . . . . [8260-43]

Plasmonic platform for rainbow trapping effect: from theoretical design to experimental realization *(Invited Paper)*, Qiaoqiang Gan, Univ. at Buffalo (USA); Yujie Ding, Filbert J. Bartoli, Lehigh Univ. (USA) . . . . . [8260-44]

Terahertz subwavelength ribbon waveguide based plasmonic sensors for refractive index and thickness detection, Borwen You, Ja-yu Lu, National Cheng Kung Univ. (Taiwan); Tze-An Liu, Jin-Long Peng, Industrial Technology Research Institute (Taiwan) . . . . . [8260-45]

SESSION 11 . . . . . Tues. 3:45 to 5:30 pm

Plasmonics II

Session Chair: **Christoph Lienau,** Carl von Ossietzky Univ. Oldenburg (Germany)

Long-term CEP-stable high energy few-cycle pulses using the feed-forward method *(Invited Paper)*, Fabian Lücking, FEMTOLASERS Produktions GmbH (Austria) and Max-Planck-Institut für Quantenoptik (Germany) and Ludwig-Maximilians-Univ.München (Germany); Alexandria Anderson, FEMTOLASERS Produktions GmbH (Austria); Alexander A. Apolonskiy, Ferenc Krausz, Max-Planck-Institut für Quantenoptik (Germany) and Ludwig-Maximilians-Univ. München (Germany); Günther Steinmeyer, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Gabriel Tempea, FEMTOLASERS Produktions GmbH (Austria); Andreas Assion, FEMTOLASERS Produktions GmbH (USA) . . . . . [8260-46]

Ultrafast spectroscopy of metal-based hybrid nanoparticles *(Invited Paper)*, Fabrice Vallee, Denis Mongin, Vincent Juvé, Aurelien Crut, Paolo Maioli, Natalia Del Fatti, Univ. Claude Bernard Lyon 1 (France) . . . . . [8260-47]

Nanoantenna-enhanced ultrafast nonlinear spectroscopy of a single gold nanoparticle, Thorsten Schumacher, Daniela Ullrich, Mario Hentschel, Max-Planck-Institut für Festkörperforschung (Germany); Harald W. Giessen, Univ. Stuttgart (Germany); Markus Lippitz, Max-Planck-Institut für Festkörperforschung (Germany) . . . . . [8260-48]

Subradiant plasmon resonances for spasing, Dries Vercruysse, Pol Van Dorpe, Verellen Niels, Liesbet Lagae, IMEC (Belgium) and Katholieke Univ. Leuven (Belgium) . . . . . [8260-49]

Are there novel resonances in nanoplasmonic structures due to nonlocal response?, Martijn Wubs, Søren Raza, Giuseppe Toscano, Technical Univ. of Denmark (Denmark); Antti-Pekka Jauho, Technical Univ. of Denmark (Denmark) and Aalto Univ, (Finland); N. Asger Mortensen, Technical Univ. of Denmark (Denmark) . . . . . [8260-50]

Wednesday 25 January

SESSION 12 . . . . . Wed. 8:00 to 10:15 am

Ultrafast Acoustics

Session Chair: **Fabrice Vallee,** Univ. Claude Bernard Lyon 1 (France)

Coherent acoustic excitation of membranes and nanostructures *(Invited Paper)*, Thomas Dekorsy, Univ. Konstanz (Germany) . . . . . [8260-51]

Ultrafast dynamics of coherent optical phonons in GeTe/Sb_{2}Te_{3} superlattices: thermal conductivity and coherent control, Muneaki Hase, Univ. of Tsukuba (Japan); Junji Tominaga, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [8260-52]

Modulation of magnetization by picosecond acoustic pulses in ferromagnetic semiconductor GaMnAs *(Invited Paper)*, Alexey V. Scherbakov, Ioffe Physical-Technical Institute (Russian Federation) . . . . . [8260-53]

Nonthermal processes of coherent acoustic phonons generation in semiconductors by femtosecond laser *(Invited Paper)*, Pascal Ruello, Vitali Goussev, Philippe P. Babilotte, Gwenaelle Vaudel, Thomas Pezeril, Denis Mounier, Univ. du Maine (France) . . . . . [8260-54]

Time-resolved acoustic phonons in low dimensional objects *(Invited Paper)*, Arnaud Devos, Institut d'Electronique, de Microélectronique, et de Nanotechnologie (France) . . . . . [8260-55]

SESSION 13 . . . . . Wed. 10:45 am to 12:00 pm

High Harmonics, X-rays, and Attosecond Phenomena

Session Chairs: **Jin-Joo Song,** Univ. of California, San Diego (USA); **Kong-Thon Tsen,** Arizona State Univ. (USA)

Control and observation of attosecond electron dynamics in nanostructures *(Invited Paper)*, Matthias Friedrich Kling, Max-Planck-Institut für Quantenoptik (Germany) and Kansas-State Univ. (USA) . . . . . [8260-56]

Engineering high harmonic generation in semiconductors via pulse shaping, Matthias Reichelt, Andrea Walther, Jens Förstner, Torsten Meier, Univ. Paderborn (Germany) . . . . . [8260-57]

Ultrafast magnetism as seen by x-rays *(Invited Paper)*, Ilie E. Radu, Radboud Univ. Nijmegen (Netherlands) and Helmholtz-Zentrum Berlin, BESSY II (Germany); Kadir Vahaplar, Radboud Univ. Nijmegen (Netherlands); Christian Stamm, Torsten Kachel, Niko Pontius, Helmholtz-Zentrum Berlin (Germany); Hermann Duerr, SLAC National Accelerator Lab. (USA); Thomas Ostler, Joe Barker, Richard Evans, Roy Chantrell, The Univ. of York (United Kingdom); Arata Tsukamoto, Akiyoshi Itoh, Nihon Univ. (Japan); Andrei Kirilyuk, Theo Rasing, Alexey Kimel, Radboud Univ. Nijmegen (Netherlands) . . . [8260-58]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 14 . . . . . Wed. 1:30 to 3:15 pm

THz Spectroscopy II

Session Chair: **Thomas Dekorsy,** Univ. Konstanz (Germany)

Terahertz magneto-optics in the quantum Hall system *(Invited Paper)*, Ryo Shimano, The Univ. of Tokyo (Japan) . . . . . [8260-59]

THz time domain spectroscopy of quantum cascade lasers *(Invited Paper)*, Michael Martl, Juraj Darmo, Daniel Dietze, Alexander Benz, Christoph Deutsch, Herman Detz, Aaron Maxwell Andrews, Gottfried Strasser, Karl Unterrainer, Technische Univ. Wien (Austria) . . . . . [8260-60]

THz time-resolved investigation of a Cu/Cu_xO Schottky barrier *(Invited Paper)*, Pouya Maraghechi, Abdulhakem Y. Elezzabi, Univ. of Alberta (Canada) . . . . . [8260-61]

Terahertz spectroscopy of Ni-Ti alloy thin films, Yun-Shik Lee, Andrew D. Jameson, Joseph L. Tomaino, Michael J. Paul, Joshua W. Kevek, Ethan D. Minot, Meghan T. Hemphill-Johnston, Milo D. Koretsky, Oregon State Univ. (USA) . . . . . [8260-62]

SESSION 15 . . . . . Wed. 3:45 to 5:30 pm

Near-Field Imaging

Session Chair: **Markus Betz,** Technische Univ. Dortmund (Germany)

Terahertz near-field imaging of electric and magnetic resonances in plasmonic microstructures *(Invited Paper)*, Markus Walther, Jan Wallauer, Stefan Waselikowski, Albert-Ludwigs-Univ. Freiburg (Germany) . . . . . [8260-63]

Nanofocusing of mid-infrared light *(Invited Paper)*, Rainer Hillenbrand, CIC nanoGUNE Consolider (Spain) . . . . . [8260-64]

Experimental demonstration of an offset-apertured near-field scanning optical microscope probe, Matthew S. Sederberg, Jonathan A. J. Backs, Abdulhakem Y. Elezzabi, Univ. of Alberta (Canada) . . . . . [8260-65]

Bethe-hole magnetic polarization analyzer, Dai-Sik Kim, Seoul National Univ. (Korea, Republic of); H. W. Kihm, Harvard Univ. (USA); Sukmo Koo, Q. H. Kim, J. E. Kihm, Namkyoo Park, Seoul National Univ. (Korea, Republic of) . . [8260-66]

Combining nanooptical fields and coherent spectroscopy on systems with delocalized excitons, Marten Richter, Felix Schlosser, Mario Schoth, Technische Univ. Berlin (Germany); Sven Burger, Frank Schmidt, Zuse-Institut Berlin (ZIB) (Germany); Andreas Knorr, Technische Univ. Berlin (Germany); Shaul Mukamel, Univ. of California, Irvine (USA). . . . . [8260-67]

POSTERS-WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Laser initial chirp effect on femtosecond optical Kerr effect measurement, Hao Bian, Feng Chen, Hewei Liu, Qing Yang, Jinhai Si, Xi'an Jiaotong Univ. (China) . . . . . [8260-68]

A nanoplasmonic contour bowtie antenna for nanoscale confinement of mid-infrared radiation, Shawn Sederberg, Abdulhakem Y. Elezzabi, Univ. of Alberta (Canada) . . . . . [8260-69]

A dual-mode terahertz metallic resonator, Cameron J. Straatsma, Abdulhakem Y. Elezzabi, Univ. of Alberta (Canada) . . . . . [8260-70]

Courses of Related Interest

SC746 Introduction to Ultrafast Technology (Trebino) Tuesday, 1:30 to 5:30 pm
SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8261

Wednesday-Thursday 25-26 January 2012 • Proceedings of SPIE Vol. 8261

Terahertz Technology and Applications V

Conference Chairs: **Laurence P. Sadwick,** InnoSys, Inc. (USA); **Créidhe M. O'Sullivan,** National Univ. of Ireland, Maynooth (Ireland)

Program Committee: **Antao Chen,** Univ. of Washington (USA); **Robert H. Giles,** Univ. of Massachusetts Lowell (USA); **R. Jennifer Hwu,** InnoSys, Inc. (USA); **J. Anthony Murphy,** National Univ. of Ireland, Maynooth (Ireland); **Michael C. Wanke,** Sandia National Labs. (USA); **Tianxin Yang,** Tianjin Univ. (China)

Wednesday 25 January

SESSION 1 . . . . . Wed. 8:20 to 10:30 am

THz Imaging, Spectroscopy, and Instrumentation I

Session Chairs: **Laurence P. Sadwick,** InnoSys, Inc. (USA); **Tianxin Yang,** Tianjin Univ. (China)

Critical comparison of GaAs and InGaAs THz photoconductors *(Invited Paper)*, Elliott Brown, M. Martin, Wright State Univ. (USA) . . . . . [8261-01]

Portable terahertz spectrometer with InP related semiconductor photonic devices, Kyung Hyun Park, Namje Kim, Hyunsung Ko, Han-Cheol Ryu, Jeong-Woo Park, Sang-Pil Han, Electronics and Telecommunications Research Institute (Korea, Republic of); Min Yong Jeon, Chungnam National Univ. (Korea, Republic of) . . . . . [8261-02]

High-speed three-dimensional terahertz tomography using electronically controlled optical sampling, Kyung Hwan Jin, KAIST (Korea, Republic of); Jaeyong Joo, Korea Research Institute of Standards and Science (Korea, Republic of); Jong Chul Ye, KAIST (Korea, Republic of); Dae-Su Yee, Korea Research Institute of Standards and Science (Korea, Republic of) . . . . [8261-03]

Terahertz dynamic scanning reflectometry of soldier protective material, Anis Rahman, Applied Research & Photonics, Inc. (USA); Mark Mentzer, U.S. Army Aberdeen Test Ctr. (USA). . . . . [8261-04]

Towards monolithically integrated CMOS cameras for active imaging with 600 GHz radiation, Alvydas Lisauskas, Sebastian Boppel, Viktor Krozer, Hartmut G. Roskos, Johann Wolfgang Goethe-Univ. Frankfurt am Main (Germany) . . . . . [8261-05]

Liquid crystals for terahertz technology, Hongkyu Park, Fan Fan, Hong Kong Univ. of Science and Technology (Hong Kong, China); Haewook Han, Pohang Univ. of Science and Technology (Korea, Republic of); Vladimir G. Chigrinov, Emma MacPherson, Hong Kong Univ. of Science and Technology (Hong Kong, China) . . . . . [8261-06]

SESSION 2 . . . . . Wed. 11:00 am to 12:00 pm

THz Imaging, Spectroscopy, and Instrumentation II

Session Chairs: **Robert H. Giles,** Univ. of Massachusetts Lowell (USA); **Michael C. Wanke,** Sandia National Labs. (USA)

Miniature self-aligned external cavity tunable single frequency laser for THz imaging, Frank Havermeyer, Ondax, Inc. (USA); Christophe Moser, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Ron T. Logan, Jr., EMCORE Corp. (USA); Lawrence Ho, Ondax, Inc. (USA); Joseph R. Demers, EMCORE Corp. (USA) . . . . . [8261-07]

Evaluation of terahertz spectra using chemometric methods, Joachim Jonuscheit, Garik Torosyan, Frank Ellrich, Sabine Wohnsiedler, Michael Herrmann, Rene Beigang, Fraunhofer-Institut für Physikalische Messtechnik (Germany); Frank Platte, Konstantinos Nalpantidis, IANUS Simulation GmbH (Germany); Thorsten Sprenger, Heiko Wolf, Huebner GmbH (Germany) [8261-08]

Application of graphene membrane in micro-Golay cell array, Elizabeth Ledwosinska, Thomas Szkopek, McGill Univ. (Canada). . . . . [8261-09]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Wed. 1:30 to 3:20 pm

THz Modeling and Simulation

Session Chairs: **Laurence P. Sadwick,** InnoSys, Inc. (USA); **Créidhe M. O'Sullivan,** National Univ. of Ireland, Maynooth (Ireland)

Advances in terahertz *(Invited Paper)*, Dwight L. Woolard, U.S. Army Research Office (USA). . . . . [8261-11]

Energy conversion efficiency calculation model for direct-bonding planar-waveguide THz emitters based on optical rectification effects in GaAs, Tianxin Yang, Xuehui Niu, Junlong Wang, Mei Sang, Tianjin Univ. (China) . . . . . [8261-12]

Long-term frequency and amplitude stability of a solid-nitrogen-cooled continuous wave THz quantum cascade laser, Andriy Danylov, Jerry Waldman, Thomas M. Goyette, Alexander R. Light, Robert H. Giles, Xifeng Qian, Neelima Chandrayan, William D. Goodhue, Univ. of Massachusetts Lowell (USA); William E. Nixon, National Ground Intelligence Ctr. (USA). . . . . [8261-13]

Plasmonic response of grating-gated InGaAs/InP HEMT device to terahertz and millimeter wave radiation, Nima Nader Esfahani, Robert E. Peale, Christopher J. Fredricksen, Univ. of Central Florida (USA); Justin Cleary, Walter R. Buchwald, Air Force Research Lab. (USA) . . . . . [8261-14]

New developments in waveguide mode matching techniques for far-infrared astronomy, J. Anthony Murphy, Neil Trappe, Stephen Doherty, Tully Peacocke, National Univ. of Ireland, Maynooth (Ireland) . . . . . [8261-15]

SESSION 4 . . . . . Wed. 3:50 to 5:10 pm

THz Sources, Generation, and Detection I

Session Chairs: **Laurence P. Sadwick,** InnoSys, Inc. (USA); **R. Jennifer Hwu,** InnoSys, Inc. (USA)

Spoof plasmon analogue of metal-insulator-metal waveguides, Mikhail A. Kats, David Woolf, Romain Blanchard, Nanfang Yu, Harvard Univ. (USA); Federico Capasso, Harvard School of Engineering and Applied Sciences (USA) . . . . . [8261-16]

Wide-range broadband terahertz emission from high chi(2) dendrimer, Anis Rahman, Applied Research & Photonics, Inc. (USA) . . . . . [8261-17]

Thin-film platinum nanowires as sub-wavelength bolometers, Pauline Renoux, Sigurdur A. Jónsson, Univ. of Iceland (Iceland); Levente J. Klein, Hendrik F. Hamann, IBM Thomas J. Watson Research Ctr. (USA); Snorri Ingvarsson, Univ. of Iceland (Iceland). . . . . [8261-18]

Terahertz transmission enhancement through GaN quantum wells controlled by DC voltage, Laurent Thibault, Institut d'Électronique Fondamentale (France); Rajesh Sharma, Jérémi Torres, Philippe Nouvel, Stephane Blin, Alexandre Penot, Luca Varani, Dominique Coquillat, Wojciech Knap, Univ. Montpellier 2 (France); Yvon Codier, M. Chmielowska, S. Chenot, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France); Jean-Pierre Faurie, Bernard Beaumont, LUMILOG (France); E. Starikov, Z. Shiktorov, Viktoras Gruzinskis, TeraVil Ltd. (Lithuania); Vadym Korotyeyev, Viatcheslav Kochelap, V. Lashkaryov Institute of Semiconductor Physics (Ukraine). [8261-19]

POSTERS-WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Aberrations of the large aperture attenuating THz lenses, Maciej Sypek, Warsaw Univ. of Technology (Poland); Jean-Louis Coutaz, IMEP-LAHC (France); Andrzej Kolodziejczyk, Michal Makowski, Jaroslaw Suszek, Warsaw Univ. of Technology (Poland) . . . . . [8261-10]

Thursday 26 January

SESSION 5 . . . . . Thurs. 8:00 to 10:10 am

THz Sources, Generation, and Detection II

Session Chairs: **Laurence P. Sadwick,** InnoSys, Inc. (USA);
Tianxin Yang, Tianjin Univ. (China)

Real-world applications of terahertz pulsed technology *(Invited Paper)*, Philip F. Taday, TeraView Ltd. (United Kingdom) . . . . . [8261-20]

One-half milliwatt 2.33 THz CW QCL operating at 77K, Xifeng Qian, Neelima Chandrayan, Shivashankar R. Vangala, William D. Goodhue, Andriy Danylov, Jerry Waldman, Robert Giles, Univ. of Massachusetts Lowell (USA); William Nixon, National Ground Intelligence Ctr. (USA). . . . . [8261-21]

Backwards wave oscillators combined with solid state frequency multipliers extend spectral coverage of electronic sources to 2.2 THz, Walter C. Hurlbut, Microtech Instruments, Inc. (USA); Vladimir G. kozlov, LightCounting LLC (USA); Dylan Fast, Microtech Instruments, Inc. (USA) . . . . . [8261-22]

Upper band operation of active photonic crystal terahertz lasers, Alexander Benz, Martin Brandstetter, Christoph Deutsch, Hermann Detz, Aaron M. Andrews, Werner Schrenk, Gottfried Strasser, Karl Unterrainer, Technische Univ. Wien (Austria) . . . . . [8261-23]

Portable real-time THz imaging setup based on QC lasers, Giacomo Scalari, Christopher Bonzon, Maria Amanti, Fabrizio Castellano, Dana Turcinkova, Mattias Beck, Jerome Faist, ETH Zurich (Switzerland) . . . . . [8261-24]

Exploring performance limits of silicon CMOS FET detectors for THz frequencies, Sebastian Boppel, Alvydas Lisauskas, Johann Wolfgang Goethe-Univ. Frankfurt am Main (Germany); Linas Minkevičius, Dalius Seliuta, Irmantas Ka?alynas, Gintaras Valu?is, TeraVil Ltd. (Lithuania); Viktor Krozer, Hartmut G. Roskos, Johann Wolfgang Goethe-Univ. Frankfurt am Main (Germany) . . . . . [8261-25]

SESSION 6 . . . . . Thurs. 10:40 am to 12:00 pm

THz Materials and Configurations

Session Chairs: **Antao Chen,** Univ. of Washington (USA);
J. Anthony Murphy, National Univ. of Ireland, Maynooth (Ireland)

Propagation loss optimization in dielectric/metal coated hollow flexible terahertz waveguides, Pallavi Doradla, Cecil S. Joseph, Jayant Kumar, Robert H. Giles, Univ. of Massachusetts Lowell (USA). . . . . [8261-26]

Thin Film Lithium Tantalate (TFLT®) pyroelectric detectors, Vincent E. Stenger, SRICO Inc. (USA) . . . . . [8261-27]

Metamaterial-based tunable absorber in the infrared regime, Iftekhar Mirza, Shouyuan Shi, Univ. of Delaware (USA); Ahmed Sharkawy, Lumilant, Inc. (USA); Dennis Prather, Univ. of Delaware (USA) . . . . . [8261-28]

Changing growth of neurites of sensory ganglions by terahertz radiation, Maria Tsurkan, Olga Smolyanskaya, Victor Bespalov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Valentina Penniyainen, Pavlov Institute of Physiology (Russian Federation); Anna Kipenko, Ekaterina Lopatina, Pavlov Institute of Physiology (Russian Federation) and Almazov Federal Heart, Blood and Endocrinology Ctr. (Russian Federation); Boris Krylov, Pavlov Institute of Physiology (Russian Federation) . . . . . [8261-29]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 7 . . . . . Thurs. 1:30 to 3:00 pm

THz Sources, Generation, and Detection III

Session Chairs: **Laurence P. Sadwick,** InnoSys, Inc. (USA);
R. Jennifer Hwu, InnoSys, Inc. (USA)

Advances in biomedical imaging using THz technology *(Invited Paper)*, Zachary D. Taylor, Univ. of California, Los Angeles (USA) . . . . . [8261-30]

Generation and detection of broadband THz pulses (>10 THz) with organic nonlinear optical crystals OH1 and DSTMS as alternatives to DAST, Mojca Jazbinsek, Rainbow Photonics AG (Switzerland); Marcel Stillhart, Blanca Ruiz, ETH Zurich (Switzerland); Carolina Medrano, Rainbow Photonics AG (Switzerland); Peter Günter, ETH Zurich (Switzerland) . . . . . [8261-31]

Terahertz generation from quasi-phase matched gallium arsenide using a type II ring cavity optical parametric oscillator, Walter C. Hurlbut, Vladimir G. Kozlov, Patrick F. Tekavec, Microtech Instruments, Inc. (USA); Konstantin L. Vodopyanov, Stanford Univ. (USA). . . . . [8261-32]

Log periodic antenna coupled microbolometer using low temperature VOx for the mm-wave detection, Daesung Lee, Korea Electronics Technology Institute (Korea, Republic of). . . . . [8261-33]

SESSION 8 . . . . . Thurs. 3:30 to 4:30 pm

THz Sources, Generation, and Detection IV

Session Chairs: **Laurence P. Sadwick,** InnoSys, Inc. (USA);
Robert H. Giles, Univ. of Massachusetts Lowell (USA)

Continuous wave terahertz reflection imaging of ex vivo nonmelanoma skin cancers, Cecil S. Joseph, Univ. of Massachusetts Lowell (USA); Anna N. Yaroslavsky, Univ. of Massachusetts Lowell (USA) and Massachusetts General Hospital (USA); Victor A. Neel, Massachusetts General Hospital (USA); Thomas M. Goyette, Robert H. Giles, Univ. of Massachusetts Lowell (USA) . . . . [8261-34]

THz time-domain spectroscopy in different carbon nanotube and graphene thin-films, Ehsan Dadrasnia, Horacio Lamela Rivera, Univ. Carlos III de Madrid (Spain); Mohan Babu Kuppam, Frédéric Garet, Jean-Louis Coutaz, IMEP-LAHC (France) . . . . . [8261-35]

Laser driven generation of intense single-cycle THz field, Carlo Vicario, Clemens Ruchert, Paul Scherrer Institut (Switzerland); Fernando L. Ardana, Christoph P. Hauri, Paul Scherrer Institut (Switzerland) and Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8261-36]

Courses of Related Interest

SC547	Terahertz Wave Technology and Applications (Zhang) Sunday, 1:30 to 5:30 pm
SC747	Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Gallium Nitride Materials and Devices VII

Conference Chairs: **Jen-Inn Chyi,** National Central Univ. (Taiwan); **Yasushi Nanishi,** Ritsumeikan Univ. (Japan); **Hadis Morkoç,** Virginia Commonwealth Univ. (USA)

Conference Co-Chairs: **Joachim Piprek,** NUSOD Institute LLC (USA); **Euijoon Yoon,** Seoul National Univ. (Korea, Republic of)

Program Committee: **Hiroshi Amano,** Nagoya Univ. (Japan); **Jong Hyeob Baek,** Korea Photonics Technology Institute (Korea, Republic of); **Shoou-Jinn Chang,** National Cheng Kung Univ. (Taiwan); **Shigefusa F. Chichibu,** Tohoku Univ. (Japan); **Hiroshi Fujioka,** The Univ. of Tokyo (Japan); **Bernard Gil,** Univ. Montpellier 2 (France); **Nicolas Grandjean,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Shangjr Gwo,** National Tsing Hua Univ. (Taiwan); **Hideki Hirayama,** RIKEN (Japan); **Detlef Hommel,** Univ. Bremen (Germany); **Yoichi Kawakami,** Kyoto Univ. (Japan); **Nam Seog Kim,** Seoul Semiconductor (Korea, Republic of); **Katsumi Kishino,** Sophia Univ. (Japan); **Michael Kneissl,** Technische Univ. Berlin (Germany); **Hao-Chung Kuo,** National Chiao Tung Univ. (Taiwan); **Narihiko Maeda,** NTT Photonics Labs. (Japan); **Hideto Miyake,** Mie Univ. (Japan); **Yong-Tae Moon,** LG Electronics Inc. (Korea, Republic of); **Takashi Mukai,** Nichia Corp. (Japan); **Ümit Özgür,** Virginia Commonwealth Univ. (USA); **Young Soo Park,** Samsung Advanced Institute of Technology (Korea, Republic of); **Ulrich T. Schwarz,** Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); **Tae-Yeon Seong,** Korea Univ. (Korea, Republic of); **Jong-In Shim,** Hanyang Univ. (Korea, Republic of); **Chih-Chung Yang,** National Taiwan Univ. (Taiwan)

Monday 23 January

SESSION 1 . . . . . Mon. 8:00 to 10:00 am

Growth I

Session Chair: **Hadis Morkoç,** Virginia Commonwealth Univ. (USA)

High growth rate of AlGaN for buffer structures for GaN on Si to increase throughput *(Invited Paper)*, Koh Matsumoto, Akinori Ubukata, Kazutada Ikenaga, Kazuki Naito, Jun Yamamoto, Yoshiki Yano, Toshiya Tabuchi, Akira Yamaguchi, Yuzaburo Ban, Kosuke Uchiyama, Taiyo Nippon Sanso EMC Ltd. (Japan) . . . . . [8262-01]

Low temperature growth of group III nitrides by pulsed sputtering and its applications to large area devices *(Invited Paper)*, Hiroshi Fujioka, The Univ. of Tokyo (Japan) and JST-CREST (Japan) . . . . . [8262-02]

Reduction of threading dislocation density by regrowth on In-polar InN, Tsutomu Araki, Tsutomu Sakamoto, Akira Miki, Nao Uematsu, Yuuki Takamatsu, Ritsumeikan Univ. (Japan); Tomohiro Yamaguchi, Kogakuin Univ. (Japan); Euijoon Yoon, Seoul National Univ. (Korea, Republic of); Yasushi Nanishi, Ritsumeikan Univ. (Japan) . . . . . [8262-03]

Pyramid nano-voids in GaN and InGaN, Andrew Yankovich, Alex V. Kvit, Univ. of Wisconsin-Madison (USA); Huiyong Liu, Xing Li, Fang Zhang, Vitaliy Avrutin, Natalia Izyumskaya, Umit Ozgur, Hadis Morkoc, Virginia Commonwealth Univ. (USA); Paul M. Voyles, Univ. of Wisconsin-Madison (USA) . . . . . [8262-04]

Effects of tensile strain on GaN nano- and micro-rods growth on Si (111) substrates, Suk-Min Ko, Jong-Moon Yoon, Yong-Hoon Cho, KAIST (Korea, Republic of) . . . . . [8262-05]

SESSION 2 . . . . . Mon. 10:30 am to 12:00 pm

Growth II

Session Chair: **Euijoon Yoon,** Seoul National Univ. (Korea, Republic of)

Reduction of dislocation density and strain by three-dimensional islands growth on TiC buffer layer in HVPE-GaN crystal *(Invited Paper)*, Akira Usui, Haruo Sunakawa, Norihiko Sumi, Kazutomi Yamamoto, Huiyuan Geng, Furukawa Co., Ltd. (Japan); Atsushi Yamaguchi, Kanazawa Institute of Technology (Japan) . . . . . [8262-06]

GaN substrates with variable vicinal angle for laser diode applications, Marcin Sarzynski, Tadeusz Suski, Piotr Perlin, Michal Leszczynski, Institute of High Pressure Physics (Poland) . . . . . [8262-07]

Molecular beam epitaxial growth and characterization of nearly intrinsic and Si-doped InN nanowires, Songrui Zhao, Saeed Fathololoumi, Kai Cui, McGill Univ. (Canada); Qiming Li, George T. Wang, Sandia National Labs. (USA); Zetian Mi, McGill Univ. (Canada) . . . . . [8262-08]

Growth of less bowed GaN/sapphire using low temperature GaN with nanocolumnar microstructure and InN interlayer, In Su Shin, Keon-Hun Lee, Sung Hyun Park, Dae Young Moon, Minhwa Kim, Seoul National Univ. (Korea, Republic of); Jinsub Park, Hanyang Univ. (Korea, Republic of); Yasushi Nanishi, Ritsumeikan Univ. (Japan); Euijoon Yoon, Seoul National Univ. (Korea, Republic of) . . . . . [8262-09]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Mon. 1:30 to 3:00 pm

Doping

Session Chair: **Yasushi Nanishi,** Ritsumeikan Univ. (Japan)

Carbon-doped p-type (0001) plane AlGaN (Al= 0.06 to 0.55) with high hole density *(Invited Paper)*, Hideo Kawanishi, Kogakuin Univ. (Japan) . . . . [8262-10]

Rare earth doping of III-nitrides: in situ doping vs. ion implantation, Katharina Lorenz, S. Magalhães, S. Miranda, N. Catarino, N. Franco, E. Alves, Instituto Tecnológico e Nuclear (Portugal); M. Peres, J. Rodrigues, T. Monteiro, Univ. de Aveiro (Portugal); I. Roqan, K. O'Donnell, Univ. of Strathclyde (United Kingdom); E. Nogales, B. Mendez, Univ. Complutense de Madrid (Spain); V. Fellmann, B. Daudin, Commissariat à l'Énergie Atomique (France); A. Nishikawa, Y. Fujiwara, Osaka Univ. (Japan) . . . . . [8262-11]

A local vibration mode in a carbon doped (1-101)AlGaN, Nobuhiko Sawaki, Kiyotaka Hagiwara, Aichi Institute of Technology (Japan); Norikatsu Koide, Yoshio Honda, Masahito Yamaguchi, Hiroshi Amano, Nagoya Univ. (Japan) . . . . . [8262-12]

AlGaN polarization doping for highly efficient LEDs, Joachim Piprek, NUSOD Institute LLC (USA) . . . . . [8262-13]

SESSION 4 . . . . . Mon. 3:30 to 6:00 pm

Material Characterization

Session Chair: **Joachim Piprek,** NUSOD Institute LLC (USA)

Natural band alignments of wurtzite InN/GaN/AlN heterojunctions *(Invited Paper)*, Shangjr Gwo, Cheng-Tai Kuo, National Tsing Hua Univ. (Taiwan) . . . . . [8262-14]

Recombination and diffusion processes in polar and nonpolar bulk GaN investigated by time-resolved photoluminescence and nonlinear optical techniques, Kestutis Jarasiunas, Patrik Scajev, Ramunas Aleksiejunas, Vilnius Univ. (Lithuania); Serdal Okur, Umit Ozgur, Hadis Morkoc, Virginia Commonwealth Univ. (USA); Jacob Leach, Tanya Paskova, Kyma Technologies, Inc. (USA) . . . . [8262-15]

Absence of electron accumulation at the InN(11-20) cleavage surface, Holger Eisele, Technische Univ. Berlin (Germany); Sarah Schaafhausen, Forschungszentrum Jülich GmbH (Germany); Andrea Lenz, Technische Univ. Berlin (Germany); Aizhan Sabitova, Forschungszentrum Jülich GmbH (Germany); Lena Ivanova, Mario Daehne, Technische Univ. Berlin (Germany); Y. L. Hong, Shangjr Gwo, National Tsing Hua Univ. (Taiwan); Philipp Ebert, Forschungszentrum Jülich GmbH (Germany) . . . . . [8262-16]

Structural and electronic properties of Al_2O_3/InN heterointerfaces, Kana Okubo, Atsushi Kobayashi, Jitsuo Ohta, Hiroshi Fujioka, Masaharu Oshima, The Univ. of Tokyo (Japan) . . . . . [8262-17]

Cathodoluminescence microscopy of polarization-reduced GaN directly grown on patterned (112) Si substrate, Frank Bertram, Sebastian Metzner, Christopher Karbaum, Juergen Christen, Otto-von-Guericke-Univ. Magdeburg (Germany); Shujian Liu, Natalia Izyumskaya, Vitaliy Avrutin, Ümit Özgür, Hadis Morkoç, Virginia Commonwealth Univ. (USA) . . . . . [8262-18]

Auger effect in nonpolar quantum wells, Lukas Schade, Ulrich T. Schwarz, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) and Univ. Freiburg (Germany); Tim Wernicke, Technische Univ. Berlin (Germany); Markus Weyers, Ferdinand-Braun-Institut (Germany); Michael Kneissl, Technische Univ. Berlin (Germany) and Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik, Berlin (Germany) . . . . . [8262-19]

Electron paramagnetic resonance study of the Mg impurity in nitride films, Mary Ellen Zvanut, Jamiyanaa Dashdorj, The Univ. of Alabama at Birmingham (USA) . . . . . [8262-20]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 5 . . . . . Tues. 10:30 am to 12:00 pm

Nano Structures and Devices I

Session Chair: **Jen-Inn Chyi,** National Central Univ. (Taiwan)

Terahertz emitters based on GaN/AlGaN HEMTs *(Invited Paper)*, Wojciech Knap, Nina Dyakonova, Dominique Coquillat, Frederic Teppe, Univ. Montpellier 2 (France). . . . . [8262-21]

Scaling of GaN single nanowire MOSFET with cut-off frequency 150GHz, Jeng-Wei Yu, Yuh-Renn Wu, Lung-Han Peng, National Taiwan Univ. (Taiwan) . . . . . [8262-22]

Hardened planar nitride based cold cathode electron emitter, Rajeev R. Pillai, Integrated Micro Sensors, Inc. (USA); David Starikov, Integrated Micro Systems, Inc. (USA); Chris Boney, Abdelhak Bensaoula, Univ. of Houston (USA) . . . . . [8262-23]

Properties of (In,Ga)N/GaN single quantum wells on defect-free micro-crystals obtained by molecular beam epitaxial overgrowth of GaN nanowires on Si(111), Pinar Dogan, Sergio Fernandez-Garrido, Oliver Brandt, Jonas Lähnemann, Raffaella Calarco, Achim Trampert, Lutz Geelhaar, Henning Riechert, Paul-Drude-Institut für Festkörperelektronik (Germany) . . . . . [8262-24]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 6 . . . . . Tues. 1:30 to 3:10 pm

Nano Structures and Devices II

Session Chair: **Shangjr Gwo,** National Tsing Hua Univ. (Taiwan)

Molecular beam epitaxy growth of InGaN nanowires and InGaN/GaN nanowire heterostructures *(Invited Paper)*, Bruno Daudin, Gabriel Tourbot, Diane Sam-Giao, Catherine Bougerol, Adeline Grenier, David Cooper, Bruno Gayral, Commissariat à l'Énergie Atomique (France); Zackaria Mahfoud, Mathieu Kociak, Univ. Paris-Sud 11 (France) . . . . . [8262-25]

Impact of surface-related effects on the exciton luminescence from GaN nanowires *(Invited Paper)*, Oliver Brandt, Paul-Drude-Institut für Festkörperelektronik (Germany) . . . . . [8262-26]

Reduction of dislocation density in GaN nanorods, Che-Hao Liao, Horng-Shyang Chen, Chih-Yen Chen, Chieh Hsieh, Wen-Ming Chang, Hao-Tsung Chen, Yu-Feng Yao, Chih-Chung Yang, National Taiwan Univ. (Taiwan)[8262-27]

Helium temperature scanning transmission electron microscopy cathodoluminescence for nano-characterization of nitrides, Jürgen Christen, Frank Bertram, Gordon Schmidt, Peter Veit, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . . . [8262-28]

SESSION 7 . . . . . Tues. 3:40 to 5:20 pm

Nano Structures and Devices III

Session Chair: **Oliver Brandt,** Paul-Drude-Institut für Festkörperelektronik (Germany)

Photonic cavities with high quality factors embedding nitride quantum dots *(Invited Paper)*, Thierry Guillet, Meletios Mexis, Univ. Montpellier 2 (France) and CNRS (France); Delphine Néel, Institut d'Électronique Fondamentale (France); Sylvain Sergent, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France); Christelle Brimont, Thierry Bretagnon, Bernard Gil, Univ. Montpellier 2 (France) and CNRS (France); Diane Sam-Giao, Bruno Gayral, Commissariat à l'Énergie Atomique (France); Fabrice Semond, Mathieu Leroux, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France); Sylvain David, Xavier Checoury, Philippe Boucaud, Institut d'Électronique Fondamentale (France) . . . . . [8262-29]

3D GaN for core-shell LEDs *(Invited Paper)*, Andreas Waag, Technische Univ. Braunschweig (Germany) . . . . . [8262-30]

Electronic and thermal tuning of violet GaN coupled cavity laser, Oleg Guziy, Technische Univ. Delft (Netherlands); Mike Leszczynski, Piotr Perlin, Institute of High Pressure Physics (Poland); Huub Salemink, Technische Univ. Delft (Netherlands). . . . . [8262-31]

Lasing action in gallium nitride photonic quasicrystal nanorod arrays, Shih-Pang Chang, Kuok-Pan Sou, National Chiao Tung Univ. (Taiwan); Yuh-Jen Cheng, Academia Sinica (Taiwan); Yi-Chen Chen, Hao-Chung Kuo, National Chiao Tung Univ. (Taiwan) . . . . . [8262-32]

Wednesday 25 January

SESSION 8 . . . . . Wed. 8:00 to 10:10 am

Photovoltaic Devices

Session Chair: **Bernard Gil,** Univ. Montpellier 2 (France)

Nitride semiconductor based photo-chemical cells *(Invited Paper)*, Kazuhiro Ohkawa, Tokyo Univ. of Science (Japan) . . . . . [8262-33]

Concentrating properties of nitride-based solar cells, Mikiko Mori, Shota Yamamoto, Yosuke Kuwahara, Takahiro Fujii, Tatsuro Nakao, Shinichiro Kondo, Motoaki Iwaya, Tetsuya Takeuchi, Satoshi Kamiyama, Isamu Akasaki, Meijo Univ. (Japan); Hiroshi Amano, Nagoya Univ. (Japan) . . . . . [8262-34]

High efficiency InGaN solar cell with a graded p-InGaN top layer, Nobuhiko Sawaki, Tomoki Fujisawa, Aichi Institute of Technology (Japan) . . . . . [8262-35]

Efficiency enhancement of InGaN multi-quantum-well solar cells via antireflective SiO_2 nano-honeycombs, Po-Han Fu, Guan-Jhong Lin, Cheng-Han Ho, Chin-An Lin, Kun-Yu Lai, Jr-Hau He, National Taiwan Univ. (Taiwan) . . . . . [8262-36]

Optimization of electrode structure in GaInN based solar cells, Shota Yamamoto, Mikiko Mori, Tatsuro Nakao, Shinichiro Kondo, Yosuke Kuwahara, Yoshiki Morita, Takahiro Fujii, Toru Sugiyama, Motoaki Iwaya, Tetsuya Takeuchi, Satoshi Kamiyama, Isamu Akasaki, Meijo Univ. (Japan); Hiroshi Amano, Nagoya Univ. (Japan) . . . . . [8262-37]

Temperature dependent behavior of the surface photovoltage for GaN, Michael A. Foussekis, Joy D. McNamara, Fan Zhang, Hadis Morkoc, Michael A. Reshchikov, Alison A. Baski, Virginia Commonwealth Univ. (USA) . . . . [8262-38]

SESSION 9 . . . . . Wed. 10:40 am to 12:00 pm

Laser Diodes I

Session Chair: **Hiroshi Fujioka,** The Univ. of Tokyo (Japan)

Absorber bias dependence of self-pulsation in GaN-based multi-section laser diodes, Wolfgang G. Scheibenzuber, Ulrich T. Schwarz, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Luca Sulmoni, Julien Dorsaz, Jean-Francois Carlin, Nicolas Grandjean, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8262-39]

Analysis of the deep level responsible for the degradation of InGaN-based laser diodes by DLTS, Matteo Meneghini, Carlo de Santi, Nicola Trivellin, Gaudenzio Meneghesso, Enrico Zanoni, Univ. degli Studi di Padova (Italy); Shinichi Takigawa, Kenji Orita, Tsuyoshi Tanaka, Panasonic Corp. (Japan). . . . . [8262-40]

Highly doped GaN: a material for plasmonic claddings for blue/green InGaN laser diodes, Piotr Perlin, Lucja Marona, Tadek Suski, Szymon Grzanka, Mike Leszczynski, Michal Bockowski, Institute of High Pressure Physics (Poland); Maciej Kuc, Tomasz Czyszanowski, Robert Sarzała, Technical Univ. of Lodz (Poland). . . . . [8262-41]

Estimation of the recombination coefficients in aged InGaN laser diodes, Lucja Marona, Piotr Perlin, Szymon Grzanka, Robert Czernecki, Tadek Suski, Mike Leszczynski, Michal Bockowski, Institute of High Pressure Physics (Poland) . . . . . [8262-42]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 10 . . . . . Wed. 1:30 to 2:50 pm

Laser Diodes II

Session Chair: **Akira Usui,** Furukawa Co., Ltd. (Japan)

Polarization of eigenmodes and the effect on the anisotropic gain in laser structures on nonpolar and semipolar GaN, Jens Rass, Tim Wernicke, Simon Ploch, Technische Univ. Berlin (Germany); Moritz Brendel, Andreas Kruse, Andreas Hangleiter, Technische Univ. Braunschweig (Germany); Wolfgang Scheibenzuber, Ulrich Schwarz, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Markus Weyers, Ferdinand-Braun-Institut (Germany); Michael Kneissl, Technische Univ. Berlin (Germany) . . . . . [8262-43]

Effect of ridge waveguide etch depth on laser threshold of InGaN MQW laser diodes, Luca Redaelli, Technische Univ. Berlin (Germany) and Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (Germany); Joachim Piprek, NUSOD Institute LLC (USA); Carsten Netzel, Avia Linke, Yuri V. Flores, Sven Einfeldt, Ferdinand-Braun-Institut (Germany); Michael Kneissl, Technische Univ. Berlin (Germany) and Ferdinand-Braun-Institut (Germany); Günther Tränkle, Ferdinand-Braun-Institut (Germany) . . . . . [8262-44]

Modeling gallium-nitride-based semiconductor blue lasers for data storage of information technology, Meng-Mu Shih, Univ. of Florida (USA) . . . [8262-45]

Comparison of gain formation in polar and nonpolar/semipolar laser diodes from violet to green, Thiago Melo, Claude Weisbuch, Univ. of California, Santa Barbara (USA); Mathew C. Schmidt, Aurelien David, Bryan Ellis, Christiane Poblenz, You-Da Lin, Michael R. Krames, James W. Raring, Soraa, Inc. (USA) . . . . . [8262-46]

SESSION 11 . . . . . Wed. 3:20 to 4:35 pm

Poster Highlights

Session Chair: **Ümit Özgür,** Virginia Commonwealth Univ. (USA)

This session will include 5-minute oral presentations of the Posters listed below.

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Impact of carrier localization, recombination, and diffusivity on excited state dynamics in InGaN/GaN quantum wells and double heterostructures, Kestutis Jarasiunas, Vilnius Univ. (Lithuania) and Virginia Commonwealth Univ. (USA); Tadas Malinauskas, Arunas Kadys, Tomas Grinys, Saulius Nargelas, Ramunas Aleksiejunas, Saulius Miasojedovas, Juras Mickevicius, Roland Tomasiunas, Mikas Vengris, Vilnius Univ. (Lithuania); Serdal Okur, Xing Li, Fang Zhang, Vitaliy Avrutin, Umit Ozgur, Hadis Morkoc, Virginia Commonwealth Univ. (USA) . . . . . [8262-63]

Impact of indium surface segregation on optical properties of ultrathin InGaN/GaN quantum wells, Mykhaylo V. Klymenko, Kharkov National Univ. of Radio Electronics (Ukraine); Igor A. Sukhoivanov, Univ. de Guanajuato (Mexico); Oleksiy V. Shulika, Kharkov National Univ. of Radio Electronics (Ukraine) . . . . . [8262-64]

Measurements of off-state electrical stress in InAlN/AlN/GaN heterostructure field-effect transistors with varying In compositions, Romualdo A. Ferreyra, Cemil Kayis, Mo Wu, Umit Ozgur, Hadis Morkoç, Virginia Commonwealth Univ. (USA) . . . . . [8262-65]

AlGaN/GaN based field effect transistors for terahertz detection and imaging, Maciej Sakowicz, Maria B. Lifshits, Oleg A. Klimenko, Salman Nadar, Dominique Coquillat, Nina Dyakonova, Frédéric Teppe, Univ. Montpellier 2 (France); Christophe Gaquière, Institut d'Electronique, de Microélectronique, et de Nanotechnologie (France); Marie-Antoinette Poisson, Sylvain Delage, III-V Lab. (France); Wojciech Knap, Univ. Montpellier 2 (France) . . . . . [8262-66]

Degradation in InAlN/AlN/GaN heterostructure field-effect transistors using low-frequency noise and current-transient methods: hot phonon effects, Cemil Kayis, Romualdo A. Ferreyra, Mo Wu, Xing Li, Ümit Özgür, Virginia Commonwealth Univ. (USA); Arvydas Matulionis, TeraVil Ltd. (Lithuania); Hadis Morkoç, Virginia Commonwealth Univ. (USA). . . . . [8262-67]

Efficiency enhancement of GaN/In0.11Ga0.89N solar cells grown on strain release sapphire substrate and biomimetic anti-reflection surface, Hsun-Wen Wang, Chien-Chung Lin, Hao-Wei Han, Min-An Tsai, Hao-Chung Kuo, Peichen Yu, Shiuan-Huei Lin, National Chiao Tung Univ. (Taiwan) [8262-68]

Investigation of emission polarization and strain in InGaN/GaN multiple quantum wells on nanorod epitaxially lateral overgrowth templates, Huei-Min Huang, Tien-Chang Lu, Chiao-Yun Chang, Yu-Pin Lan, Shih-Chun Ling, Wei-Wen Chan, Hao-Chung Kuo, Shing-Chung Wang, National Chiao Tung Univ. (Taiwan) . . . . . [8262-69]

Free-standing a-plane GaN substrates grown by HVPE, Yin-Hao Wu, Yen-Hsien Yeh, Kuei-Ming Chen, Yu-jen Yang, Wei-I Lee, National Chiao Tung Univ. (Taiwan) . . . . . [8262-70]

Homoepitaxial growth of GaN on nonpolar and semipolar free-standing substrates, Daiki Jinno, Bei Ma, Hideto Miyake, Kazumasa Hiramatsu, Mie Univ. (Japan) . . . . . [8262-71]

High performance 375 nm ultraviolet InGaN/AlGaN light-emitting diodes by using a heavily Si-doped GaN growth mode transition layer, Shih-Cheng Huang, Po-Min Tu, Shun-Kuei Yang, Ya-Wen Lin, Chih-Peng Hsu, Advanced Optoelectronic Technology, Inc. (Taiwan). . . . . [8262-72]

Reduction of efficiency droop in InGaN-based UV light-emitting diodes with InAlGaN barrier, Ching-Hsueh Chiu, Po-Min Tu, Jet-Rung Chang, Wei-Ting Chang, Hao-Chung Kuo, Chun-Yen Chang, National Chiao Tung Univ. (Taiwan) . . . . . [8262-73]

Thermally stable low-resistance Ohmic contacts to N-polar n-type GaN for high-power vertical light-emitting diodes, Joon-Woo Jeon, Tae-Yeon Seong, Korea Univ. (Korea, Republic of) . . . . . [8262-74]

Effect of MOCVD growth conditions on the optical properties of semipolar (1 -1 0 1) GaN on Si patterned substrates, Natalya Izyumskaya, Shujian Liu, Vitaliy Avrutin, Serdal Okur, Ümit Özgür, Virginia Commonwealth Univ. (USA); Sebastian Metzner, Christopher Karbaum, Frank Bertram, Juergen Christen, Otto-von-Guericke-Univ. Magdeburg (Germany); David Smith, Arizona State Univ. (USA); Hadis Morkoç, Virginia Commonwealth Univ. (USA) . . . . . [8262-75]

Degradation mechanism of InAlN/GaN based HFETs under high electric field stress, Congyong Zhu, Mo Wu, Cemil Kayis, Fan Zhang, Xing Li, Vitaliy Avrutin, Umit Ozgur, Hadis Morkoc, Virginia Commonwealth Univ. (USA) . . . . . [8262-76]

Electrical properties of ZnO:Ga as a transparent conducting oxide in InGaN-based light emitting diodes, Huiyong Liu, Xing Li, Fan Zhang, Vitaliy Avrutin, Natalia Izyumskaya, Ümit Özgür, Virginia Commonwealth Univ. (USA); Andy Yankovich, Alex Kvit, Paul Voyles, Univ. of Wisconsin-Madison (USA); Hadis Morkoç, Virginia Commonwealth Univ. (USA). . . . . [8262-77]

Effects of polarization fields on avalanche breakdown of AlGaN quantum-well photodiode, Shengkun Zhang, Borough of Manhattan Community College (USA); Wubao Wang, Robert Alfano, The City College of New York (USA); Amir Dabiran, Andrew Wowchak, Peter Chow, SVT Associates, Inc. (USA). . [8262-78]

Thursday 26 January

SESSION 12 . . . . . Thurs. 8:00 to 10:10 am

LEDs I

Session Chair: **Andreas Waag,** Technische Univ. Braunschweig (Germany)

Highly efficient InGaN/GaN blue LED on 8-inch Si (111) substrate *(Invited Paper)*, Jun-Youn Kim, Youngjo Tak, Jaekyun Kim, Hyun-Gi Hong, Suhee Chae, Jae Won Lee, Hyoji Choi, Young Soo Park, U-In Chung, Samsung Advanced Institute of Technology (Korea, Republic of); Jong-Ryeol Kim, Sejong Univ. (Korea, Republic of); Jongin Shim, Hanyang Univ. (Korea, Republic of) . . . . . [8262-47]

Roles of the radiative and nonradiative recombination rates on the efficiency droop in InGaN-based quantum-well light-emitting diodes, Jong-In Shim, Hyunsung Kim, Dong-Soo Shin, Hanyang Univ. (Korea, Republic of); Han-Youl Ryu, Inha Univ. (Korea, Republic of); Yong-Tae Moon, Dae-Seob Han, Joong-Seo Park, LG Electronics Inc. (Korea, Republic of). . . . . [8262-48]

Device characteristics of InGaN quantum well light-emitting diodes with AlInN thin barrier insertion, Guangyu Liu, Jing Zhang, Lehigh Univ. (USA); Hongping Zhao, Case Western Reserve Univ. (USA); Nelson Tansu, Lehigh Univ. (USA) . . . . . [8262-49]

The quantum efficiency of InGaN light emitting diodes: effects of active layer design, electron cooler, and electron blocking layer, Xing Li, Fan Zhang, Serdal Okur, Shujian Liu, Umit Ozgur, Hadis Morkoc, Virginia Commonwealth Univ. (USA); Steve M. Hong, Sheng-Horng Yen, Ta-Cheng Hsu, Epistar Corp. (Taiwan); Arvydas Matulionis, TeraVil Ltd. (Lithuania). . . . [8262-50]

High-voltage thin GaN LEDs array, Ray-Hua Horng, Jia-Hua Lin, Dong-Sing Wuu, National Chung Hsing Univ. (Taiwan). . . . . [8262-51]

InGaN/GaN quantum-well light-emitting diodes with a reversed piezoelectric polarization field, Meng-Jie Lee, Hsueh-Hsing Liu, Jen-Inn Chyi, National Central Univ. (Taiwan) . . . . . [8262-52]

SESSION 13 . . . . . Thurs. 10:40 am to 12:10 pm

LEDs II

Session Chair: **Jong-In Shim,** Hanyang Univ. (Korea, Republic of)

VLED for Si wafer-level packaging *(Invited Paper)*, Chiming Chen, Jui-Kang Yen, Chen-Fu Chu, Yung-Wei Chen, Semi-Photonics Co., Ltd. (Taiwan); Chingfu Tsou, Chunming Chang, Feng Chia Univ. (Taiwan); Trung Doan, Chuong A. Tran, Semi-Photonics Co., Ltd. (Taiwan) . . . . . [8262-53]

Large-scaled fabrication of InGaN Nanowire LED using economic nano-crack lithography, Po-Hsiang Chang, Meng-Che Tsai, Yun-Chorng Chang, National Cheng Kung Univ. (Taiwan). . . . . [8262-54]

Improved performance of 375 nm InGaNAlGaN light-emitting diodes by incorporating a heavily Si-doped transition layer, Shih-Cheng Huang, Kun-Ching Shen, National Chung Hsing Univ. (Taiwan); Po-Min Tu, National Chiao Tung Univ. (Taiwan); Dong-Sing Wuu, National Chung Hsing Univ. (Taiwan); Hao-Chung Kuo, National Chiao Tung Univ. (Taiwan); Ray-Hua Horng, National Chung Hsing Univ. (Taiwan) . . . . . [8262-55]

Improved performance of nonpolar a-plane GaN light emitting diodes by controlled integration of silica nano-spheres into GaN buffer layers, Sung Hyun Park, Seoul National Univ. (Korea, Republic of); Jinsub Park, Hanyang Univ. (Korea, Republic of); Kisu Joo, Duck-Jae You, Daeyoung Moon, Dong-Uk Kim, Hojun Jang, Seunghyun Moon, Yoon-Kyu Song, Heonsu Jeon, Seoul National Univ. (Korea, Republic of); Yasushi Nanishi, Ritsumeikan Univ. (Japan); Euijoon Yoon, Seoul National Univ. (Korea, Republic of) . . . . . [8262-56]

Lunch/Exhibition Break . . . . . 12:10 to 1:40 pm

SESSION 14 . . . . . Thurs. 1:40 to 3:00 pm

LEDs III

Session Chair: **Katsumi Kishino,** Sophia Univ. (Japan)

Production technology of high power LED grown on 6" sapphire substrate for general illumination *(Invited Paper)*, MyeongSeok Oh, LG Innotek (Korea, Republic of) . . . . . [8262-57]

Nitride- and oxynitride-based phosphors for LED lighting devices *(Invited Paper)*, Yongchi Tian, Lightscape Materials, Inc. (USA) . . . . . [8262-58]

High-efficiency phosphor-free InGaN/GaN dot-in-a-wire white-light-emitting diodes on silicon, Hieu P. Nguyen, Kai Cui, Shaofei Zhang, Saeed Fathololoumi, Roufan Wu, Zetian Mi, McGill Univ. (Canada) . . . . . [8262-59]

SESSION 15 . . . . . Thurs. 3:30 to 5:00 pm

Novel Devices

Session Chair: **Hadis Morkoç,** Virginia Commonwealth Univ. (USA)

Polariton lasers based on GaN microcavities *(Invited Paper)*, Alexey V. Kavokin, Univ. of Southampton (United Kingdom) . . . . . [8262-60]

III-nitride intersubband photonics *(Invited Paper)*, Francois H. Julien, Univ. Paris-Sud 11 (France) . . . . . [8262-61]

Second harmonic generation in GaN-based photonic crystals for single molecule investigations *(Invited Paper)*, Dominique Coquillat, Jérémi Torres, Marine Le Vassor d'Yerville, David Cassagne, Frédéric Teppe, Nina Dyakonova, Wojciech Knap, Univ. Montpellier 2 (France); Richard M. De La Rue, Univ. of Malaya (Malaysia); Sophie Bouchoule, Ctr. National de la Recherche Scientifique (France); Emmanuel Margeat, Catherine Royer, Ctr. de biochimie Structurale (France) . . . . . [8262-62]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8263

Sunday-Wednesday 22-25 January 2012 • Proceedings of SPIE Vol. 8263

Oxide-based Materials and Devices III

Conference Chairs: **Ferechteh H. Teherani,** Nanovation (France); **David C. Look,** Wright State Univ. (USA); **David J. Rogers,** Nanovation (France)

Program Committee: **Ivan Bozovic,** Brookhaven National Lab. (USA); **Stefan T. Bromley,** Univ. de Barcelona (Spain); **Jean-Jacques Delaunay,** The Univ. of Tokyo (Japan); **Aleksandra B. Djurisic,** The Univ. of Hong Kong (Hong Kong, China); **Rodrigo Ferrão de Paiva Martins,** CEMOP/Uninova (Portugal); **Michael D. Gerhold,** U.S. Army Research Office (USA); **Hanns-Ulrich Habermeier,** Max-Planck-Institut für Festkörperforschung (Germany); **Axel Hoffmann,** Technische Univ. Berlin (Germany); **Masashi Kawasaki,** Tohoku Univ. (Japan); **Katharina Lorenz,** Instituto Tecnológico e Nuclear (Portugal); **Andreia Luisa da Rosa,** Univ. Bremen (Germany); **Tatsuo Okada,** Kyushu Univ. (Japan); **Manijeh Razeghi,** Northwestern Univ. (USA); **Bruno Viana,** Ecole Nationale Supérieure de Chimie de Paris (France); **Takafumi Yao,** Tohoku Univ. (Japan)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:00 to 10:00 am

Highly Conducting Transparent Oxides I

Session Chairs: **David C. Look,** Wright State Univ. (USA); **Axel Hoffmann,** Technische Univ. Berlin (Germany)

Making highly conductive ZnO: creating donors and killing acceptors, David C. Look, Wright State Univ. (USA); Kevin D. Leedy, Air Force Research Lab. (USA) . . . . . [8263-01]

Optical characterization of high mobility polycrystalline ZnO:Al films *(Invited Paper)*, Florian Ruske, Mark Wimmer, Grit Köppel, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (Germany); Andreas Pflug, Fraunhofer-Institut für Schicht- und Oberflächentechnik (Germany); Bernd Rech, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH (Germany) . . . . . [8263-02]

First-principles investigation of unusual electronic structures of oxides *(Invited Paper)*, Su-Huai Wei, National Renewable Energy Lab. (USA) . . [8263-03]

Hydrothermal growth and properties of group III (indium, gallium, and aluminum) doped bulk ZnO crystals *(Invited Paper)*, Buguo Wang, Solid State Scientific Corp. (USA); Michael Snure, Matthew Mann, Air Force Research Lab. (USA); David Look, Wright State Univ. (USA) . . . . . [8263-04]

Novel fabrication method for ZnO films via nitrogen-mediated crystallization *(Invited Paper)*, Naho Itagaki, Kazunari Kuwahara, Kouichi Matsushima, Kouichiro Oshikawa, Kyushu Univ. (Japan) . . . . . [8263-05]

SESSION 2 . . . . . Sun. 10:25 to 11:40 am

Highly Conducting Transparent Oxides II

Session Chairs: **Axel Hoffmann,** Technische Univ. Berlin (Germany); **David C. Look,** Wright State Univ. (USA)

Unraveling the mystery of conductivity at polar/nonpolar perovskite interfaces *(Invited Paper)*, Scott A. Chambers, Pacific Northwest National Lab. (USA) . . . . . [8263-06]

Properties of TCO anodes deposited by APCVD and their applications to OLED lighting *(Invited Paper)*, Roman Y. Korotkov, Pierre Ricou, Liang Fang, Arkema Research Ctr. (USA); Holger Schwab, Manfred Ruske, Philips Technologie GmbH (Germany); Daniel Gaspar, Asanga B. Padmaperuma, Pacific Northwest National Lab. (USA) . . . . . [8263-07]

Electronic and optical properties of transparent conductive oxides from ab-initio calculations *(Invited Paper)*, Andre Schleife, Lawrence Livermore National Lab. (USA); Claudia Roedl, Frank Fuchs, Karsten Hannewald, Juergen Furthmueller, Benjamin Hoeffling, Friedrich-Schiller-Univ. Jena (Germany); Patrick Rinke, Fritz-Haber-Institut der Max-Planck-Gesellschaft (Germany); Joel B. Varley, Anderson Janotti, Chris G. Van de Walle, Univ. of California, Santa Barbara (USA); Friedhelm Bechstedt, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8263-08]

Lunch Break . . . . . 11:40 am to 12:40 pm

SESSION 3 . . . . . Sun. 12:40 to 2:20 pm

Doping and Band Structure Studies

Session Chairs: **Masashi Kawasaki,** Tohoku Univ. (Japan); **Andreia Luisa da Rosa,** Univ. Bremen (Germany)

Thermal process induced change of conductivity in As-doped ZnO *(Invited Paper)*, Chi-Chung Ling, S. C. Fan, The Univ. of Hong Kong (China) . . . . . [8263-09]

Doped gallium oxide nanowires for photonics *(Invited Paper)*, Emilio Nogales, Iñaki López, Bianchi Méndez, Javier Piqueras, Univ. Complutense de Madrid (Spain); Katharina Lorenz, Eduardo Alves, Instituto Tecnológico e Nuclear (Portugal); José Ángel García, Univ. del País Vasco (Spain) . . . . . [8263-10]

Structural defects and shallow impurities in ZnO *(Invited Paper)*, Axel Hoffmann, Markus R. Wagner, Technische Univ. Berlin (Germany) [8263-11]

Proliferating metal-insulator transition by x-ray in an electron doped vanadium dioxide thin film *(Invited Paper)*, Keisuke Shibuya, RIKEN (Japan); Masashi Kawasaki, Yoshinori Tokura, The Univ. of Tokyo (Japan) . . . . [8263-12]

SESSION 4 . . . . . Sun. 2:20 to 3:35 pm

Material Growth

Session Chairs: **Michael D. Gerhold,** U.S. Army Research Office (USA); **Takafumi Yao,** Tohoku Univ. (Japan)

Growth and characterization of large-diameter lithium-free ZnO single crystals *(Invited Paper)*, Shaoping Wang, Fairfield Crystal Technology, LLC (USA) . . . . . [8263-13]

New application fields of periodically polarity-inverted ZnO structures *(Invited Paper)*, Jinsub Park, Hanyang Univ. (Korea, Republic of); Soon-Ku Hong, Chungnam National Univ. (Korea, Republic of); Jiho Chang, Korea Maritime Univ. (Korea, Republic of); Takafumi Yao, Tohoku Univ. (Japan) . . . . . [8263-14]

Innovative and cost-effective eco-synthesis of oxide-based materials by Electrostatic Spray Assisted Vapour Deposition *(Invited Paper)*, Kwang L. Choy, The Univ. of Nottingham (United Kingdom) . . . . . [8263-15]

SESSION 5 . . . . . Sun. 4:00 to 6:25 pm

Light Emitters I

Session Chairs: **David J. Rogers,** Nanovation (France); **Aleksandra B. Djurisic,** The Univ. of Hong Kong (Hong Kong, China)

Recent advances and novel approaches of p-type doping of zinc oxide *(Invited Paper)*, Oleg Maksimov, The Pennsylvania State Univ. (USA) . . [8263-67]

ZnO microwire quantum well heterostructures, Christof P. Dietrich, Martin Lange, Marko Stölzel, Helena Franke, Marius Grundmann, Univ. Leipzig (Germany) . . . . . [8263-16]

Modification and applications of ZnO nanocrystals by laser irradiation *(Invited Paper)*, Tatsuo Okada, Kota Okazaki, Kazuki Kubo, Tetsuya Shimogaki, Mitsuhiro Higashihata, Daisuke Nakamura, Kyushu Univ. (Japan) . . . . . [8263-17]

White-light lasing in ZnO microspheres fabricated by laser ablation *(Invited Paper)*, Shinya Okamoto, Yosuke Minowa, Masaaki Ashida, Osaka Univ. (Japan) . . . . . [8263-18]

White light upconversion emission in Yb^{3+}/ Er^{3+}/ Tm^{3+} codoped oxy-fluoride lithium tungsten tellurite glass ceramics *(Invited Paper)*, Ghizal F. Ansari, All Saints' College of Technology (India); Sachin K. Mahajan, Samrat Ashok Technological Institute (India) . . . . . [8263-19]

Optimization of photoluminescence and electroluminescence of silicon nanocrystals in a superlattice host *(Invited Paper)*, Michael Roman, Dennis W. Prather, Univ. of Delaware (USA) . . . . . [8263-20]

Monday 23 January

SESSION 6 . . . . . Mon. 8:00 to 9:15 am

Light Emitters II

Session Chairs: **Aleksandra B. Djurisic,** The Univ. of Hong Kong (Hong Kong, China); **David J. Rogers,** Nanovation (France)

Metal oxide nanostructures and white light emission *(Invited Paper)*, Magnus Willander, Linköping Univ. (Sweden) . . . . . [8263-21]

ZnO nanowire for tunable near-UV blue LED *(Invited Paper)*, Bruno Viana, Ecole Nationale Supérieure de Chimie de Paris (France) . . . . . [8263-22]

Photoresponse comparison of indium oxide (In_2O_3) nanomaterials *(Invited Paper)*, Shayla Sawyer, Liqiao Qin, Dali Shao, Rensselaer Polytechnic Institute (USA) . . . . . [8263-23]

SESSION 7 . . . . . Mon. 9:15 to 10:05 am

Material Processing

Session Chairs: **Michael D. Gerhold,** U.S. Army Research Office (USA); **Masashi Kawasaki,** Tohoku Univ. (Japan)

Oxide crystal-fibers grown by micro-pulling-down technique and applications for lasers and scintillators *(Invited Paper)*, Julien Didierjean, FiberCryst (France); François Balembois, Lab. Charles Fabry (France); Nicolas Aubry, Didier Perrodin, Jean-Marie Fourmigué, Adrien Aubourg, Igor Martial, FiberCryst (France); Xavier Delen, Patrick Georges, Lab. Charles Fabry (France) . . . . . [8263-24]

Novel approach for chemical lift-off and wafer bonding of (In)GaN based devices using sacrificial ZnO template layers *(Invited Paper)*, Abdallah Ougazzaden, Georgia Tech-Lorraine (France); David J. Rogers, Ferechteh H. Teherani, Nanovation (France); Simon Gautier, Tarik Moudakir, Supélec (France); Manijeh Razeghi, Northwestern Univ. (USA) . . . . . [8263-25]

SESSION 8 . . . . . Mon. 10:30 to 11:45 am

Band Gap Engineering

Session Chairs: **Stefan T. Bromley,** Univ. de Barcelona (Spain); **David J. Rogers,** Nanovation (France)

Highly correlated quantum Hall system realized at MgZnO/ZnO interfaces *(Invited Paper)*, Yusuke Kozuka, Joseph Falson, The Univ. of Tokyo (Japan); Denis Maryenko, RIKEN (Japan); Atsushi Tsukazaki, The Univ. of Tokyo (Japan); Christopher Bell, Minu Kim, Yasuyuki Hikita, Harold Y. Hwang, Stanford Univ. (USA); Shintaro Nakamura, Satoshi Awaji, Tohoku Univ. (Japan); Kazunori Ueno, Masashi Kawasaki, The Univ. of Tokyo (Japan) . . . . . [8263-26]

Time-resolved photuminescence spectroscopy investigations of nonpolar homoepitaxial ZnO/(Zn,Mg)O quantum wells *(Invited Paper)*, Thierry Bretagnon, Luc Béaur, Bernard Gil, Thierry Guillet, Christelle Brimont, Univ. Montpellier 2 (France); Jean-Michel Chauveau, Univ. de Nice Sophia Antipolis (France) . . . . . [8263-27]

Ion beams as a tool for advanced structural characterization in ZnO-based materials *(Invited Paper)*, Andrés Redondo-Cubero, Katharina Lorenz, Eduardo Alves, Instituto Tecnológico e Nuclear (Portugal); Raul Gago, Instituto de Ciencia de Materiales de Madrid (Spain); Adrian Hierro, Univ. Politécnica de Madrid (Spain); Mykola Vinnichenko, Helmholtz-Zentrum Dresden-Rossendorf e. V. (Germany); Jean-Michel Chauveau, Ctr. de Recherche sur l'Hétéro-Epitaxie et ses Applications (France); Atsushi Nakamura, Shizuoka Univ. (Japan); Matthias Krause, Helmholtz-Zentrum Dresden-Rossendorf e. V. (Germany); Jiro Temmyo, Shizuoka Univ. (Japan); Elias Muñoz, Univ. Politécnica de Madrid (Spain); Matthias Brandt, Fritz Henneberger, Humboldt-Univ. zu Berlin (Germany) . . . . . [8263-28]

Lunch Break . . . . . 11:45 am to 12:45 pm

SESSION 9 . . . . . Mon. 12:45 to 3:15 pm

Optical Properties

Session Chairs: **Katharina Lorenz,** Instituto Tecnológico e Nuclear (Portugal); **Rodrigo Ferrão de Paiva Martins,** CEMOP/Uninova (Portugal)

Optical properties of excitons in $CuMO_2$ delafossite-type oxide thin films *(Invited Paper)*, Takayuki Makino, RIKEN (Japan) . . . . . [8263-29]

Microscopic origins of the surface exciton photoluminescence in ZnO nanostructures *(Invited Paper)*, Enda McGlynn, Dublin City Univ. (Ireland) . . . . . [8263-30]

Excitonic transport in ZnO *(Invited Paper)*, Frank Bertram, Martin Noltemeyer, Thomas Hempel, Juergen Christen, Otto-von-Guericke-Univ. Magdeburg (Germany); Matthias A. Brandt, Michael Lorenz, Marius Grundmann, Univ. Leipzig (Germany) . . . . . [8263-31]

Electro-optical properties of barium titanate films epitaxially grown on silicon *(Invited Paper)*, Stefan Abel, Daniele Caimi, Marilyne Sousa, Thilo Stöferle, Christophe P. Rossel, Chiara Marchiori, IBM Zürich Research Lab. (Switzerland); Alexei Chelnokov, CEA-LETI (France); Jean Fompeyrine, IBM Zürich Research Lab. (Switzerland). . . . . [8263-32]

Optical probe of heterointerfaces composed of correlated electron oxides *(Invited Paper)*, Masao Nakamura, RIKEN (Japan) and The Univ. of Tokyo (Japan); Masashi Kawasaki, Yoshinori Tokura, The Univ. of Tokyo (Japan). . . . . [8263-33]

Tuning optical properties of complex oxides: examples of nanoporous materials and perovskite heterostructures *(Invited Paper)*, Peter V. Sushko, Univ. College London (United Kingdom). . . . . [8263-34]

SESSION 10 . . . . . Mon. 3:40 to 4:55 pm

Oxide-Organic Hybridation

Session Chairs: **Axel Hoffmann,** Technische Univ. Berlin (Germany); **Manijeh Razeghi,** Northwestern Univ. (USA)

Inorganic/organic ZnO-based hybrid structures for opto-electronics *(Invited Paper)*, Fritz Henneberger, Humboldt-Univ. zu Berlin (Germany) . [8263-35]

Functionalization of ZnO surfaces with organic molecules *(Invited Paper)*, Andreia Luisa da Rosa, Ney Moreira, Adriel Dominguez, Thomas Frauenheim, Univ. Bremen (Germany) . . . . . [8263-36]

Transparent conducting oxides for building applications *(Invited Paper)*, Arnaud Verger, Saint-Gobain Recherche (France) . . . . . [8263-37]

SESSION 11 . . . . . Mon. 4:55 to 6:05 pm

Oxide-based Devices I

Session Chairs: **Bruno Viana,** Ecole Nationale Supérieure de Chimie de Paris (France); **Rodrigo Ferrão de Paiva Martins,** CEMOP/Uninova (Portugal)

Reactive dual magnetron sputtering of Ta_2O_5, Y_2O_3, TiO_2, Al_2O_3, Zr_2O_3, and Nb_2O_3: optical and structural properties and thin film applications, Stuart J. Pearce, Hassan Esfandiarijahromi, Martin D. B. Charlton, Univ. of Southampton (United Kingdom) . . . . . [8263-38]

P-type oxide thin film transistors produced at low temperatures *(Invited Paper)*, Rodrigo Ferrão de Paiva Martins, CEMOP/Uninova (Portugal) . . . . . [8263-39]

Multicomponent dielectrics for oxide TFT *(Invited Paper)*, Luis M. Pereira, Pedro Barquinha, Gonçalo Gonçalves, Elvira Fortunato, Rodrigo Martins, Univ. Nova de Lisboa (Portugal) and CEMOP/UNINOVA (Portugal) . . . . . [8263-40]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 12 . . . . . Tues. 10:30 am to 12:10 pm

Oxide-based Devices II

Session Chairs: **Rodrigo Ferrão de Paiva Martins,** CEMOP/Uninova (Portugal); **Bruno Viana,** Ecole Nationale Supérieure de Chimie de Paris (France)

Growth and characterization of Ga_2O_3 on sapphire substrates for UV sensor applications *(Invited Paper)*, Sin-Liang Ou, Dong-Sing Wuu, Yu-Chuan Fu, Tzu-Yu Wang, Ray-Hua Horng, National Chung Hsing Univ. (Taiwan) . . . . . [8263-41]

Controlling trap depth to enhance optical properties of oxides materials for medical imaging *(Invited Paper)*, Bruno Viana, Ecole Nationale Supérieure de Chimie de Paris (France) . . . . . [8263-42]

Development of functional magnetic nanoparticles for biomedical application *(Invited Paper)*, Yuko Ichiyanagi, Yokohama National Univ. (Japan) . . . . . [8263-43]

Vertically aligned ZnO-$ZnGa_2O_4$ core-shell nanowires for photoelectrochemical water splitting *(Invited Paper)*, Miao Zhong, Yanbo Li, Jean-Jacques Delaunay, The Univ. of Tokyo (Japan) . . . . . [8263-44]

Lunch/Exhibition Break . . . . . 12:10 to 1:10 pm

SESSION 13 . . . . . Tues. 1:10 to 3:35 pm

Superconductivity

Session Chairs: **Hanns-Ulrich Habermeier,** Max-Planck-Institut für Festkörperforschung (Germany); **Ivan Bozovic,** Brookhaven National Lab. (USA)

Transient and persistent photoconductivity in complex oxide heterostructures and superlattices *(Invited Paper)*, Hanns-Ulrich Habermeier, Max-Planck-Institut für Festkörperforschung (Germany) . . . . . [8263-45]

Atomic-layer engineering of oxide superconductors *(Invited Paper)*, Ivan Bozovic, Brookhaven National Lab. (USA) . . . . . [8263-46]

Metallic quantum well states in artificial structures based on strongly correlated oxide *(Invited Paper)*, Hiroshi Kumigashira, The Univ. of Tokyo (Japan) . . . . . [8263-47]

Tuning elecronic phases by electric double layer transistor *(Invited Paper)*, Yoshihiro Iwasa, The Univ. of Tokyo (Japan) and RIKEN (Japan) . . . . . [8263-48]

X-ray absorption spectroscopy (XAS) study of superconducting thin film single crystals *(Invited Paper)*, Hiroyuki Oyanagi, National Institute of Advanced Industrial Science and Technology (Japan); Akio Tsukada, NTT Basic Research Labs. (Japan) and Tokyo Univ. of Agriculture and Technology (Japan); Michio Naito, Tokyo Univ. of Agriculture and Technology (Japan) . . . . . [8263-49]

Progress in development of nanostructured YBCO films with engineered artificial pinning centers, Paolo Mele, Hiroshima Univ. (Japan); Kaname Matsumoto, Kyushu Institute of Technology (Japan); Ataru Ichinose, Central Research Institute of Electric Power Industry (Japan); Yutaka Yoshida, Nagoya Univ. (Japan); Masashi Mukaida, Kyushu Univ. (Japan); Ryusuke Kita, Shizuoka Univ. (Japan) . . . . . [8263-50]

SESSION 14 . . . . . Tues. 4:00 to 6:30 pm

Growth, Properties, and Applications of Nanostructures

Session Chairs: **Jean-Jacques Delaunay,** The Univ. of Tokyo (Japan); **Tatsuo Okada,** Kyushu Univ. (Japan)

Structure and properties of nano-oxides: a theoretical overview *(Invited Paper)*, Stefan T. Bromley, Univ. de Barcelona (Spain) . . . . . [8263-51]

Morphological effects on optical and electrical properties of ZnO nanostructures *(Invited Paper)*, Sang Hyun Lee, Jun Xu, Xiaoguang Zhang, Chad M. Parish, Ho Nyung Lee, Barton Smith, Oak Ridge National Lab. (USA); Takafumi Yao, Takenari Goto, Hiroshi Miyazaki, Tohoku Univ. (Japan) . [8263-52]

Real-space distribution of cavity modes in single ZnO nanowires *(Invited Paper)*, Frank Güell, Univ. de Barcelona (Spain); Alejandro R. Goñi, Consejo Superior de Investigaciones Científicas (Spain); Josep Oriol Ossó, MATGAS (Spain); Luis A. Perez, Eduardo A. Coronado, La Univ. Nacional de Córdoba (Argentina); Joan Ramón Morante, Institut de Recerca en Energia de Catalunya (Spain) . . . . . [8263-53]

Influence of hydrothermal treatment on morphology and properties of ZnO nanostructures *(Invited Paper)*, Xin Yi Chen, Alan M. C. Ng, Aleksandra B. Djurišić, Wai Kin Chan, The Univ. of Hong Kong (Hong Kong, China) . . [8263-54]

Solution-based strategies for synthesizing ZnO nanostructures with controlled morphology and composition *(Invited Paper)*, Xudong Wang, Univ. of Wisconsin-Madison (USA) . . . . . [8263-55]

Engineered ZnO nanowire arrays for novel photonic devices *(Invited Paper)*, János Volk, Research Institute for Technical Physics and Materials Science (Hungary); Zoltán Szabó, Research Institute for Technical Physics and Materials Science (Hungary) and Univ. of Pannonia, Faculty of Information Technology (Hungary); Róbert Erdélyi, Khanh Quoc Nguyen, Research Institute for Technical Physics and Materials Science (Hungary) . . . . . [8263-56]

Wednesday 25 January

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Fabrication and characterization of titanium dioxide and zinc oxide based ultraviolet photodetectors, James C. Moore, Ryan Stansell, Laura R. Covington, Coastal Carolina Univ. (USA) . . . . . [8263-57]

Effect of V dopants on the electrical and optical properties of AZO thin films prepared by magnetron sputtering, Yu Shan Wei, Cheng-Yi Liu, National Central Univ. (Taiwan) . . . . . [8263-58]

Analysis of ZnO microfilms luminescence features caused by shallow levels, Mikhail V. Ryzhkov, Charus M. Briskina, Valery M. Markushev, Stepan Rumyantsev, Andrey Borodkin, Institute of Radio Engineering and Electronics (Russian Federation) . . . . . [8263-59]

Carrier-concentration separation model for transparent conducting Sn:In_2O_3, Yen-Shuo Liu, Yung Hsun Lin, Cheng-Yi Liu, National Central Univ. (Taiwan) . . . . . [8263-60]

Mach-Zehnder optical sensor based on pedestal anti-resonant reflecting optical waveguides, Daniel Orquiza de Carvalho, Marco Isaías Alayo, Escola Politecnica da Univ. de São Paulo (Brazil) . . . . . [8263-61]

Time-resolved photoluminescence study of homoepitaxial ZnO/ZnMgO quantum wells grown by metal organic vapor phase epitaxy, Thierry Bretagnon, Univ. Montpellier 2 (France); Nadia Haneche, Univ. de Versailles Saint-Quentin-en Yvelines (France); Luc Béaur, Univ. Montpellier 2 (France); Alain Lusson, Corinne Sartel, Vincent Sallet, Univ. de Versailles Saint-Quentin-en Yvelines (France) . . . . . [8263-62]

Erbium-doped silicon MOS devices for optoelectronic applications, Joan Manel Ramírez, Yonder Berencén, Federico Ferrarese-Lupi, Olivier Jambois, Daniel Navarro-Urrios, Univ. de Barcelona (Spain); Oleksiy Anopchenko, Alessandro Marconi, Nikola Prtljaga, Andrea Tengattini, Lorenzo Pavesi, Univ. degli Studi di Trento (Italy); Jean-Phillippe Colonna, Jean-Marc Fédéli, CEA-LETI (France); Blas Garrido, Univ. de Barcelona (Spain) . . . . . [8263-63]

Green-emissive $BaSi_2O_5:Eu^{2+}$ thin film phosphor and its transparent plasma display application, Sang Hyun Lim, Pukyong National Univ. (Korea, Republic of) . . . . . [8263-64]

Electroluminescence in thick $ZnGa_2O_4$: Mn^{2+} phosphor film, Ji Min Lim, Pukyung National Univ. (Korea, Republic of) . . . . . [8263-65]

Investigation for stressed Kane type semiconductors, Subhamoy Singha Roy, JIS College of Engineering (India) . . . . . [8263-66]

Conference 8264

Monday-Wednesday 23-25 January 2012 • Proceedings of SPIE Vol. 8264

Integrated Optics: Devices, Materials, and Technologies XVI

Conference Chairs: **Jean Emmanuel Broquin,** IMEP-LAHC (France); **Gualtiero Nunzi Conti,** Istituto di Fisica Applicata Nello Carrara (Italy)

Conference Co-Chairs: **Pierre Berini,** Univ. of Ottawa (Canada); **Christoph M. Greiner,** LightSmyth Technologies, Inc. (USA)

Program Committee: **Pavel Cheben,** National Research Council Canada (Canada); **Xudong Fan,** Univ. of Michigan (USA); **Helmut Heidrich,** Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); **Andrea Melloni,** Politecnico di Milano (Italy); **Robert L. Nelson,** Air Force Research Lab. (USA); **Jens H. Schmid,** National Research Council Canada (Canada); **Frank Schmidt,** Konrad-Zuse-Zentrum für Informationstechnik Berlin (Germany); **Yakov Sidorin,** Quarles Brady LLP (USA); **Stefano Taccheo,** Swansea Univ. (United Kingdom); **Christoph A. Wächter,** Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); **Qiwen Zhan,** Univ. of Dayton (USA)

Monday 23 January

SESSION 1 . . . . . Mon. 8:10 to 10:20 am

Waveguide Engineering I

Session Chair: **Jean Emmanuel Broquin,** IMEP-LAHC (France)

Hybrid organic integrated optical isolators *(Invited Paper)*, Robert A. Norwood, College of Optical Sciences, The Univ. of Arizona (USA). . . . [8264-01]

Magneto-optical mode conversion in a hybrid glass waveguide made by sol-gel and ion-exchange techniques, François Royer, Hadi Amata, Univ. Jean Monnet Saint-Etienne (France); François Parsy, IMEP-LAHC (France); Damien Jamon, Univ. Jean Monnet Saint-Etienne (France); Elise Ghibaudo, Jean Emmanuel Broquin, IMEP-LAHC (France); Sophie Neveu, Univ. Pierre et Marie Curie (France) . . . . . [8264-02]

Slow light electro-optic modulator based on EO polymer-infiltrated slotted silicon photonic crystal waveguides, Shin-ichiro Inoue, Akira Otomo, National Institute of Information and Communications Technology (Japan). . . . . [8264-03]

TiO_2 nanophotonic waveguides for on-chip nonlinear optical devices, Jonathan D. B. Bradley, Christopher C. Evans, Jennifer T. Choy, Orad Reshef, Parag B. Deotare, Marko Loncar, Eric Mazur, Harvard Univ. (USA) . . . . [8264-04]

Fabrication of barrier-type slab waveguides in Er^{3+}-doped tellurite glass by single- and double-energy MeV N^+ ion implantation, István Bányász, Zsolt Zolnai, Research Institute for Solid-State Physics and Optics (Hungary); Stefano Pelli, Simone Berneschi, Gualtiero Nunzi-Conti, Istituto di Fisica Applicata Nello Carrara (Italy); Miklós Fried, Tivadar Lohner, Péter Petrik, Research Institute for Solid-State Physics and Optics (Hungary); Massimo Brenci, Giancarlo C. Righini, Istituto di Fisica Applicata Nello Carrara (Italy). . . . . [8264-05]

On-chip electro-optic waveguides in isotropic liquid crystal blends for switching applications, Florenta A. Costache, Martin Blasl, Kirstin Bornhorst, Harald Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [8264-06]

SESSION 2 . . . . . Mon. 10:50 am to 12:20 pm

Amplifiers and Lasers

Session Chair: **Gualtiero Nunzi Conti,** Istituto di Fisica Applicata Nello Carrara (Italy)

Rare-earth activated potassium double tungstate waveguide lasers and amplifiers *(Invited Paper)*, Sonia M. García-Blanco, Dimitri Geskus, Koop Van Dalfsen, Shanmugam Aravazhi, Markus Pollnau, Univ. Twente (Netherlands) . . . . . [8264-07]

1.55-µm hybrid waveguide laser made by ion-exchange and wafer bonding, Marco Casale, Davide Bucci, Lionel Bastard, Jean-Emmanuel Broquin, IMEP-LAHC (France) . . . . . [8264-08]

Supercontinuum generation using integrated Q-switched laser made by ion-exchange, Bertrand Charlet, Fabien Geoffray, Lionel Bastard, Jean-Emmanuel Broquin, Institut de Microélectronique Électromagnétisme et Photonique (France) . . . . . [8264-09]

Analytical modeling of mid-infrared silicon raman lasers, Jichi Ma, Sasan Fathpour, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8264-10]

Lunch Break . . . . . 12:20 to 1:40 pm

SESSION 3 . . . . . Mon. 1:40 to 3:30 pm

Photonic Integration

Session Chair: **Pavel Cheben,** National Research Council Canada (Canada)

Hybrid silicon/III-V laser sources based on adiabatic mode transformers *(Invited Paper)*, Badhise Ben Bakir, Antoine Descos, Nicolas Olivier, Damien Bordel, Philippe Grosse, Jean Marc Fedeli, CEA-LETI (France) [8264-11]

Edge-emitting III-V/Si hybrid laser: fabrication and efficient coupling to silicon waveguide, Olesya Bondarenko, Qing Gu, Aleksandar Simic, Boris Slutsky, Maziar Nezhad, Yeshaiahu Fainman, Univ. of California, San Diego (USA) . . . . . [8264-12]

Recombination and loss mechanisms in Ga(NAsP)/(BGa)P QW lasers grown lattice-matched to exact (001) silicon, Nadir Hossain, Stephen Sweeney, Univ. of Surrey (United Kingdom); Sven Liebich, Peter Ludewig, Martin Zimprich, Kerstin Volz, Bernardette Kunert, Philipps-Univ. (Germany); Wolfgang Stolz, Philipps-Univ. Marburg (Germany) . . . . . [8264-13]

Highly efficient coupling between a photonic crystal cavity and a bus waveguide, Kapil Debnath, Thomas F. Krauss, Liam O'Faolain, Univ. of St. Andrews (United Kingdom) . . . . . [8264-14]

Polymer waveguides based on silicon optical benches, Chin-Ta Chen, Bo-Kuan Shen, Chia-Chi Chang, Jen-Yu Li, Hsu-Liang Hsiao, National Central Univ. (Taiwan); Yun-Chih Lee, Centera Photonics Inc. (Taiwan); Mount-Learn Wu, National Central Univ. (Taiwan) . . . . . [8264-15]

SESSION 4 . . . . . Mon. 4:00 to 5:40 pm

Modelling

Session Chair: **Christoph A. Wächter,** Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)

A perturbation approach for the design of coupled resonator optical waveguides (CROWs), Osman S. Ahmed, McMaster Univ. (Canada); Mohamed A. Swillam, Univ. of Toronto (Canada); Mohamed H. Bakr, Xun Li, McMaster Univ. (Canada). . . . . [8264-16]

Theoretical model for the effective nonlinearity of surface plasmons based on a Green function formalism, Israel De Leon, Robert W. Boyd, Univ. of Ottawa (Canada); John E. Sipe, Univ. of Toronto (Canada) . . . . . [8264-17]

Modeling and analysis of multiple ring-resonator performance as optical filter, Sanjoy Mandal, Indian School of Mines (India); Sabitabrata Dey, College of Engineering and Management, Kolaghat (India) . . . . . [8264-18]

Design of multilayered strip SiON waveguide for polarizer application, Vishnu Priye, Janardan Prasad, Anamika Singh, Indian School Of Mines (India). . . . . [8264-19]

Asymmetrically coupled bus with tunable ring resonators for multiple functionalities: Fano resonance, asymmetric transmission, and wavelength shifting, Weiqiang Ding, Chengwei Qiu, National Univ. of Singapore (Singapore) . . . . . [8264-20]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 5 . . . . . Tues. 10:30 am to 12:00 pm

Sensors I

Session Chair: **Jens H. Schmid,** National Research Council Canada (Canada)

Enhancing gradient optical force in silicon photonic devices *(Invited Paper)*, Mo Li, Univ. of Minnesota, Twin Cities (USA) . . . . . [8264-21]

The development of a novel monolithic spectrometer chip concept, Stephen J. Sweeney, Yaping Zhang, Ian D. Goodyer, ZiNIR Ltd. (United Kingdom) . . . . . [8264-22]

On-chip interrogation of a silicon-on-insulator microring resonator based ethanol vapor sensor with an arrayed waveguide grating(AWG) spectrometer, Nebiyu A. Yebo, Wim Bogaerts, Zeger Hens, Roel Baets, Univ. Gent (Belgium) . . . . . [8264-23]

Array of subwavelength rectangular holes in palladium for optical hydrogen detection, Etsuo Maeda, Takanori Matsuki, Ichiro Yamada, The Univ. of Tokyo (Japan); Gilles Lérondel, Univ. de Technologie Troyes (France); Jean-Jacques Delaunay, The Univ. of Tokyo (Japan) . . . . . [8264-24]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 6 . . . . . Tues. 1:30 to 3:00 pm

Sensors II

Amorphous photonic membranes for broadband chemical sensing applications *(Invited Paper)*, Ralph D. Whaley, Jr., Sonja D. Abbey, Parthiban Rajan, Ohio Univ. (USA) . . . . . [8264-25]

Foil-based optical technology platform for optochemical sensors, Sandeep Kalathimekkad, Jeroen Missinne, Bram Van Hoe, Erwin Bosman, Univ. Gent (Belgium); Erwin Meinders, Rajesh Mandamparambil, Holst Ctr. (Netherlands); Geert Van Steenberge, Jan Vanfleteren, Univ. Gent (Belgium) . . . . . [8264-26]

Compact static Fourier transform spectrometer in glass integrated optics in the NIR and visible domain, Amélie Creux, Alain Morand, Pierre Benech, IMEP-LAHC (France); Bruno Martin, Institut de Planétologie et d'Astrophysique de Grenoble (France); Grégory Grosa, IMEP-LAHC (France); Etienne Le Coarer, Pierre Kern, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [8264-27]

Development of a slow-light spectrometer on a chip, Sangeeta Murugkar, Israel De Leon, Univ. of Ottawa (Canada); Zhimin Shi, Univ. of Rochester (USA); Edwin Ma, Univ. of Ottawa (Canada); Boshen Gao, Andreas C. Liapis, Joseph E. Vornehm, Univ. of Rochester (USA); Robert Boyd, Univ. of Ottawa (Canada) . . . . . [8264-28]

SESSION 7 . . . . . Tues. 3:30 to 5:50 pm

Waveguide Engineering II

Session Chair: **Christoph M. Greiner,** LightSmyth Technologies, Inc. (USA)

Volume structuring of transparent materials by ultrashort laser pulses: potential and applications *(Invited Paper)*, Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8264-29]

Mode-conversion cavities-applications in integrated optics *(Invited Paper)*, Jacob B. Khurgin, The Johns Hopkins Univ. (USA) . . . . . [8264-30]

Broad-area laser diode with stable single-mode output, Thomas Nappez, Thales Avionics S.A. (France); Elise Ghibaudo, IMEP-LAHC (France); Philippe Rondeau, Jean-Pierre Schlotterbeck, Thales Avionics S.A. (France); Jean-Emmanuel Broquin, IMEP-LAHC (France) . . . . . [8264-31]

Photonic nanojet-induced modes: fundamentals and applications, Arash Darafsheh, Stephen A. Burand, Kenneth W. Allen, Thomas C. Hutchens, Nathaniel M. Fried, The Univ. of North Carolina at Charlotte (USA); Anatole Lupu, Maria Tchernycheva, Univ. Paris-Sud 11 (France); Vasily N. Astratov, The Univ. of North Carolina at Charlotte (USA) . . . . . [8264-32]

Polarizer based on graphene, Jin Tae Kim, Sung-Yool Choi, Electronics and Telecommunications Research Institute (Korea, Republic of) . . . . . [8264-33]

Waveguide grating couplers in low index materials, Michael Pollard, Stuart Pearce, Ruiqi Chen, Swezin Oo, Martin Charlton, Univ. of Southampton (United Kingdom) . . . . . [8264-34]

Wednesday 25 January

SESSION 8 . . . . . Wed. 8:00 to 10:20 am

Plasmonics

Session Chair: **Pierre Berini,** Univ. of Ottawa (Canada)

Silicon-plasmonic router for optical interconnects: PLATON approach *(Invited Paper)*, Alain Dereux, Karim Hassan, Laurent Markey, Jean-Claude Weeber, Lab. Interdisciplinaire Carnot de Bourgogne (France); Sergey I. Bozhevolnyi, Univ. of Southern Denmark (Denmark); O. Tsilipakos, A. Pilitakis, E. Kriezis, S. Papaioannou, K. Vyrsokinos, Nikos Pleros, Aristotle Univ. of Thessaloniki (Greece); Tolga Tekin, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); Matthias Baus, AMO GmbH (Germany); D. Kalavrouziotis, G. Giannoulis, H. Avramopoulos, National Technical Univ. of Athens (Greece) . . . . . [8264-35]

Engineered plasmonic nanostructures for microfluidic biosensing *(Invited Paper)*, Hyungsoon Im, Nathan J. Wittenberg, Si Hoon Lee, Timothy W. Johnson, Lukas R. Jordan, Nathan C. Lindquist, Univ. of Minnesota, Twin Cities (USA); Jennifer A. Maynard, The Univ. of Texas at Austin (USA); Arthur E. Warrington, Moses Rodriguez, Mayo Clinic College of Medicine (USA); David J. Norris, ETH Zurich (Switzerland); Sang-Hyun Oh, Univ. of Minnesota, Twin Cities (USA) . . . . . [8264-36]

Hybrid silicon-organic photonic integration of nano-scale silicon strip and plasmonic metallic waveguide based on adiabatic waveguide mode transformer on silicon-on-insulator (SOI) wafer, Richard S. Kim, Air Force Research Lab. (USA); Antao Chen, Larry R. Dalton, Univ. of Washington (USA) . . . . . [8264-37]

Integration of nanostructures and waveguide core for surface enhanced Raman spectroscopy: a novel excitation method, Stuart J. Pearce, Martin D. B. Charlton, Michael E. Pollard, Swezin Oo, Ruiqi Y. Chen, Univ. of Southampton (United Kingdom) . . . . . [8264-38]

Compact optical microcavity structures for enhancement of absorption and transmission cross sections of subwavelength plasmonic devices, Changjun Min, Yin Huang, Liu Yang, Georgios Veronis, Louisiana State Univ. (USA) . . . . . [8264-39]

Coupling in a twin-core photonic crystal fiber with subwavelength confinement, Shuyan Zhang, Xia Yu, A*STAR Singapore Institute of Manufacturing Technology (Singapore); Ping Shum, Nanyang Technological Univ. (Singapore); Ying Zhang, Singapore Institute of Manufacturing Technology (Singapore) . . . . . [8264-40]

SESSION 9 . . . . . Wed. 10:50 am to 12:30 pm

Optofluidics

Session Chair: **Xudong Fan,** Univ. of Michigan (USA)

Optofluidic SERS on inkjet-fabricated paper-based substrates *(Invited Paper)*, Ian M. White, Wei W. Yu, Univ. of Maryland, College Park (USA) . [8264-41]

Optofluidics: waveguides and devices *(Invited Paper)*, Genni Testa, Consiglio Nazionale delle Ricerche (Italy); Yujian Huang, Technische Univ. Delft (Netherlands); Luigi Zeni, Seconda Univ. degli Studi di Napoli (Italy); Pasqualina M. Sarro, Technische Univ. Delft (Netherlands); Romeo Bernini, Consiglio Nazionale delle Ricerche (Italy) . . . . . [8264-42]

Vertically coupled polymer microresonators for optofluidic label-free biosensors, Camille Delezoide, Joseph Lautru, Joseph Zyss, Isabelle Ledoux-Rak, Chi Thanh Nguyen, Ecole Normale Supérieure de Cachan (France) . . . . . [8264-43]

High Q silica microbubble resonators, Daniele Farnesi, Simone Berneschi, Massimo Brenci, Franco Cosi, Gualtiero Nunzi Conti, Stefano Pelli, Giancarlo C. Righini, Silvia Soria, Istituto di Fisica Applicata Nello Carrara (Italy). . . . [8264-44]

POSTERS-WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Sensor for optical characteristics of liquid using gapped waveguides: theory, Kazutaka Baba, Kohei Nemoto, Sendai National College of Technology (Japan). . . . . [8264-45]

Design of multiple nano-ring based metallic nanophotonic superlens, Jong-ryul Choi, Youngjin Oh, Donghyun Kim, Yonsei Univ. (Korea, Republic of) . . . . . [8264-46]

Integrated surface plasmon resonance array sensor using semiconductor optical amplifier, Geum-Yoon Oh, Chung-Ang Univ. (Korea, Republic of); Doo-Gun Kim, Korea Photonics Technology Institute (Korea, Republic of); Hong-Seung Kim, Tae-Kyeong Lee, Byeong-Hyeon Lee, Young-Wan Choi, Chung-Ang Univ. (Korea, Republic of) . . . . . [8264-47]

Experimental measurement of photonic/plasmonic crystal dispersion applied to the investigation of surface plasmon dispersion for SERS sensing applications, M. Firdaus A. Muttalib, Martin D. B. Charlton, Swe Z. Oo, Univ. of Southampton (United Kingdom) . . . . . [8264-48]

Nanowire coupled to a waveguide for the characterization of the guided light, Laurent Arnaud, Aniello Apuzzo, Rafael Salas-Montiel, Mikael Renault, Yassine Hadjar, Aurélien Bruyant, Gilles Lérondel, Sylvain Blaize, Univ. de Technologie Troyes (France) . . . . . [8264-49]

Analysis of total internal reflection mirror based on horizontal slot waveguide, Tae-Kyeong Lee, Hong-Seung Kim, Geum-Yoon Oh, Byeong-Hyeon Lee, Chung-Ang Univ. (Korea, Republic of); Doo-Gun Kim, Korea Photonics Technology Institute (Korea, Republic of); Young-Wan Choi, Chung-Ang Univ. (Korea, Republic of) . . . . . [8264-50]

Visible and near infrared wavelength photonic crystal fiber splitter for multi wavelength spectral domain optical coherence tomography, Joo Beom Eom, Korea Photonics Technology Institute (Korea, Republic of); Eun Jung Min, Byeong-Ha Lee, Gwangju Institute of Science and Technology (Korea, Republic of). . . . . [8264-51]

Polarization-dependent phase modulators incorporating low loss birefringent polymers, Jun-Whee Kim, Su-Hyun Park, Beom-Jun Cheon, Kyung-Jo Kim, Woo-Sung Chu, Min-Cheol Oh, Pusan National Univ. (Korea, Republic of) . . . . . [8264-52]

Near infrared external cavity tunable laser based on polymer waveguide Bragg grating, Nam-Seon Son, Kyung-Jo Kim, Jun-Whee Kim, Min-Cheol Oh, Pusan National Univ. (Korea, Republic of) . . . . . [8264-53]

Evaluation of damping ratio in a glass-based guided-wave optical microphone with a diaphragm, Masashi Ohkawa, Kazuya Murata, Takashi Sato, Niigata Univ. (Japan) . . . . . [8264-54]

Waveguide polarization converters incorporating UV-curable reactive mesogen, Woo-Sung Chu, Sung-Moon Kim, Jun-Whee Kim, Kyung-Jo Kim, Min-Cheol Oh, Pusan National Univ. (Korea, Republic of) . . . . . [8264-55]

Polymer waveguide integrated-optic current transducers, Min-Cheol Oh, Woo-Sung Chu, Kyung-Jo Kim, Jun-Whee Kim, Pusan National Univ. (Korea, Republic of) . . . . . [8264-56]

Colorimetric resonant detection of biochemical agents in mesoporous silicon based photonic crystals, Silvia Soria, Istituto di Fisica Applicata Nello Carrara (Italy); Irina A. Kolmychek, Sergei E. Svakhovskiy, Tatyana V. Murzina, Lomonosov Moscow State Univ. (Russian Federation); Francesco Baldini, Giacomo Ghini, Ambra Giannetti, Cosimo Trono, Gualtiero Nunzi Conti, Istituto di Fisica Applicata Nello Carrara (Italy) . . . . . [8264-57]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8265

Wednesday-Thursday 25-26 January 2012 • Proceedings of SPIE Vol. 8265

Optoelectronic Integrated Circuits XIV

Conference Chairs: **Louay A. Eldada,** SunEdison (USA); **El-Hang Lee,** Inha Univ. (Korea, Republic of)

Program Committee: **Yung-Jui Chen,** Univ. of Maryland, Baltimore County (USA); **Larry A. Coldren,** Univ. of California, Santa Barbara (USA); **Mario Dagenais,** Univ. of Maryland, College Park (USA); **P. Daniel Dapkus,** The Univ. of Southern California (USA); **Yeshaiahu Fainman,** Univ. of California, San Diego (USA); **Chennupati Jagadish,** The Australian National Univ. (Australia); **Richard M. Osgood, Jr.,** Columbia Univ. (USA); **Manijeh Razeghi,** Northwestern Univ. (USA); **Giancarlo C. Righini,** Istituto di Fisica Applicata Nello Carrara (Italy); **David J. Rogers,** Nanovation (France) and Univ. of St. Andrews (France)

Wednesday 25 January

SESSION 1 . . . . . Wed. 8:00 to 10:00 am

Optical Interconnects in High Performance Computing

Joint Session with Conference 8267

Session Chair: **Louay A. Eldada,** SunEdison (USA)

Optics in computers, servers, and data centers *(Invited Paper)*, Harmen J. S. Dorren, Technische Univ. Eindhoven (Netherlands) . . . . . [8267-30]

Chip-scale integrated optical interconnects: a key enabler for future high-performance computing *(Invited Paper)*, Michael W. Haney, Univ. of Delaware (USA) . . . . . [8267-31]

Requirements for optical interconnect and networking devices for low-energy communications within digital systems *(Invited Paper)*, Anthony L. Lentine, Sandia National Labs. (USA) . . . . . [8265-01]

Multicore fiber link demonstrating large bandwidth density for future multimode optical interconnects *(Invited Paper)*, Benjamin G. Lee, Christian Baks, Fuad E. Doany, Daniel M. Kuchta, Petar K. Pepeljugoski, Clint L. Schow, IBM Thomas J. Watson Research Ctr. (USA) . . . . . [8265-02]

SESSION 2 . . . . . Wed. 10:30 am to 12:30 pm

Nanophotonics for Optical Interconnects

Joint Session with Conference 8267

Session Chair: **Ray T. Chen,** The Univ. of Texas at Austin (USA)

Silicon photonics in computing applications *(Invited Paper)*, Michael Watts, Massachusetts Institute of Technology (USA) . . . . . [8265-03]

Chip-scale photonic interconnection networks for energy efficient processor-memory communications *(Invited Paper)*, Keren Bergman, Columbia Univ. (USA) . . . . . [8267-32]

Low-power integration of on-chip nanophotonic interconnect for high-performance opto-electrical IC *(Invited Paper)*, Duo Ding, David Z. Pan, The Univ. of Texas at Austin (USA) . . . . . [8267-33]

Multiprocessor silicon photonic interconnects: a systems perspective *(Invited Paper)*, Pranay Koka, Oracle Labs. (USA). . . . . [8265-04]

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 3 . . . . . Wed. 2:00 to 3:00 pm

Silicon OEICs I

Session Chair: **El-Hang Lee,** Inha Univ. (Korea, Republic of)

Advanced silicon device technologies for optical interconnects *(Invited Paper)*, Lech Wosinski, Royal Institute of Technology (Sweden); Zhechao Wang, Univ. Gent (Belgium); Fei Lou, Royal Institute of Technology (Sweden); Daoxin Dai, Zhejiang Univ. (China); Sebastian Lourdudoss, Lars Thylen, Royal Institute of Technology (Sweden) . . . . . [8265-05]

Recent advances in manufactured silicon photonics integrated circuits *(Invited Paper)*, Dazeng Feng, B. Jonathan Luff, Mehdi Asghari, Kotura, Inc. (USA) . . . . . [8265-06]

SESSION 4 . . . . . Wed. 3:30 to 4:30 pm

Silicon OEICs II

Session Chair: **El-Hang Lee,** Inha Univ. (Korea, Republic of)

Silicon-based nonlinear photonics *(Invited Paper)*, Alexander L. Gaeta, Cornell Univ. (USA) . . . . . [8265-07]

Advanced integration, processing, and interconnection technologies for high-energy conversion efficiency crystalline silicon solar cells *(Invited Paper)*, Louay A. Eldada, SunEdison (USA) . . . . . [8265-08]

POSTERS-WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Micro-integrated, high power, narrow linewidth diode lasers for precision quantum optics experiments in space, Andreas Wicht, Ferdinand-Braun-Institut (Germany) and Humboldt-Univ. zu Berlin (Germany); Erdenetsetseg Luvsandamdin, Anja Kohfeldt, Ferdinand-Braun-Institut (Germany); Max Schiemangk, Humboldt-Univ. zu Berlin (Germany); Stefan Spiessberger, Alexander Sahm, Frank Bugge, Jörg Fricke, Hans Wenzel, Ferdinand-Braun-Institut (Germany); Achim Peters, Humboldt-Univ. zu Berlin (Germany) and Ferdinand-Braun-Institut, Leibniz Institut für Höchstfrequenztechnik (Germany); Götz Erbert, Günther Tränkle, Ferdinand-Braun-Institut (Germany) . . . . [8265-21]

Integration of 3D plasmonic devices with silicon-on-insulator-based optical circuitry, Ruoxi Yang, Zhaolin Lu, Rochester Institute of Technology (USA) . . . . . [8265-22]

Integrated Si/III-V racetrack lasers, photodetectors, and waveguide-to-fiber surface grating couplers, Antoine Descos, Badhise Ben Bakir, Nicolas Olivier, Jean-Marc Fedeli, Bernard André, CEA-LETI (France) . . . . . [8265-23]

Thursday 26 January

SESSION 5 . . . . . Thurs. 8:30 to 10:10 am

VLSI Photonics

Session Chair: **El-Hang Lee,** Inha Univ. (Korea, Republic of)

Scaling CMOS photonics transceivers beyond 100 Gb/s *(Invited Paper)*, Attila Mekis, Sherif Abdalla, Peter M. De Dobbelaere, Dennis Foltz, Steffen Gloeckner, Steven Hovey, Steven Jackson, Yi Liang, Michael Mack, Gianlorenzo Masini, Rafaela Novais, Mark Peterson, Thierry Pinguet, Subal Sahni, Jeff Schramm, Michael Sharp, Daniel Song, Brian P. Welch, Kosei Yokoyama, Shuhuan Yu, Luxtera (USA) . . . . . [8265-09]

Photonic integrated system-in-package platform for Tb/s silicon-plasmonic router, Tolga Tekin, Technische Univ. Berlin (Germany); Alpaslan Suna, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); Oriol Gili de Villasante, Paul Tcheg, Technische Univ. Berlin (Germany); Bei Wang, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); Sascha Lutzmann, Bouchaib Bouhlal, Technische Univ. Berlin (Germany); Nikos Pleros, Emmanouil Kriezis, Aristotle Univ. of Thessaloniki (Greece); Matthias Baus, Matthias Karl, AMO GmbH (Germany) . . . . . [8265-10]

Chip-scale demonstration of 3D integrated intrachip free-space optical interconnect *(Invited Paper)*, Hui Wu, Berkehan Ciftcioglu, Rebecca Berman, Jiyanhun Hu, Shang Wang, Ioannis Savidis, Manish Jain, Duncan Moore, Michael Huang, Eby Friedman, Gary Wicks, Univ. of Rochester (USA) . [8265-11]

Low-loss photonic wires defined by LOCal Oxidation of Silicon (LOCOS), Yule Xiong, Winnie N. Ye, Carleton Univ. (Canada) . . . . . [8265-12]

SESSION 6 . . . . . Thurs. 10:40 am to 12:30 pm

Nanoscale and Quantum OEICs

Session Chair: **Louay A. Eldada,** SunEdison (USA)

Nanophotonics for datacom and telecom applications *(Invited Paper)*, Dieter D. Bimberg, Dejan Arsenijevic, Holger Schmeckebier, Christian Meuer, Gerrit Fiol, Technische Univ. Berlin (Germany); Gadi Eisenstein, Technion-Israel Institute of Technology (Israel) . . . . . [8265-13]

Rolled-up InAs/InGaAsP quantum dot microtube lasers, Pablo Bianucci, Ecole Polytechnique de Montréal (Canada) and McGill Univ. (Canada); Shouvik Mukherjee, M. Hadi Tavakoli Dastjerdi, McGill Univ. (Canada); Philip J. Poole, NRC Institute for Microstructural Sciences (Canada); Zetian Mi, McGill Univ. (Canada) . . . . . [8265-14]

Identification of localized group-velocity dispersion of nanostructured silicon waveguide devices using white-light interferometry *(Invited Paper)*, Kyong-Hon Kim, Seung-Hwan Kim, Dongwook Kim, Seoung Hun Lee, El-Hang Lee, Inha Univ. (Korea, Republic of) . . . . . [8265-15]

Plasmonic coherent perfect absorption by guided-mode resonance for active switching and integrated photonics application *(Invited Paper)*, Seok-Ho Song, Myungjin Jung, Hanyang Univ. (Korea, Republic of); Jaewoong Yoon, Robert Magnusson, The Univ. of Texas at Arlington (USA); El-Hang Lee, Inha Univ. (Korea, Republic of) . . . . . [8265-16]

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 7 . . . . . Thurs. 2:00 to 3:50 pm

Trends in OEICs

Session Chair: **Kyong-Hon Kim,** Inha Univ. (Korea, Republic of)

Light guidance through void: silicon slot waveguides and their rigorous characterizations *(Invited Paper)*, B. M. Azizur Rahman, David Leung, Syed N. Ahsan, Ping Tang, Kenneth T. V. Grattan, The City Univ. (United Kingdom) . . . . . [8265-17]

A speckle-based CMOS sensor for arbitrary surface movement detection with correlated double sampling and gain error correction, Chao Wang, Steve Tanner, Pierre-André Farine, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8265-18]

Time-and-Frequency-Domain Modeling (TFDM) of hybrid photonic integrated circuits *(Invited Paper)*, Cristina Arellano, Igor Koltchanov, André Richter, VPIsystems GmbH (Germany); Eugene Sokolov, Sergei Mingaleev, VPI Development Ctr. (Belarus) . . . . . [8265-19]

Integrated silicon photonic nanocircuits and technologies for optical communications and optical sensing *(Invited Paper)*, Sailing He, Daoxin Dai, Zhejiang Univ. (China) . . . . . [8265-20]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8266

Sunday-Wednesday 22-25 January 2012 • Proceedings of SPIE Vol. 8266

Silicon Photonics VII

Conference Chairs: **Joel Kubby,** Univ. of California, Santa Cruz (USA); **Graham Trevor Reed,** Univ. of Surrey (United Kingdom)

Program Committee: **Laurence W. Cahill,** La Trobe Univ. (Australia); **Philippe M. Fauchet,** Univ. of Rochester (USA); **L. Cary Gunn,** Genalyte, Inc. (USA); **Siegfried Janz,** National Research Council Canada (Canada); **Andrew P. Knights,** McMaster Univ. (Canada); **Laura Maria Lechuga,** Ctr. d'Investigacions en Nanociència i Nanotecnologia (Spain); **Sebania Libertino,** Istituto per la Microelettronica e Microsistemi (Italy); **Goran Z. Mashanovich,** Univ. of Surrey (United Kingdom); **Mario J. Paniccia,** Intel Corp. (USA); **Andrew W. Poon,** Hong Kong Univ. of Science and Technology (Hong Kong, China); **Holger Schmidt,** Univ. of California, Santa Cruz (USA); **Dan-Xia Xu,** National Research Council Canada (Canada); **Zhiping Zhou,** Peking Univ. (China)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:30 to 10:30 am

Lab-on-a-Chip I

Session Chair: **Holger Schmidt,** Univ. of California, Santa Cruz (USA)

Biophotonic sensors on a silicon chip for Raman spectroscopy and optical coherence tomography *(Invited Paper)*, Markus Pollnau, Nur Ismail, B. Imran Akca, Kerstin Wörhoff, Rene M. de Ridder, Univ. Twente (Netherlands) [8266-01]

Temperature-independent vertically coupled double-ring sensor, Yule Xiong, Winnie N. Ye, Carleton Univ. (Canada) . . . . . [8266-02]

Investigation of parallel coupling mechanisms in silicon integrated chip sensors, Oleg Zero, Astrid Aksnes, Norwegian Univ. of Science and Technology (Norway) . . . . . [8266-03]

Optonanomechanical sensors based on silicon waveguides *(Invited Paper)*, Gregory P. Nordin, Ryan Anderson, Weisheng Hu, Stanley J. Ness, Timothy M. Gustafson, Ben Tsai, Joseph Oxborrow, Danny C. Richards, Adam T. Woolley, Brian Mazzeo, Brigham Young Univ. (USA) . . . . . [8266-04]

Manipulation, trapping, and SERS detection of nanoparticle-coated microspheres in optofluidic waveguides, Kaelyn D. Leake, Shamik Mascharak, Philip Measor, Univ. of California, Santa Cruz (USA); Brian S. Phillips, Aaron R. Hawkins, Brigham Young Univ. (USA); Pradip Mascharak, Holger Schmidt, Univ. of California, Santa Cruz (USA). . . . . [8266-05]

SESSION 2 . . . . . Sun. 11:00 am to 12:00 pm

Lab-on-a-Chip II

Session Chair: **Holger Schmidt,** Univ. of California, Santa Cruz (USA)

Optical resonators for ultra-sensitive biosensing *(Invited Paper)*, Frank Vollmer, Max Planck Institute for the Science of Light (Germany) . . . . . [8266-06]

Photonic crystals: a versatile platform for optics-based biological detection *(Invited Paper)*, Brian T. Cunningham, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [8266-07]

Lunch Break. . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Sun. 1:30 to 3:00 pm

Materials

Session Chair: **Andrew P. Knights,** McMaster Univ. (Canada)

Photo-induced trimming of chalcogenide-assisted silicon photonic circuits *(Invited Paper)*, Andrea I. Melloni, Stefano Grillanda, Antonio Canciamilla, Carlo Ferrari, Francesco Morichetti, Politecnico di Milano (Italy); Michael J. Strain, Marc Sorel, Univ. of Glasgow (United Kingdom); Vivek Singh, Massachusetts Institute of Technology (USA); Anu Agarwal, Lionel Kimerling, Massachussets Institute of Technology (USA) . . . . . [8266-08]

Tensile strained germanium for photonics, Malo de Kersauson, Moustafa El Kurdi, Sylvain J. David, Xavier Checoury, Guy Fishman, Sebastien Sauvage, Institut d'Électronique Fondamentale (France); Roberto Jakomin, Ludovic Largeau, Olivia Mauguin, Gregoire Beaudoin, Ctr. National de la Recherche Scientifique (France); Razvigor Ossikovski, Gérald Ndong, Marc Chaigneau, Isabelle Sagnes, Ecole Polytechnique (France); Philippe Boucaud, Institut d'Électronique Fondamentale (France) . . . . . [8266-09]

Glass-based silicon-clad optical device designs, Robert C. Gauthier, Kristian Medir, Carleton Univ. (Canada) . . . . . [8266-10]

Loss reduction of silicon slot waveguides with ALD-grown thin films, Antti Säynätjoki, Lasse Karvonen, Aalto Univ. School of Electrical Engineering (Finland); Tapani Alasaarela, Beneq Oy (Finland); Dietmar Korn, Luca Alloatti, Karlsruher Institut für Technologie (Germany); Ari Tervonen, Aalto Univ. School of Electrical Engineering (Finland); Robert Palmer, Christian Koos, Juerg Leuthold, Wolfgang Freude, Karlsruher Institut für Technologie (Germany); Seppo K. Honkanen, Aalto Univ. School of Electrical Engineering (Finland) and Univ. of Eastern Finland (Finland) . . . . . [8266-11]

SESSION 4 . . . . . Sun. 3:30 to 5:30 pm

Photonic Crystals and Wires

Session Chair: **Graham Trevor Reed,** Univ. of Surrey (United Kingdom)

New concepts in silicon component design using subwavelength structures *(Invited Paper)*, Inigo Molina-Fernandez, Univ. de Málaga (Spain) . . . . . [8266-12]

Deterministic aperiodic nanostructures for silicon photonics *(Invited Paper)*, Luca Dal Negro, Boston Univ. (USA). . . . . [8266-13]

Selecting the polarization in silicon photonic wire components *(Invited Paper)*, Dan-Xia Xu, Andre Delage, Rubin Ma, Shurui Wang, Jean Lapointe, Jens Schmid, Pavel Cheben, Martin Vachon, Siegfried Janz, National Research Council Canada (Canada) . . . . . [8266-14]

Broadband signal processing in photonic crystal waveguides *(Invited Paper)*, Thomas F. Krauss, Univ. of St. Andrews (United Kingdom). . . . . [8266-15]

Monday 23 January

SESSION 5 . . . . . Mon. 8:30 to 10:30 am

Waveguides

Session Chair: **Graham Trevor Reed,** Univ. of Surrey (United Kingdom)

Design and applications of silicon waveguide grating couplers *(Invited Paper)*, Xia Chen, The Chinese Univ. of Hong Kong (Hong Kong, China) and Univ. of Surrey (United Kingdom); Hon K. Tsang, The Chinese Univ. of Hong Kong (Hong Kong, China) . . . . . [8266-16]

Compact and efficient couplers for silicon slot waveguides, Antti Säynätjoki, Lasse Karvonen, Aalto Univ. School of Science and Technology (Finland); Xiaoguang Tu, Tsung-Yang Liow, A*STAR Institute of Microelectronics (Singapore); Ari Tervonen, Aalto Univ. School of Science and Technology (Finland); Guo-Qiang Lo, A*STAR Institute of Microelectronics (Singapore); Seppo K. Honkanen, Aalto Univ. School of Science and Technology (Finland) and Univ. of Eastern Finland (Finland). . . . . [8266-17]

Realization of all-optical discrete cosine and sine transforms using MMI structures on an SOI platform, Trung-Thanh Le, Hanoi Univ. of Natural Resources (Viet Nam); Laurence W. Cahill, La Trobe Univ. (Australia) . . [8266-18]

Parallel-coupled dual racetrack silicon microresonators for quadrature amplitude modulation, Ryan A. Integlia, Lianghong Yin, Rutgers, The State Univ. of New Jersey (USA); Duo Ding, David Z. Pan, The Univ. of Texas at Austin (USA); Douglas M. Gill, Alcatel-Lucent Bell Labs. (USA); Weiwei Song, Wei Jiang, Rutgers, The State Univ. of New Jersey (USA). . . . . [8266-19]

Optical signal buffering using silicon waveguide routing and slow-light structures *(Invited Paper)*, Linjie Zhou, Jianping Chen, Xiaomeng Sun, Jingya Xie, Haike Zhu, Shanghai Jiao Tong Univ. (China) . . . . . [8266-20]

SESSION 6 . . . . . Mon. 11:00 am to 12:10 pm

Modulators and Detectors

Session Chair: **Andrew W. Poon,** Hong Kong Univ. of Science and Technology (Hong Kong, China)

High speed silicon optical modulation using the silicon-on-insulator platform *(Invited Paper)*, Frédéric Y. Gardes, David J. Thomson, Youfang Hu, Milan M. Milosevic, Rob Topley, Paul Thomas, Graham T. Reed, Univ. of Surrey (United Kingdom); Liam O'Faolain, Kapil Debnath, Thomas F. Krauss, Univ. of St. Andrews (United Kingdom); Leon J. Lever, Robert W. Kelsall, Zoran Ikonic, Univ. of Leeds (United Kingdom); Jason J. Ackert, Andrew P. Knights, McMaster Univ. (United Kingdom); Xue-Chao Liu, Maksym Myronov, Andy Dobbie, R. J. Morris, David R. Leadley, The Univ. of Warwick (United Kingdom) . . . . [8266-21]

Deep-level charge state control: a novel method for optical modulation in silicon waveguides, Andrew P. Knights, Edgar Huante-Ceron, Dylan Logan, McMaster Univ. (Canada); Paul E. Jessop, Wilfrid Laurier Univ. (Canada) . . . . . [8266-22]

A compact high-speed and low-cost hyperspectral imager, Nicolaas Tack, Andy Lambrechts, Philippe Soussan, Luc Haspeslagh, Francesco Pessolano, IMEC (Belgium) . . . . . [8266-23]

Lunch Break . . . . . 12:10 to 1:40 pm

SESSION 7 . . . . . Mon. 1:40 to 3:20 pm

Emitters and Lasers

Session Chair: **Philippe M. Fauchet,** Univ. of Rochester (USA)

Time-resolved photoluminescence and optical gain of Ga(NAsP) heterostructures pseudomorphically grown on silicon (001) substrate, Nektarios Koukourakis, Maximilian Klimasch, Dominic A. Funke, Nils C. Gerhardt, Martin R. Hofmann, Ruhr-Univ. Bochum (Germany); Bernardette Kunert, NAsP III/V GmbH (Germany); Sven Liebich, Philipps-Univ. Marburg (Germany); Martin Zimprich, Philipps Univ. Marburg (Germany); Kerstin Volz, Wolfgang Stolz, Philipps-Univ. Marburg (Germany) . . . . . [8266-24]

NIR spectral characteristics of avalanche electroluminescent silicon CMOS light emitters, Alfons W. Bogalecki, INSiAVA (Pty) Ltd. (South Africa); Monuko du Plessis, Petrus J. Venter, Univ. of Pretoria (South Africa) . . . . . [8266-25]

Kinetics of energy transfer in Er-doped SiO_2/nc-Si multilayers, Halina Krzyzanowska, Yijing Fu, Karl S. Ni, Philippe M. Fauchet, Univ. of Rochester (USA) . . . . . [8266-26]

Efficient infrared electroluminescence from Er-doped SiO_2/nc-Si multilayers under lateral carrier injection, Halina Krzyzanowska, Karl S. Ni, Yijing Fu, Philippe M. Fauchet, Univ. of Rochester (USA) . . . . . [8266-27]

Silicon-based three-dimensional photonic crystal with enhanced spontaneous emission, Aniwat Tandaechanurat, The Univ. of Tokyo (Japan); Norman Hauke, Thomas Zabel, Thorsten Reichert, Walter Schottky Institut (Germany); Hiroyuki Takagi, The Univ. of Tokyo (Japan); Michael Kaniber, Walter Schottky Institut (Germany); Satoshi Iwamoto, The Univ. of Tokyo (Japan); Dominique Bougeard, Univ. Regensburg (Germany); Jonathan J. Finley, Gerhard Abstreiter, Walter Schottky Institut (Germany); Yasuhiko Arakawa, The Univ. of Tokyo (Japan) . . . . . [8266-28]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

Wednesday 25 January

Wed. 6:00 to 7:30 pm

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Compound FDTD method for silicon photonics, Abbas Olyaee, The Univ. of Mazandran (Iran, Islamic Republic of) . . . . . [8266-29]

Gas absorbtion sensors on the basis of porous silicon, Liubomyr S. Monastyrsky, Igor B. Olenych, Olena Aksimentyeva, Bogdan S. Sokolovskii, Ivan Franko National Univ. of L'viv (Ukraine). . . . . [8266-30]

Free-carrier electro-absorption and electro-refraction modulation in group IV materials at mid-infrared wavelengths, Milos Nedeljkovic, Univ. of Surrey (United Kingdom); Richard A. Soref, Univ. of Massachusetts Boston (USA); Goran Z. Mashanovich, Univ. of Surrey (United Kingdom) . . . . . [8266-31]

SOI-based trapezoidal waveguide with 45° microreflector for non-coplanar light bending, Po-Kuan Shen, Chia-Chi Chang, Chin-Ta Chen, Hsu-Liang Hsiao, Mount-Learn Wu, National Central Univ. (Taiwan); Yun-Chih Lee, Centera Photonics Inc. (Taiwan) . . . . . [8266-32]

Courses of Related Interest

SC817 Silicon Photonics (Michel, Saini) Tuesday, 8:30 am to 12:30 pm

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8267

Monday-Wednesday 23-25 January 2012 • Proceedings of SPIE Vol. 8267

Optoelectronic Interconnects XII

Conference Chairs: **Alexei L. Glebov,** OptiGrate Corp. (USA); **Ray T. Chen,** The Univ. of Texas at Austin (USA)

Program Committee: **Bill Blubaugh,** US Conec Ltd. (USA); **John E. Cunningham,** Oracle (USA); **Allen M. Earman,** Intersil Corp. (USA); **Ruth Houbertz-Krauss,** Fraunhofer-Institut für Silicatforschung (Germany); **Jürgen Jahns,** FernUniv. in Hagen (Germany); **D. A. Livshits,** Innolume GmbH (Germany); **Edris M. Mohammed,** Intel Corp. (USA); **Bert-Jan Offrein,** IBM Zürich Research Lab. (Switzerland); **David Z. Pan,** The Univ. of Texas at Austin (USA); **Hyo-Hoon Park,** KAIST (Korea, Republic of); **Henning Schröder,** Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); **Harish Subbaraman,** Omega Optics, Inc. (USA); **Peter Van Daele,** Univ. Gent (Belgium); **Michael R. Wang,** Univ. of Miami (USA); **Ian H. White,** Univ. of Cambridge (United Kingdom); **Tetsuzo Yoshimura,** Tokyo Univ. of Technology (Japan)

Monday 23 January

SESSION 1 . . . . . Mon. 8:30 to 10:10 am

Optical PCB I

Session Chair: **Alexei L. Glebov,** OptiGrate Corp. (USA)

Development of electro-optical PCBs with polymer waveguides for high-speed on-board optical interconnects *(Invited Paper)*, Marika P. R. Immonen, TTM Technologies (Finland); Jinhua Wu, Peifeng Chen, Dan Tin Ma, Jian Xiang Xu, Tarja Rapala-Virtanen, TTM Technologies, Inc. (China) . . . . . [8267-01]

Injection molded optical backplane for broadcast architecture *(Invited Paper)*, Paul K. Rosenberg, Sagi Mathai, Wayne Sorin, Moray McLaren, Joseph Straznicky, Georgios Panotopoulos, Hewlett-Packard Labs. (USA); David Warren, Terrel Morris, Hewlett-Packard Co. (USA); Michael R. Tan, Hewlett-Packard Labs. (USA) . . . . . [8267-02]

Fabrication and characterization of single mode polysiloxane waveguides for optical interconnects, Brandon Swatowski, David DeShazer, Jeremy Beebe, Craig Yeakle, Jon V. DeGroot, Jr., Dow Corning Corp. (USA) . . [8267-03]

Design of a highly parallel board-level-interconnection with 320-Gbps capacity, Ulrich Lohmann, Jürgen Jahns, FernUniv. in Hagen (Germany); Steffen Limmer, Dietmar Fey, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Hannes Bauer, MICROSENS GmbH & Co. KG (Germany). . [8267-04]

SESSION 2 . . . . . Mon. 10:40 am to 12:20 pm

Optical PCB II

Session Chair: **Ian H. White,** Univ. of Cambridge (United Kingdom)

3D optical interconnects: from research to reality *(Invited Paper)*, Ruth Houbertz-Krauss, Sönke Steenhusen, Fraunhofer-Institut für Silicatforschung (Germany); Markus B. K. Riester, Maris TechCon Technology and R & D Consulting (Austria) . . . . . [8267-05]

Polymer waveguide components and interconnection architectures for board-level optical communications *(Invited Paper)*, Richard V. Penty, Nikolaos Bamiedakis, Aeffendi H. Hashim, Y. Hao, Joseph Beals IV, Ian H. White, Univ. of Cambridge (United Kingdom). . . . . [8267-06]

Polymer optical waveguide based bi-directional optical bus architecture for high speed optical backplane, Xinyuan Dou, Xiaohui Lin, The Univ. of Texas at Austin (USA); Xiaolong A. Wang, Oregon State Univ. (USA); Ray T. Chen, The Univ. of Texas at Austin (USA) . . . . . [8267-07]

Characterization and analysis of graded index optical waveguides for the realization of low-power, high-density, and high-speed optical link, Hsiang-Han Hsu, Keio Univ. (Japan) and IBM Research - Tokyo (Japan); Takaaki Ishigure, Keio Univ. (Japan); Shigeru Nakagawa, IBM Research - Tokyo (Japan) . . . . . [8267-08]

Lunch Break . . . . . 12:20 to 1:30 pm

SESSION 3 . . . . . Mon. 1:30 to 3:00 pm

Integrated Tx/Rx Modules

Session Chair: **Bert-Jan Offrein,** IBM Zürich Research Lab. (Switzerland)

Heterogeneous integrated photonic circuits *(Invited Paper)*, Alexander W. Fang, Gregory A. Fish, Eric Hall, Aurrion, Inc. (USA). . . . . [8267-09]

A 25-Gbps high-sensitivity optical receiver with 10-Gbps photodiode using inductive input coupling for optical interconnects, Hideki Oku, Kiyomi Narita, Takashi Shiraishi, Satoshi Ide, Kazuhiro Tanaka, Fujitsu Labs. (Japan) . [8267-10]

4 channels x 10-Gbps optoelectronic transceiver based on silicon optical bench technology, Chin-Ta Chen, Hsu-Liang Hsiao, Chia-Chi Chang, Bo-Kuan Shen, Guan-Fu Lu, National Central Univ. (Taiwan); Yun-Chih Lee, Centera Photonics Inc. (Taiwan); Shou-Fu Chang, Yo-Shen Lin, Mount-Learn Wu, National Central Univ. (Taiwan) . . . . . [8267-11]

Multigigabit optical transceivers for high data rate military applications, Brian Catanzaro, CFE Services (USA); Charlie Kuznia, Ultra Communications, Inc. (USA). . . . . [8267-12]

SESSION 4 . . . . . Mon. 3:30 to 5:00 pm

Si Photonics for Interconnects

Session Chair: **Hyo-Hoon Park,** KAIST (Korea, Republic of)

Si-based optical I/O for optical memory interface *(Invited Paper)*, Kyoung-Ho Ha, Dongjae Shin, Kwanghyun Lee, Hochul Ji, Junghyung Pyo, Kyungwon Na, Kwan-Sik Cho, Beomsuk Lee, Seonggu Kim, Sungdong Suh, Seokyong Hong, Hyunil Byun, In-Sung Joe, Hanmei Choi, Bongjin Kuh, Kichul Kim, Yoondong Park, Chilhee Chung, SAMSUNG Electronics Co., Ltd. (Korea, Republic of) . . . . . [8267-13]

Widely tunable photonic crystal filters for optical interconnects on Si chip, Anna Baldycheva, Trinity College Dublin (Ireland); Vladimir A. Tolmachev, Ioffe Physico-Technical Institute (Russian Federation); Kevin Berwick, Dublin Institute of Technology (Ireland); Tatiana S. Perova, Trinity College Dublin (Ireland) . . . . . [8267-14]

Silicon nanomembranes for high performance flexible photonic interconnects and devices, Harish Subbaraman, Omega Optics, Inc. (USA); Xiaochuan Xu, Nassibe Rahimi, Amir Hosseini, Ray T. Chen, The Univ. of Texas at Austin (USA) . . . . . [8267-15]

Photonic crystal cavity based cascaded modulators for WDM interconnects, Kapil Debnath, Liam O'Faolain, Univ. of St. Andrews (United Kingdom); Frederic Gardes, Graham Reed, Univ. of Surrey (United Kingdom); Thomas F. Krauss, Univ. of St. Andrews (United Kingdom) . . . . . [8267-16]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 5 . . . . . Tues. 10:30 am to 12:10 pm

Waveguides for Opto-PCB

Session Chair: **Ruth Houbertz-Krauss,** Fraunhofer-Institut für Silicatforschung (Germany)

Link power budget advantage in GI-core polymer optical waveguide link for optical printed circuit boards, Sho Yakabe, IBM Research - Tokyo (Japan) and Keio Univ. (Japan); Takaaki Ishigure, Keio Univ. (Japan); Shigeru Nakagawa, IBM Research - Tokyo (Japan) . . . . . [8267-17]

Novel optical interconnect devices applying photomask-transfer self-written waveguide technology, Nobuhiko Ishizawa, Yusuke Matsuzawa, Yu Tokiwa, Kenichi Nakama, Osamu Mikami, Tokai Univ. (Japan). . . . . [8267-18]

Coplanar optical waveguides for optical interconnects, Jin Tae Kim, Electronics and Telecommunications Research Institute (Korea, Republic of) . . . . . [8267-19]

Single-mode glass waveguide technology for optical interchip communication on board level, Lars Brusberg, Marcel Neitz, Henning Schröder, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) . . . . . [8267-20]

Optical waveguide end roughness in correlation to optical coupling, Kevin Kruse, Michigan Technological Univ. (USA); Casey Demars, Calumet Electronics Corp. (USA); Nicholas Riegel, Christopher T. Middlebrook, Michael C. Roggemann, Michigan Technological Univ. (USA). . . . . [8267-21]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 6 . . . . . Tues. 1:30 to 3:10 pm

Passive Components

Session Chair: **Michael R. Wang,** Univ. of Miami (USA)

Next-generation high-density low-cost multimode optical interconnect *(Invited Paper)*, Mike Hughes, Darrell Childers, Joe Graham, US Conec Ltd. (USA) . . . . . [8267-22]

Rapid prototyping of interfacing microcomponents for printed circuit board-level optical interconnects *(Invited Paper)*, Jurgen Van Erps, Vrije Univ. Brussel (Belgium). . . . . [8267-23]

Tailored hybrid materials for sub-100 nm two-photon lithography and micro-optical applications, Sönke Steenhusen, Nico Tucher, Ruth Houbertz-Krauss, Fraunhofer-Institut für Silicatforschung (Germany) . . . . . [8267-24]

Soft lithography fabricated polymer waveguides and 45° inclined mirrors for card-to-backplane optical interconnects, Guomin Jiang, Sarfaraz Baig, Michael R. Wang, Univ. of Miami (USA) . . . . . [8267-25]

SESSION 7 . . . . . Tues. 3:40 to 5:20 pm

Packaging and Integration

Session Chair: **Jürgen Jahns,** FernUniv. in Hagen (Germany)

Aspects of short-range interconnect packaging *(Invited Paper)*, Denis Wohlfeld, Karl-Heinz Brenner, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [8267-26]

Novel coupling and packaging approaches for optical interconnects *(Invited Paper)*, Bram Van Hoe, Erwin Bosman, Jeroen Missinne, Sandeep Kalathimekkad, Geert Van Steenberge, Peter Van Daele, Univ. Gent (Belgium) . . . . . [8267-27]

Chip-to-chip interconnects based on 3D stacking of opto-electrical dies on Si, Pinxiang Duan, Oded Raz, Barry Smalbrugge, Harmen Dorren, Technische Univ. Eindhoven (Netherlands) . . . . . [8267-28]

Proposal and FDTD simulation of reflective self-organizing lightwave network (R-SOLNET) using phosphor, Masatoshi Seki, Tetsuzo Yoshimura, Tokyo Univ. of Technology (Japan). . . . . [8267-29]

Wednesday 25 January

SESSION 8 . . . . . Wed. 8:00 to 10:00 am

Optical Interconnects in High Performance Computing

Joint Session with Conference 8265

Session Chair: **Louay A. Eldada,** SunEdison (USA)

Optics in computers, servers, and data centers *(Invited Paper)*, Harmen J. S. Dorren, Technische Univ. Eindhoven (Netherlands) . . . . . [8267-30]

Chip-scale integrated optical interconnects: a key enabler for future high-performance computing *(Invited Paper)*, Michael W. Haney, Univ. of Delaware (USA) . . . . . [8267-31]

Requirements for optical interconnect and networking devices for low-energy communications within digital systems *(Invited Paper)*, Anthony L. Lentine, Sandia National Labs. (USA) . . . . . [8265-01]

Multicore fiber link demonstrating large bandwidth density for future multimode optical interconnects *(Invited Paper)*, Benjamin G. Lee, Christian Baks, Fuad E. Doany, Daniel M. Kuchta, Petar K. Pepeljugoski, Clint L. Schow, IBM Thomas J. Watson Research Ctr. (USA) . . . . . [8265-02]

SESSION 9 . . . . . Wed. 10:30 am to 12:30 pm

Nanophotonics for Optical Interconnects

Joint Session with Conference 8265

Session Chair: **Ray T. Chen,** The Univ. of Texas at Austin (USA)

Silicon photonics in computing applications *(Invited Paper)*, Michael Watts, Massachusetts Institute of Technology (USA) . . . . . [8265-03]

Chip-scale photonic interconnection networks for energy efficient processor-memory communications *(Invited Paper)*, Keren Bergman, Columbia Univ. (USA) . . . . . [8267-32]

Low-power integration of on-chip nanophotonic interconnect for high-performance opto-electrical IC *(Invited Paper)*, Duo Ding, David Z. Pan, The Univ. of Texas at Austin (USA) . . . . . [8267-33]

Multiprocessor silicon photonic interconnects: a systems perspective *(Invited Paper)*, Pranay Koka, Oracle Labs. (USA). . . . . [8265-04]

Lunch/Exhibition Break . . . . . 12:30 to 1:40 pm

SESSION 10 . . . . . Wed. 1:40 to 3:20 pm

Components

Session Chair: **Henning Schröder,** Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany)

Nanophotonics for information systems *(Invited Paper)*, Yeshaiahu Fainman, Univ. of California, San Diego (USA) . . . . . [8267-34]

Energy-efficient high-speed 850 nm VCSELs for optical interconnects *(Invited Paper)*, James A. Lott, Nikolay N. Ledentsov, VI Systems GmbH (Germany) . . . . . [8267-35]

Design and experimental study on the grating outcouplers providing the controlled 2D-intensity profile of the output beam from a broad area laser diode, Oleg V. Smolski, Viktor O. Smolski, Eric C. Browy, Eric G. Johnson, The Univ. of North Carolina at Charlotte (USA); Zane A. Shellenbarger, SRI International Sarnoff (USA) . . . . . [8267-36]

Novel VCSEL driving technique with virtual back termination for high-speed optical interconnection, Mariko Sugawara, Yukito Tsunoda, Hideki Oku, Satoshi Ide, Kazuhiro Tanaka, Fujitsu Labs., Ltd. (Japan) . . . . . [8267-37]

SESSION 11 . . . . . Wed. 3:50 to 5:30 pm

Optical Links

Session Chair: **Peter Van Daele,** Univ. Gent (Belgium)

Application of MIMO technology for next-generation optical and millimeter-wave interconnects *(Invited Paper)*, Gee-Kung Chang, Georgia Institute of Technology (USA) . . . . . [8267-38]

Device design for multiple-input multiple-output (MIMO) over multimode optical fiber *(Invited Paper)*, Seth R. Bank, Sriram Vishwanath, K. Appaiah, S. Zisman, The Univ. of Texas at Austin (USA) . . . . . [8267-39]

A high-speed 0.35µm CMOS optical communication link, Marius E. Goosen, INSiAVA (Pty) Ltd. (South Africa) and Univ. of Pretoria (South Africa); Antonie C. Alberts, Pieter Rademeyer, Alfons W. Bogalecki, INSiAVA (Pty) Ltd. (South Africa); Monuko du Plessis, Petrus J. Venter, Univ. of Pretoria (South Africa) . . . . . [8267-40]

Increasing bandwidth through increased coupling efficiency: 0.75 - 0.85 micron Si Av LEDs into optical fibres, Lukas W. Snyman, Dieter Schmieder, Tshwane Univ. of Technology (South Africa) . . . . . [8267-41]

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Design and fabrication of a compact 1-by-4 multimode interference power splitter, Li Ma, Hongliang Zhu, Institute of Semiconductors (China); Minghua Chen, Tsinghua Univ. (China) . . . . . [8267-42]

Transmitting part of optical interconnect module with three-dimensional optical path, Chia-Chi Chang, Po-Kuan Shen, Chin-Ta Chen, Hsu-Liang Hsiao, National Central Univ. (Taiwan); Yun-Chih Lee, Centera Photonics Inc. (Taiwan); Yen Chung Chang, Mount-Learn Wu, National Central Univ. (Taiwan). . [8267-43]

Improved performance of traveling wave directional coupler modulator based on electro-optic polymer, Xingyu Zhang, Beom-Suk Lee, Che-Yun Lin, The Univ. of Texas at Austin (USA); Alan Wang, Omega Optics, Inc. (USA); Amir Hosseini, Xiaohui Lin, Ray T. Chen, The Univ. of Texas at Austin (USA) [8267-44]

Router and network design for power-efficient optical network-on-chip, Tsung-Ying Yang, Yu-Chueh Hung, National Tsing Hua Univ. (Taiwan). [8267-45]

80µm-core graded-index multimode fiber for consumer electronic devices, Denis Molin, Marianne Bigot-Astruc, Pierre Sillard, Prysmian / Draka (France) . . . . . [8267-46]

Mode coupling due to isotropic random heterogeneities in graded-index plastic optical fibers, Azusa Inoue, Kenji Makino, Atsushi Kondo, Keio Univ. (Japan); Takafumi Sassa, RIKEN (Japan); Yasuhiro Koike, Keio Univ. (Japan) . . . . . [8267-47]

Inverted-tapered mode-size converter for coupling of optical fiber with Si-photonics chip, Do-Won Kim, Gyungok Kim, Electronics and Telecommunications Research Institute (Korea, Republic of) . . . . . [8267-48]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8268

Sunday-Thursday 22-26 January 2012 • Proceedings of SPIE Vol. 8268

Quantum Sensing and Nanophotonic Devices IX

Conference Chair: **Manijeh Razeghi,** Northwestern Univ. (USA)

Conference Co-Chairs: **Eric Tournie,** Univ. Montpellier 2 (France); **Gail J. Brown,** Air Force Research Lab. (USA)

Program Committee: **Jong Hyeob Baek,** Korea Photonics Technology Institute (Korea, Republic of); **Jean-Francois Baumard,** Agence Nationale de la Recherche (France); **Vincent Berger,** Univ. Paris 7-Denis Diderot (France); **David A. Cardimona,** Air Force Research Lab. (USA); **Raffaele Colombelli,** Univ. Paris-Sud 11 (France); **Henry O. Everitt,** Duke Univ. (USA) and U.S. Army Research, Development and Engineering Command (USA); **John E. Hubbs,** Ball Aerospace & Technologies Corp. (USA); **Jean-Pierre Huignard,** Consultant (France); **Christine A. Jhabvala,** NASA Goddard Space Flight Ctr. (USA); **Woo-Gwang Jung,** Kookmin Univ. (Korea, Republic of); **Tsukuru Katsuyama,** Sumitomo Electric Industries, Ltd. (Japan); **Shigeyuki Kuboya,** The Univ. of Tokyo (Japan); **Armin Lambrecht,** Fraunhofer-Institut für Physikalische Messtechnik (Germany); **Tariq Manzur,** Naval Undersea Warfare Ctr. (USA); **Jerry R. Meyer,** U.S. Naval Research Lab. (USA); **Vaidya Nathan,** Air Force Research Lab. (USA); **Joseph G. Pellegrino,** U.S. Army Night Vision & Electronic Sensors Directorate (USA); **Nicolas Péré-Laperne,** Ctr. National de la Recherche Scientifique (France); **Ramesh K. Shori,** Naval Air Warfare Ctr. Weapons Div. (USA); **Donald J. Silversmith,** Defense Threat Reduction Agency (USA); **Marija Strojnik,** Ctr. de Investigaciones en Óptica, A.C. (Mexico); **Rengarajan Sudharsanan,** Spectrolab, Inc. (USA); **Ferechteh Hosseini Teherani,** Nanovation (France); **Meimei Z. Tidrow,** U.S. Army Night Vision & Electronic Sensors Directorate (USA); **Miriam S. Vitiello,** Consiglio Nazionale delle Ricerche (Italy); **Nakita Vodjdani,** Agence Nationale de la Recherche (France); **Sheng Wu,** California Institute of Technology (USA); **Franco Zappa,** Politecnico di Milano (Italy); **John M. Zavada,** National Science Foundation (USA)

Sunday 22 January

Introduction and Opening Remarks . . Sun. 8:00 to 8:10 am

Manijeh Razeghi, Northwestern Univ. (USA)

Keynote Session . . . . . Sun. 8:10 to 8:40 am

Session Chair: **Manijeh Razeghi,** Northwestern Univ. (USA)

Title to be determined *(Keynote Presentation)*, Chandra Kumar N. Patel, Pranalytica, Inc. (USA) . . . . . [8268-01]

SESSION 1 . . . . . Sun. 8:40 to 10:00 am

Plasmonics/Metamaterials I

Session Chairs: **Jean-Michel Gérard,** Commissariat à l'Énergie Atomique (France); **Joseph G. Pellegrino,** U.S. Army Night Vision & Electronic Sensors Directorate (USA)

Mid-infrared field concentration of electrically-generated surface plasmons polaritons *(Invited Paper)*, Adel Bousseksou, Jean-Phillipe Tetienne, Raffaele Colombelli, Univ. Paris-Sud 11 (France); Arthur Babuty, Yannick De Wilde, L'Institut Langevin (Algeria); Grégoire Beaudoin, Isabelle Sagnes, Ctr. National de la Recherche Scientifique (France). . . . . [8268-02]

Tunneling and scattering of excited surface-plasmon waves through a finite slit array on a metallic film with variable slit width or filled with variable dielectric material *(Invited Paper)*, Danhong Huang, Air Force Research Lab. (USA) . . . . . [8268-03]

Binary nanoparticle dispersed metamaterial implementation and characterization *(Invited Paper)*, Partha P. Banerjee, Rola Aylo, George T. Nehmetallah, Han Li, Andrew M. Sarangan, Peter E. Powers, Univ. of Dayton (USA) . . . . . [8268-04]

Localized surface plasmon resonant photosensors for nano-spectroscopy *(Invited Paper)*, Zuki Tanaka, Univ. of California, Santa Cruz (USA) . . . . [8268-05]

SESSION 2 . . . . . Sun. 10:20 am to 12:00 pm

Plasmonics/Metamaterials II

Session Chairs: **Emmanuel Rosencher,** ONERA (France); **Vincenzo Spagnolo,** Politecnico di Bari (Italy)

Spectral filtering with subwavelength gratings: overview and latest advances *(Invited Paper)*, Grégory Vincent, Emilie Sakat, Thomas Estruch, ONERA (France); Petru Ghenuche, Ctr. National de la Recherche Scientifique (France); Jérôme Primot, Julien Jaeck, Sophie Derelle, ONERA (France); Fabrice Pardo, Stéphane Collin, Jean-Luc Pelouard, Ctr. National de la Recherche Scientifique (France); Riad Haïdar, ONERA (France). . . . . [8268-06]

Plasmonic nanocavities for photovoltaics devices and biosensing *(Invited Paper)*, Stéphane S. Collin, Andrea Cattoni, Clément Colin, Inès Massiot, Petru V. Ghenuche, Nathalie Bardou, Dominique Decanini, Anne-Marie Haghiri-Gosnet, Jean-Luc Pelouard, Ctr. National de la Recherche Scientifique (France) . . . . . [8268-07]

Enhanced infrared detection using plasmonic mode-converters *(Invited Paper)*, Hooman Mohseni, Northwestern Univ. (USA) . . . . . [8268-08]

Semiconductor nanostructures towards optoelectronic device applications *(Invited Paper)*, Jae Su Yu, Kyung Hee Univ. (Korea, Republic of) . . . . . [8268-09]

Metamaterials and nanophotonic devices for energy and sensing *(Invited Paper)*, Koray Aydin, Northwestern Univ. (USA) . . . . . [8268-10]

Lunch Break . . . . . 12:00 to 1:00 pm

SESSION 3 . . . . . Sun. 1:00 to 2:40 pm

New Spectroscopy Approaches

Session Chairs: **Armin Lambrecht,** Fraunhofer-Institut für Physikalische Messtechnik (Germany); **Ryan P. McClintock,** Northwestern Univ. (USA)

Photonic crystal nanophotonic open sensor platform for highly sensitive highly specific high-throughput chip-integrated sensing and spectroscopy *(Invited Paper)*, Ray T. Chen, The Univ. of Texas at Austin (USA); Swapnajit Chakravarty, Omega Optics, Inc. (USA); Wei-Cheng Lai, The Univ. of Texas at Austin (USA); Xiaolong A. Wang, Omega Optics, Inc. (USA); Cheyun Lin, The Univ. of Texas at Austin (USA) . . . . . [8268-11]

Quantum cascade laser enabled polymer waveguide sensor, Sheng Wu, Andrei Deev, California Institute of Technology (USA) . . . . . [8268-12]

Long wave infrared on-chip absorption spectroscopy with photonic crystal slot waveguides, Yi Zou, The Univ. of Texas at Austin (USA); Swapnajit Chakravarty, Omega Optics, Inc. (USA); Wei-Cheng Lai, Ray T. Chen, The Univ. of Texas at Austin (USA) . . . . . [8268-13]

Sensitive detection of nitric oxide using a 5.26μm CW DFB quantum cascade laser based QEPAS sensor, Frank K. Tittel, Lei Dong, Rafal Lewicki, Adjani Peralta, George Lee, Rice Univ. (USA); Vincenzo Spagnolo, Politecnico di Bari (Italy). . . . . [8268-14]

Spectral selective absorption enhancement from stacked ultra-thin InGaAs/Si Fano resonance membranes, Arvinder Chadha, Weiquan Yang, Tapas K. Saha, Santhad Chuwongin, Weidong Zhou, The Univ. of Texas at Arlington (USA); Zhenqiang Ma, Univ. of Wisconsin-Madison (USA); Gail J. Brown, Air Force Research Lab. (USA) . . . . . [8268-15]

Applications of infrared FPAs in FT-IR chemical imaging spectroscopy and their unique performance requirement set *(Invited Paper)*, Mustafa Kansiz, Agilent Technologies Australia P/L (Australia); Ian McAlexander, Agilent Technologies, Inc. (USA) . . . . . [8268-16]

SESSION 4 . . . . . Sun. 2:40 to 3:35 pm

New IR Materials

Session Chairs: **Hiroshi Inada,** Sumitomo Electric Industries, Ltd. (Japan); **David J. Smith,** Arizona State Univ. (USA)

III-V-N alloys grown by MOVPE in H_2 and N_2 mixed carrier gases *(Invited Paper)*, Shigeyuki Kuboya, The Univ. of Tokyo (Japan); Sanorpim Sakuntam, Chulalongkorn Univ. (Thailand); Ryuji Katayama, Tohoku Univ. (Japan); Kentaro Onabe, The Univ. of Tokyo (Japan) . . . . . [8268-17]

MBE growth of Sb-based type-2 quantum dots for the application to long wavelength sensors *(Invited Paper)*, Jin Dong Song, E. H. Lee, Sang Hyuck Kim, M. H. Bae, I. K. Han, Jung Il Lee, Korea Institute of Science and Technology (Korea, Republic of); Qin Wang, A. Karim, Jan Y. Andersson, Acreo AB (Sweden) . . . . . [8268-18]

Valence band offset study for InAs/InAsSb superlattice infrared detectors, Elizabeth H. Steenbergen, Oray O. Cellek, Yong-Hang Zhang, Arizona State Univ. (USA); Dmitri Lubyshev, Yueming Qiu, Joel M. Fastenau, Amy W. Liu, IQE Inc. (USA) . . . . . [8268-19]

SESSION 5 . . . . . Sun. 3:50 to 5:05 pm

Quantum Cascade Lasers

Session Chairs: **Rui Q. Yang,** The Univ. of Oklahoma (USA); **Jean-Pierre Huignard,** Consultant (France)

Nonlinear GaInAs/AlInAs/InP quantum cascade laser sources for wavelength generation in the 2.7-70µm wavelength range *(Invited Paper)*, Augustinas Vizbaras, Walter Schottky Institut (Germany); Robert W. Adams, The Univ. of Texas at Austin (USA); Christian Grasse, Walter Schottky Institut (Germany); Min Jang, The Univ. of Texas at Austin (USA); Ralf Meyer, Walter Schottky Institut (Germany); Mikhail A. Belkin, The Univ. of Texas at Austin (USA); Markus-Christian Amann, Walter Schottky Institut (Germany) . . [8268-20]

Linewidth broadening by intrinsic temperature fluctuations in quantum cascade lasers *(Invited Paper)*, Qijie Wang, Tao Liu, Nanyang Technological Univ. (Singapore) . . . . . [8268-21]

Substrate emission quantum cascade ring lasers with room temperature continuous wave operation, Yanbo Bai, Quanyong Lu, Neelanjan Bandyopadhyay, Stanley Tsao, Steven Slivken, Manijeh Razeghi, Northwestern Univ. (USA) . . . . . [8268-22]

Nitride-based quantum cascade lasers: a material and performance study *(Invited Paper)*, A. F. Mehdi Anwar, Hung Chi Chou, Univ. of Connecticut (USA); Tariq Manzur, Naval Undersea Warfare Ctr. (USA) . . . . . [8268-23]

SESSION 6 . . . . . Sun. 5:05 to 6:25 pm

Nanowires Applications

Session Chairs: **Stéphane S. Collin,** Ctr. National de la Recherche Scientifique (France); **Miriam Serena Vitiello,** Consiglio Nazionale delle Ricerche (Italy)

GaN-based nanowire photodetectors *(Invited Paper)*, Eva Monroy, Commissariat à l'Énergie Atomique (France); Fernando Gonzalez-Posada, Commissariat à l'Energie Atomque (France); Martien Den Hertog, Rudeesun Songmuang, Institut NÉEL (France) . . . . . [8268-24]

III-V nanowires by self-assembly MOVPE technology for novel and efficient opto-electronic and photovoltaic devices *(Invited Paper)*, Nico Lovergine, Univ. del Salento (Italy); Paola Prete, Istituto per la Microelettronica e Microsistemi (Italy) . . . . . [8268-25]

III-V nanowires in photonic crystal microcavities: toward vertical emitting nanolasers *(Invited Paper)*, Alexandre Larrue, Christophe Wilhelm, Gwenaelle Vest, Nanyang Technological Univ. (Singapore); Sylvain Combrie, Alfredo De Rossi, Thales Research & Technology (France); Cesare Soci, Nanyang Technological Univ. (Singapore) . . . . . [8268-26]

Photovoltaic devices based on quantum dot functionalized nanowire arrays embedded in an organic matrix *(Invited Paper)*, Nicholas A. Harris, Gang Shen, David Wilbert, William Baughman, Soner Balci, Nabil F. Dawahre, Lee A. Butler, Patrick Kung, Seongsin M. Kim, The Univ. of Alabama (USA) . . . . . [8268-27]

Monday 23 January

SESSION 7 . . . . . Mon. 8:00 to 10:40 am

Type II Superlattices

Session Chairs: **Gail J. Brown,** Air Force Research Lab. (USA); **Philippe F. Bois,** Thales Research & Technology (France)

Optimisation of InAs/GaSb superlattice pin photodiode design for the high temperature operation in the midwave infrared range *(Invited Paper)*, Philippe Christol, Rachid Taalat, Charlotte Maingue-Wilson, Cyril Cervera, Hocine Aït-Kaci, Jean-Baptiste Rodriguez, Univ. Montpellier 2 (France); Isabelle Ribet-Mohamed, ONERA (France) . . . . . [8268-28]

High operating temperature XBn-InAsSb bariode detectors *(Invited Paper)*, Philip Klipstein, Olga Klin, Steven Grossman, Noam Snapi, Inna Lukomsky, Michael Yassen, Daniel Aronov, Eyal Berkowitz, Alex Glozman, Osnat Magen, Itay Shtrichman, Rami Frenkel, Eliezer Weiss, SCD Semiconductor Devices (Israel) . . . . . [8268-29]

Thermal conductivity of type II InAs/GaSb superlattices, Matthew Grayson, Chuanle Zhou, Northwestern Univ. (USA) . . . . . [8268-30]

High operating temperature detectors using barrier engineering in quantum dots and InAs/GaSb superlattices *(Invited Paper)*, Sanjay Krishna, Ctr. for High Technology Materials (USA) . . . . . [8268-31]

Low frequency noise in 1024 x 1024 long wavelength infrared focal plane array based on type-II InAs/GaSb superlattice, Abbas Haddadi, Shaban R. Darvish, Guanxi A. Chen, Anh Minh Hoang, Binh Minh Nguyen, Manijeh Razeghi, Northwestern Univ. (USA) . . . . . [8268-32]

High-performance LWIR superlattice detectors and FPA based on CBIRD design, Alexander Soibel, Jean Nguyen, Sir Don B. Rafol, Anna Liao, Linda Hoeglund, Arezou Khoshakhlagh, Sam A. Keo, Jason M. Mumolo, John K. Liu, David Z. Ting, Sarath D. Gunapala, Jet Propulsion Lab. (USA) . . . . . [8268-33]

Type-II superlattice dualband 640 x 512 LWIR focal plane array *(Invited Paper)*, Edward K. W. Huang, Manijeh Razeghi, Northwestern Univ. (USA) . . . . . [8268-34]

Free-space optical communication in long- and mid-wavelength infrared using type-II superlattices and quantum cascade lasers *(Invited Paper)*, Ryan P. McClintock, Abbas Haddadi, Manijeh Razeghi, Northwestern Univ. (USA) . . . . . [8268-35]

Suppression of surface leakage in gate controlled type-II InAs/GaSb mid-infrared photodetectors, Guanxi A. Chen, Binh-Minh Nguyen, Anh Minh Hoang, Edward K. W. Huang, Shaban R. Darvish, Manijeh Razeghi, Northwestern Univ. (USA) . . . . . [8268-36]

SESSION 8 . . . . . Mon. 11:00 am to 12:40 pm

GaN Fundamentals

Session Chairs: **Paul Voisin,** Ctr. National de la Recherche Scientifique (France); **Shigeyuki Kuboya,** The Univ. of Tokyo (Japan)

Physical properties of heteroepitial and homoepitaxial wurtzitic heterostructures grown along arbitrary orientation: III-nitrides and II-oxides *(Invited Paper)*, Bernard Gil, Univ. Montpellier 2 (France); Pierre Bigenwald, Univ. Blaise Pascal (France); Alexey V. Kavokine, Thierry Bretagnon, Thierry Guillet, Christelle Brimont, Univ. Montpellier 2 (France) . . . . . [8268-37]

Magneto-optical spectroscopy of MOVPE grown narrow gap III-Mn-V ferromagnetic semiconductors *(Invited Paper)*, Giti A. Khodaparast, Mithun Bhowmick, Travis Merritt, Virginia Polytechnic Institute and State Univ. (USA); Caitlin Feeser, Bruce W. Wessels, Northwestern Univ. (USA); Stephen A. McGill, National High Magnetic Field Lab. (USA); Dipta Saha, Xinguan Pan, Gary D. Sanders, Christopher J. Stanton, Univ. of Florida (USA) . . . . . [8268-38]

Optical properties of the periodic polarity-inverted GaN waveguides *(Invited Paper)*, Ryuji Katayama, Naoto Fujii, Takashi Matsuoka, Tohoku Univ. (Japan); Yujiro Fukuhara, Shigeyuki Kuboya, Kentaro Onabe, The Univ. of Tokyo (Japan) . . . . . [8268-39]

Growth and applications of ammonothermal bulk GaN substrates *(Invited Paper)*, Robert Dwilinski, Roman Doradzinski, Robert Kucharski, Marcin Zajac, Ammono Sp. z o.o. (Poland) . . . . . [8268-40]

Lasing in GaN microcavities *(Invited Paper)*, Nicolas Grandjean, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8268-41]

Lunch Break . . . . . 12:40 to 1:40 pm

SESSION 9 . . . . . Mon. 1:40 to 3:00 pm

Large Area GaSb Wafers and Epitaxy

Session Chairs: **Eric Tournie,** Univ. Montpellier 2 (France); **Jerry R. Meyer,** U.S. Naval Research Lab. (USA)

Manufacturing of 100mm diameter GaSb and 150mm InSb substrates for advanced space-based applications *(Invited Paper)*, Lisa P. Allen, J. Patrick Flint, Gregory Meshew, John Trevethan, Gordon Dallas, Daniel Bakken, Galaxy Compound Semiconductors, Inc. (USA); Arezou Khoshakhlagh, Cory J. Hill, Jet Propulsion Lab. (USA) . . . . . [8268-42]

Multiwafer production of epitaxy ready 4" GaSb substrates: requirements for epitaxially grown infrared detectors *(Invited Paper)*, Mark J. Furlong, Rebecca J. Martinez, Sasson Amirhaghi, Andrew Mowbray, Brian Smith, Wafer Technology Ltd. (United Kingdom) . . . . . [8268-43]

Surface chemistry improvement of 100mm GaSb for advanced space-based applications *(Invited Paper)*, Lisa P. Allen, J. Patrick Flint, Gregory Meshew, John Trevethan, Galaxy Compound Semiconductors, Inc. (USA); Mark J. Furlong, Rebecca J. Martinez, Andrew Mobray, Wafer Technology Ltd. (United Kingdom). . . . . [8268-44]

Manufacturable MBE growth process for Sb-based superlattices on large-diameter substrates for LWIR applications *(Invited Paper)*, Dmitri Lubyshev, Yueming Qiu, IQE Inc. (USA); Joel M. Fastenau, IQE, Inc. (USA); Amy W. Liu, IQE Inc. (USA); Edwin J. Koerperick, Jonathon T. Olesberg, Dennis T. Norton, Jr., ASL Analytical, Inc. (USA) . . . . . [8268-45]

SESSION 10 . . . . . Mon. 3:00 to 3:50 pm

Avalanche Photodiodes

Session Chairs: **Christine A. Jhabvala,** NASA Goddard Space Flight Ctr. (USA); **Vincent Berger,** Univ. Paris 7-Denis Diderot (France)

Arrays of Geiger-mode avalanche photodiodes *(Invited Paper)*, Erik K. Duerr, MIT Lincoln Lab. (USA) . . . . . [8268-46]

SPAD mini-arrays for indirect time-of-flight 3D ranging, Simone Bellisai, Federica A. Villa, Politecnico di Milano (Italy); Simone Tisa, Micro Photon Devices S.r.l. (Italy); Danilo Bronzi, Federica Barbieri, Franco Zappa, Politecnico di Milano (Italy) . . . . . [8268-47]

Planar technologies for SPAD arrays with improved performances, Angelo Gulinatti, Francesco Panzeri, Ivan Rech, Politecnico di Milano (Italy); Piera Maccagnani, Istituto per la Microelettronica e Microsistemi (Italy); Massimo Ghioni, Sergio Cova, Politecnico di Milano (Italy) and Micro Photon Devices s.r.l. (Italy). . . . . [8268-48]

SESSION 11 . . . . . Mon. 4:10 to 5:45 pm

Interband IR Lasers

Session Chairs: **Lisa P. Allen,** Galaxy Compound Semiconductors, Inc. (USA); **Jin Dong Song,** Korea Institute of Science and Technology (Korea, Republic of)

Quantum well lasers emitting between 3.0 and 3.4 µm for gas spectroscopy *(Invited Paper)*, Yves Rouillard, Sofiane Belahsene, Mohammed Jahjah, Guilhem Boissier, Pierre Grech, Grégoire Narcy, Aurore Vicet, Univ. Montpellier 2 (France); Lars Naehle, Michael von Edlinger, Marc O. Fischer, Johannes Koeth, nanoplus GmbH (Germany). . . . . [8268-49]

Physics of interband cascade lasers *(Invited Paper)*, Igor Vurgaftman, William W. Bewley, Charles D. Merritt, Chadwick L. Canedy, Chul Soo Kim, Joshua Abell, Mijin Kim, Jerry R. Meyer, U.S. Naval Research Lab. (USA) . . . . . [8268-50]

Silicon emission in and out resonant coupling with high Q optical mode *(Invited Paper)*, Jimmy Xu, Lyuba Kuznetsova, Gustavo Fernandes, Brown Univ. (USA) . . . . . [8268-51]

GaAsPN/GaPN quantum wells for photonics on silicon applications, Olivier Durand, Thanh Tra Nguyen, Cédric Robert, Charles Cornet, Antoine Letoublon, Institut National des Sciences Appliquées de Rennes (France); Anne Ponchet, Ctr. d'Elaboration de Matériaux et d'Etudes Structurales (France); Alain Le Corre, Institut National des Sciences Appliquées de Rennes (France); Georges Elias, Ctr. d'Elaboration de Matériaux et d'Etudes Structurales (France); Jean-Marc Jancu, Jacky Even, Mathieu Perrin, Nicolas Bertru, Institut National des Sciences Appliquées de Rennes (France). . . . . [8268-52]

CW operation at RT of Sb-based laser monolithically grown on Si substrate *(Invited Paper)*, Jean-Baptiste Rodriguez, Laurent Cerutti, Jean-Remy Reboul, Eric Tournié, Univ. Montpellier 2 (France) . . . . . [8268-53]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 12 . . . . . Tues. 10:30 to 11:45 am

Quantum Optics I

Session Chairs: **Qijie Wang,** Nanyang Technological Univ. (Singapore); **Jimmy Xu,** Brown Univ. (USA)

Quantum optics with quantum dots in photonic nanowires *(Invited Paper)*, Jean-Michel Gérard, Commissariat à l'Énergie Atomique (France) . . . . [8268-54]

Quantum sensing in integrated photonic devices *(Invited Paper)*, Jonathan C. F. Matthews, Alberto Politi, Damien Bonneau, Jeremy L. O'Brien, Univ. of Bristol (United Kingdom). . . . . [8268-55]

Cavity solitons and nonlinear dynamical regimes in semiconductor microcavities *(Invited Paper)*, Robert Kuszelewicz, Sylvain Barbay, Tiffany Elsass, Ctr. National de la Recherche Scientifique (France) . . . . . [8268-56]

Fully automated code for exact and efficient analysis of quantum systems in the ultrastrong coupling regime, Abbas Arab, Univ. of Dayton (USA); Sina Khorasani, Georgia Institute of Technology (USA) . . . . . [8268-57]

Lunch/Exhibition Break . . . . . 11:45 am to 1:00 pm

SESSION 13 . . . . . Tues. 1:00 to 2:35 pm

Spectroscopy and Security Applications

Session Chairs: **Alexander Soibel,** Jet Propulsion Lab. (USA); **Gerard Wysocki,** Princeton Univ. (USA)

Stand off detection of explosives with broad band tunable external cavity quantum cascade lasers *(Invited Paper)*, Frank Fuchs, Stefan Hugger, Michel Kinzer, Quankui K. Yang, Wolfgang Bronner, Rolf Aidam, Hans-Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Kai A. Degreif, Sven Rademacher, Fraunhofer-Institut für Physikalische Messtechnik (Germany); Frank H. Schnürer, Wenka Schweikert, Fraunhofer-Institut für Chemische Technologie (Germany) . . . . . [8268-58]

Angle-resolved scattering spectroscopy of explosives using an external cavity quantum cascade laser *(Invited Paper)*, Jonathan D. Suter, Mark C. Phillips, Bruce E. Bernacki, Pacific Northwest National Lab. (USA) . . . . . [8268-59]

Detecting contamination with a QCL spectrometer *(Invited Paper)*, Frederick G. Haibach, Adam Erlich, Alex Mazurenko, Erik Deutsch, Block Engineering, LLC (USA). . . . . [8268-60]

Hollow fiber based quantum cascade laser spectrometer for fast and sensitive drug identification, Johannes Herbst, Benjamin Scherer, Alexander Ruf, Jochen Erb, Armin Lambrecht, Fraunhofer-Institut für Physikalische Messtechnik (Germany). . . . . [8268-61]

Hyperspectral microscopy using an external cavity quantum cascade laser and its applications for explosives detection *(Invited Paper)*, Mark C. Phillips, Jonathan D. Suter, Bruce E. Bernacki, Pacific Northwest National Lab. (USA) . . . . . [8268-62]

SESSION 14 . . . . . Tues. 2:35 to 3:40 pm

Single Photon Detection

Session Chairs: **Sheng Wu,** California Institute of Technology (USA); **Marco Genovese,** Istituto Nazionale di Ricerca Metrologica (Italy)

InGaAs/InP single-photon counting module running up to 133 MHz, Alberto Tosi, Adriano Della Frera, Andrea Bahgat Shehata, Carmelo Scarcella, Fabio Acerbi, Franco Zappa, Politecnico di Milano (Italy) . . . . . [8268-63]

Detecting single photons with superconducting nanowires, Sander N. Dorenbos, Iman E. Zadeh, Valery Zwiller, Technische Univ. Delft (Netherlands) . . . . . [8268-64]

Fast-gated single-photon detection module with 200 ps transitions running up to 50 MHz with 30 ps resolution, Gianluca Boso, Alberto Dalla Mora, Alberto Tosi, Adriano Della Frera, Franco Zappa, Politecnico di Milano (Italy) . . . . . [8268-65]

Spectral dependence of ultra low dark count: Superconducting single photon detector for the evaluation of broadband parametric fluorescence *(Invited Paper)*, Shanthi Subashchandran, Ryo Okamoto, Akira Tanaka, Masayuki Okano, Hokkaido Univ. (Japan) and Osaka Univ. (Japan); Labao Zhang, Lin Kang, Jian Chen, Peiheng Wu, Nanjing Univ. (China); Shigeki Takeuchi, Hokkaido Univ. (Japan) and Osaka Univ. (Japan). . . . . [8268-66]

SESSION 15 . . . . . Tues. 4:10 to 5:30 pm

GaN LEDs

Session Chairs: **Nicolas Grandjean,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **A. F. Mehdi Anwar,** Univ. of Connecticut (USA)

Electroluminescence from p-type thin film/n-type nanostructures aligned by non-uniform electric field *(Invited Paper)*, Jihyun Kim, Korea Univ. (Korea, Republic of) . . . . . [8268-67]

Self-emissive full-scale high-resolution blue/green microdisplays *(Invited Paper)*, Jingyu Lin, Hongxing Jiang, Texas Tech Univ. (USA) . . [8268-68]

Flexible GaN LED for display and biomedical applications *(Invited Paper)*, Keon Jae Lee, KAIST (Korea, Republic of) . . . . . [8268-69]

Light emitting diodes: the future lighting source with high efficiency *(Invited Paper)*, Ho Ki Kwon, LG Electronics Inc. (Korea, Republic of) . . [8268-70]

Wednesday 25 January

SESSION 16 . . . . . Wed. 8:00 to 9:10 am

Graphene

Session Chairs: **Jingyu Lin,** Texas Tech Univ. (USA); **Jae Su Yu,** Kyung Hee Univ. (Korea, Republic of)

Nanoscale metrology of graphene *(Invited Paper)*, Kevin F. Kelly, Rice Univ. (USA) . . . . . [8268-71]

Direct graphene growth on dielectric substrates: enabling technology for industrial development of graphene electronics and spintronics *(Invited Paper)*, Jeffry Kelber, Mi Zhou, Frank L. Pasquale, Univ. of North Texas (USA); Peter A. Dowben, Univ. of Nebraska-Lincoln (USA) . . . . . [8268-72]

Oxygen sensor made by graphene, Sheng Chun Hung, Chung Wei Chen, Y. H. Chien, Y. P. Huang, Chen-Yu Shieh, National Central Univ. (Taiwan); Gou-Chung Chi, National Chiao Tung Univ. (Taiwan). . . . . [8268-73]

Zinc oxide nanorod/graphene heterostructure for efficient photovoltaic applications, Rohini Bhardwaj, Pramod K. Bhatnagar, Parmatma C. Mathur, Univ. of Delhi (India). . . . . [8268-74]

SESSION 17 . . . . . Wed. 9:10 to 10:10 am

Quantum Optics II

Session Chairs: **Bernard Gil,** Univ. Montpellier 2 (France); **Jonathan C. F. Matthews,** Univ. of Bristol (United Kingdom)

Two-photon conductivity in semiconductors: a new tool for the study of the quantum properties of light *(Invited Paper)*, Emmanuel Rosencher, ONERA (France) and Ecole Polytechnique (France); Fabien Boitier, Antoine Godard, ONERA (France); Claude Fabre, Univ. Pierre et Marie Curie (France). . . [8268-75]

Semiconductor sources of two-photon states at room temperature in the telecom range *(Invited Paper)*, Sara Ducci, Adeline Orieux, Carlos Eduardo Rodrigues de Souza, Marc Savanier, Univ. Paris 7-Denis Diderot (France); Aristide Lemaitre, Ctr. National de la Recherche Scientifique (France); Pascal Filloux, Christophe Manquest, Ivan Favero, Giuseppe Leo, Univ. Paris 7-Denis Diderot (France). . . . . [8268-76]

Laterally confined photonic Tamm states: a new approach for single photon sources and cavity-enhanced photodetectors *(Invited Paper)*, Paul Voisin, Olivier Gazzano, Steffen Michaelis de Vasconcellos, Karine Gauthron, Ctr. National de la Recherche Scientifique (France); Clementine Symonds, Univ. Claude Bernard Lyon 1 (France); Jacqueline Bloch, Ctr. National de la Recherche Scientifique (France); Joel Belessa, Univ. Claude Bernard Lyon 1 (France); Aristide Lemaître, Pascale Senellart, Ctr. National de la Recherche Scientifique (France) . . . . . [8268-77]

SESSION 18 . . . . . Wed. 10:40 am to 12:40 pm

THz Emission And Detection

Session Chairs: **Robert Kuszelewicz,** Ctr. National de la Recherche Scientifique (France); **Zuki Tanaka,** Univ. of California, Santa Cruz (USA)

Reliable GaN-based resonant tunneling diodes with reproducible room-temperature negative differential resistance *(Invited Paper)*, Can Bayram, IBM Thomas J. Watson Research Ctr. (USA); Manijeh Razeghi, Northwestern Univ. (USA) . . . . . [8268-78]

Tunable surface emitting THz quantum cascade structure based on cyclotron emission *(Invited Paper)*, Francois-Regis Jasnot, Louis-Anne de Vaulchier, Yves Guldner, Gerald Bastard, Ecole Normale Supérieure (France); Angela Vasanelli, Christophe Manquest, Carlo Sirtori, Univ. Paris 7-Denis Diderot (France); Mattias Beck, Jerome Faist, ETH Zurich (Switzerland) [8268-79]

High performance room temperature terahertz detectors based on semiconductor nanowire field effect transistors *(Invited Paper)*, Miriam S. Vitiello, Consiglio Nazionale delle Ricerche (Italy). . . . . [8268-80]

Surface phonon polaritons for active THz devices *(Invited Paper)*, Jean-Jacques Greffet, Simon Vassant, Alexandre Archambault, François Marquier, Lab. Charles Fabry (France); Fabrice Pardo, Ulf Gennser, Antonella Cavanna, Jean-Luc Pelouard, Ctr. National de la Recherche Scientifique (France)[8268-81]

Phase-locking of a 2.5THz quantum cascade laser to a frequency comb using a GaAs photo-mixer *(Invited Paper)*, Marco Ravaro, Christophe Manquest, Carlo Sirtori, Univ. Paris 7-Denis Diderot (France); Giorgio Santarelli, Observatoire de Paris (France); Jean-Francois Lampin, Univ. des Sciences et Technologies de Lille (France); Edmund Linfield, Suraj Khanna, Univ. of Leeds (United Kingdom); Stefano Barbieri, Univ. Paris 7-Denis Diderot (France) . . . . . [8268-82]

LT GaAs nanophotoswitches for microwave sampling *(Invited Paper)*, Didier J. Decoster, Antoine Pagies, Jean Francois Lampin, Xavier Wallart, Vincent Magnin, Joseph Harari, Univ. des Sciences et Technologies de Lille (France); Charlotte Tripon-Canseliet, Salim Faci, Univ. Pierre et Marie Curie (France); Stephane Formont, Loic Menager, Jean Chazelas, Thales Optronique S.A. (France); Gay Jestin, La Délégation Générale pour l'Armement (France) . . . . . [8268-83]

Lunch/Exhibition Break . . . . . 12:40 to 2:00 pm

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

SESSION 19 . . . . . Wed. 2:00 to 3:45 pm

Mid-IR Spectroscopy

Session Chairs: **Partha P. Banerjee,** Univ. of Dayton (USA); **Frank Fuchs,** Fraunhofer-Institut für Angewandte Festkörperphysik (Germany)

Optical heterodyne detection in the mid-infrared: capabilities and new molecular sensing applications *(Invited Paper)*, Gerard Wysocki, Michal Nikodem, Tracy R. Tsai, Princeton Univ. (USA); Damien Weidmann, Rutherford Appleton Lab. (United Kingdom); Yin Wang, Princeton Univ. (USA). . . . [8268-84]

Spectroscopic measurements of isotopic water composition using a new modulation cancellation method, Vincenzo Spagnolo, Politecnico di Bari (Italy); Lei Dong, Anatoliy A. Kosterev, Frank K. Tittel, Rice Univ. (USA) [8268-85]

Shot-noise limited performance of a heterodyne enhanced Faraday rotation spectrometer, Yin Wang, Michal Nikodem, Princeton Univ. (USA); Jake Hoyne, Washington Univ. in St. Louis (USA); Gerard Wysocki, Princeton Univ. (USA) . . . . . [8268-86]

A modular architecture for multi-channel external cavity quantum cascade laser-based chemical sensors: a systems approach *(Invited Paper)*, Matthew S. Taubman, Bruce E. Bernacki, John T. Schiffern, Bret D. Cannon, Robert D. Stahl, Tanya L. Myers, Mark C. Phillips, Pacific Northwest National Lab. (USA) . . . . . [8268-87]

Sub-ppb detection of nitrogen dioxide with an external cavity quantum cascade laser, Rafal Lewicki, Kun Liu, Rice Univ. (USA); Timothy Day, Daylight Solutions Inc. (USA); Frank K. Tittel, Rice Univ. (USA) . . . . . [8268-88]

Progress towards compact broadly tunable laser modules for high-resolution mid-IR spectroscopy and commercial applications *(Invited Paper)*, Miles J. Weida, Edeline Fotheringham, Timothy Day, Daylight Solutions Inc. (USA). . . . . [8268-89]

SESSION 20 . . . . . Wed. 4:10 to 5:10 pm

Imaging

Session Chairs: **David A. Cardimona,** Air Force Research Lab. (USA); **Philip Klipstein,** SCD Semiconductor Devices (Israel)

Innovative quantum imaging protocols *(Invited Paper)*, Marco Genovese, Istituto Nazionale di Ricerca Metrologica (Italy) . . . . . [8268-90]

Recent advances in quantum cascade lasers in the InAs/AlSb material system *(Invited Paper)*, Alexei N. Baranov, Roland Teissier, Pierre Laffaille, Michael Bahriz, Jean-Christophe Moreno, Univ. Montpellier 2 (France). [8268-91]

Infrared imaging with quantum wells and strained layer superlattices *(Invited Paper)*, Mani Sundaram, Axel Reisinger, Richard Dennis, Kelly Patnaude, Douglas Burrows, Jason Bundas, Kim Beech, Ross Faska, QmagiQ, LLC (USA) . . . . . [8268-92]

Thursday 26 January

SESSION 21 . . . . . Thurs. 8:30 to 10:00 am

QWIPS

Session Chairs: **Sanjay Krishna,** Ctr. for High Technology Materials (USA); **Hooman Mohseni,** Northwestern Univ. (USA)

QWIP status and future trends in Thales *(Invited Paper)*, Philippe F. Bois, Thales Research & Technology (France). . . . . [8268-93]

Optically addressed multiband photodetector for infrared imaging applications, Oray Orkun Cellek, Yong-Hang Zhang, Arizona State Univ. (USA) . . . . . [8268-94]

Electromagnetic design of resonator-QWIPs *(Invited Paper)*, Kwong-Kit Choi, U.S. Army Research Lab. (USA); David P. Forrai, L-3 Communications Cincinnati Electronics (USA). . . . . [8268-95]

Evolution of QWIP focal plane development at the NASA/Goddard Space Flight Center *(Invited Paper)*, Murzy D. Jhabvala, NASA Goddard Space Flight Ctr. (USA); Kwong-Kit Choi, U.S. Army Research Lab. (USA) . . . . . [8268-96]

Responsivity enhancement of QWIPs by photonic crystal slabs, Roman Gansch, Stefan Kalchmair, Peter Reininger, Hermann Detz, Aaron M. Andrews, Pavel Klang, Werner Schrenk, Gottfried Strasser, Technische Univ. Wien (Austria) . . . . . [8268-97]

SESSION 22 . . . . . Thurs. 10:30 am to 12:10 pm

New Wide Bandgap Materials

Session Chairs: **Eva Monroy,** Commissariat à l'Énergie Atomique (France); **Ferechteh Hosseini Teherani,** Nanovation (France)

Semiconducting hexagonal boron nitride for deep ultraviolet photonics *(Invited Paper)*, Hongxing Jiang, Jingyu Lin, Texas Tech Univ. (USA) . . [8268-98]

Solar blind metal-semiconductor-metal ultraviolet photodetectors using quasi-alloy of BGaN/GaN superlattices *(Invited Paper)*, Abdallah Ougazzaden, Georgia Tech-Lorraine (France); Jean-Paul Salvestrini, Hussein Srour, Ali Ahaitouf, Simon Gautier, Univ. de Metz (France); Tarik Moudakir, Supélec (France); Badreddine Assouar, Georgia Tech-Lorraine (France). . . . . [8268-99]

The electrical properties of transparent conducting- and semiconducting oxides *(Invited Paper)*, Oliver Bierwagen, Paul-Drude-Institut für Festkörperelektronik (Germany) and Univ. of California, Santa Barbara (USA); Takahiro Nagata, National Institute for Materials Science (Japan); Mark E. White, Min-Ying Tsai, James S. Speck, Univ. of California, Santa Barbara (USA) . . . . . [8268-100]

Nanophotonics devices based on magnetic materials *(Invited Paper)*, Jean-Yves Bigot, Mircea Vomir, Marie Barthelemy, Michele Albrecht, Institut de Physique et Chimie des Matériaux de Strasbourg (France) . . . . . [8268-101]

Redefinition of probability and spin currents in semiconductors *(Invited Paper)*, Henri-Jean Drouhin, Federico Bottegoni, Ecole Polytechnique (France); Guy Fishman, Institut d'Électronique Fondamentale (France); Jean-Eric Wegrowe, Ecole Polytechnique (France). . . . . [8268-102]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 23 . . . . . Thurs. 1:30 to 2:50 pm

CMT Photodetectors

Session Chairs: **Manijeh Razeghi,** Northwestern Univ. (USA); **Ray T. Chen,** The Univ. of Texas at Austin (USA)

HgCdTe photon trapping detectors for mid-wavelength infrared (MWIR) high operating temperature (HOT) focal plane arrays *(Invited Paper)*, Justin Wehner, Kasey D. Smith, Borys Kolasa, Aaron Ramirez, Edward Smith, Raytheon Vision Systems (USA) . . . . . [8268-103]

HgCdTe nBn and auger-suppressed photodetectors grown by molecular beam epitaxy *(Invited Paper)*, Silviu Velicu, Jun Zhao, EPIR Technologies, Inc. (USA); Anne M. Itsuno, Jamie D. Phillips, Univ. of Michigan (USA) . . . [8268-104]

Wide-area SWIR arrays and active illumination *(Invited Paper)*, Daniel S. Renner, Michael H. MacDougal, Jonathan C. Geske, Andrew D. Hood, Aerius Photonics, LLC (USA). . . . . [8268-105]

Colloidal quantum dots for infrared detection *(Invited Paper)*, Philippe Guyot-Sionnest, Sean Keuleyan, Emmanuel Lhuillier, Heng Liu, The Univ. of Chicago (USA) . . . . . [8268-106]

SESSION 24 . . . . . Thurs. 3:20 to 5:15 pm

Type II Superlattices and Quantum Cascade Detectors

Session Chairs: **Philippe Christol,** Univ. Montpellier 2 (France); **Franco Zappa,** Politecnico di Milano (Italy)

Structural properties of InAs/InAs $_{1-x}$Sb $_x$ type-II superlattices *(Invited Paper)*, David J. Smith, Lu Ouyang, Elizabeth Steenbergen, Orkun Cellek, Yong-Hang Zhang, Arizona State Univ. (USA) . . . . . [8268-107]

Strain mapping of interfaces in quaternary InAs-GaSb heterostructures by aberration-corrected HRTEM and STEM, Krishnamurthy Mahalingam, Heather J. Haugan, Gail J. Brown, Kurt G. Eyink, Air Force Research Lab. (USA) . . . . . [8268-108]

MOVPE grown InGaAs/GaAsSb type II quantum well photodiode for SWIR focal plane array *(Invited Paper)*, Hiroshi Inada, Hiroki Mori, Youichi Nagai, Yasuhiro Iguchi, Fuminori Mitsuhashi, Kei Fujii, Takashi Ishizuka, Katsushi Akita, Sumitomo Electric Industries, Ltd. (Japan) . . . . . [8268-109]

Comparison of the electro-optical performances of symmetrical and asymmetrical MWIR InAs/GaSb superlattice pin photodiodes *(Invited Paper)*, Isabelle Ribet-Mohamed, Michel Tauvy, ONERA (France); Rachid Taalat, Cyril Cervera, Jean-Baptiste Rodriguez, Philippe Christol, Univ. Montpellier 2 (France) . . . . . [8268-110]

Progress in the development of interband cascade infrared photodetectors *(Invited Paper)*, Rui Q. Yang, The Univ. of Oklahoma (USA) . . . . . [8268-111]

Noise in quantum cascade detectors *(Invited Paper)*, Laetitia Doyennette, Alexandre Delga, Univ. Paris 7-Denis Diderot (France); Mathieu Carras, Virginie Trinite, Alexandru Nedelcu, Alcatel-Thales III-V Lab. (France); Vincent Berger, Univ. Paris 7-Denis Diderot (France) . . . . . [8268-112]

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Photonic and Phononic Properties of Engineered Nanostructures II

Conference Chairs: **Ali Adibi,** Georgia Institute of Technology (USA); **Shawn-Yu Lin,** Rensselaer Polytechnic Institute (USA); **Axel Scherer,** California Institute of Technology (USA)

Program Committee: **Shanhui Fan,** Stanford Univ. (USA); **Abdelkrim Khelif,** CNRS-Georgia Tech Lorraine (France); **Maryanne C. J. Large,** The Univ. of Sydney (Australia); **Susumu Noda,** Kyoto Univ. (Japan); **Masaya Notomi,** NTT Basic Research Labs. (Japan); **Ekmel Ozbay,** Bilkent Univ. (Turkey); **Domenico Pacifici,** California Institute of Technology (USA); **Dennis W. Prather,** Univ. of Delaware (USA); **William J. Wadsworth,** Univ. of Bath (United Kingdom); **Yong Xu,** Virginia Polytechnic Institute and State Univ. (USA); **Eli Yablonovitch,** Univ. of California, Berkeley (USA)

Monday 23 January

SESSION 1 . . . . . Mon. 8:00 to 10:00 am

Recent Advances in Engineered Nanostructures

Photonic crystal light trapping for solar energy harvesting *(Invited Paper)*, Sajeev John, Univ. of Toronto (Canada) . . . . . [8269-01]

Passive and active nanophotonics *(Invited Paper)*, Yeshaiahu Fainman, Univ. of California, San Diego (USA) . . . . . [8269-02]

Molding light propagation with phase discontinuities *(Invited Paper)*, Zeno Gaburro, Harvard Univ. (USA) and Univ. degli Studi di Trento (Italy); Nanfang Yu, Patrice Genevet, Mikhail Kats, Francesco Aieta, Jean-Philippe Tetienne, Federico Capasso, Harvard Univ. (USA) . . . . . [8269-03]

Applications of the circuit model for plasmonics *(Invited Paper)*, Eli Yablonovitch, Univ. of California, Berkeley (USA) . . . . . [8269-04]

SESSION 2 . . . . . Mon. 10:30 am to 12:00 pm

Photonic Crystal Waveguides and Fibers

Design and fabrication of HC-PCF for high-power fast laser beam transportation *(Invited Paper)*, Fetah A. Benabid, Univ. of Bath (United Kingdom) . . . . . [8269-05]

Design of silica fibers for supercontinuum generation, Steven Carneiro, Margarida M. V. Facão, Sofia C. Latas, Mário F. S. Ferreira, Univ. de Aveiro (Portugal) . . . . . [8269-06]

Slow light loss due to roughness in photonic crystal waveguides: insights on loss reduction from an analytic theory, Weiwei Song, Ryan A. Integlia, Wei Jiang, Rutgers, The State Univ. of New Jersey (USA) . . . . . [8269-07]

Broadband optical resonator based on coupled positive and negative-index waveguides, Max Bethune-Waddell, Kenneth J. Chau, The Univ. of British Columbia (Canada) . . . . . [8269-08]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3 . . . . . Mon. 1:30 to 3:00 pm

Novel Phenomena in Photonic Crystals

First steps towards nanophotonic particle accelerators on a chip *(Invited Paper)*, Isabelle Staude, Karlsruher Institut für Technologie (Germany); Christopher McGuinness, SLAC National Accelerator Lab. (USA); Andreas M. Frölich, Karlsruher Institut für Technologie (Germany); Robert L. Byer, Stanford Univ. (USA); Eric R. Colby, SLAC National Accelerator Lab. (USA); Martin Wegener, Karlsruher Institut für Technologie (Germany) . . . . . [8269-09]

Electro-optic lithium niobate photonic crystal nanowire: towards a new generation of lithium niobate integrated optics devices, Maria-Pilar Bernal Artajona, Huihui Lu, Benattou Sadani, Fadi Issam Baida, Univ. de Franche-Comté (France) . . . . . [8269-10]

Nanopatterned metallo-dielectric photonic crystal to enhance nonlinear conversion: theory and experiment, Elsie Barakat, Maria-Pilar Bernal, Roland Salut, Fadi Issam Baida, Univ. de Franche-Comté (France) . . . . . [8269-11]

Broadband perfect light absorber using a multiplexed metal-dielectric structure, Joshua Hendrickson, Air Force Research Lab. (USA); Junpeng Guo, Boyang Zhang, The Univ. of Alabama in Huntsville (USA); Walter Buchwald, Richard Soref, Air Force Research Lab. (USA) . . . . . [8269-12]

SESSION 4 . . . . . Mon. 3:30 to 4:30 pm

Photonic Crystal Resonators and Light Emitters

Control of the Purcell effect of quantum dots embedded in photonic crystal nanocavity by manipulating Q-factor, Tatsuya Nakamura, Takashi Asano, Kazunobu Kojima, Takanori Kojima, Susumu Noda, Kyoto Univ. (Japan) . . . . . [8269-13]

One-dimensional linear chain photonic crystal laser, Sihan Kim, Sungmo Ahn, Heonsu Jeon, Seoul National Univ. (Korea, Republic of) . . . . . [8269-14]

Anderson localized modes in random photonic crystal lasers with two-dimensional glassy perturbation, Seiji Takeda, Keio Univ. (Japan); Romain Peretti, Pierre Viktorovitch, Ecole Centrale de Lyon (France); Minoru Obara, Keio Univ. (Japan) . . . . . [8269-15]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 5 . . . . . Tues. 10:30 am to 12:00 pm

Photonic Metamaterials I

Recent progresses in optical metamaterials *(Invited Paper)*, Xiang Zhang, Univ. of California, Berkeley (USA) . . . . . [8269-16]

Enhanced nonlinear effects in metamaterials and plasmonic materials *(Invited Paper)*, Andrea Alu, The Univ. of Texas at Austin (USA) . . . . . [8269-17]

Science meets magic: photonic metamaterials *(Invited Paper)*, Ekmel Ozbay, Bilkent Univ. (Turkey) . . . . . [8269-18]

Lunch/Exhibition Break . . . . . 12:00 to 1:00 pm

SESSION 6 . . . . . Tues. 1:00 to 3:00 pm

Photonic Metamaterials II

Title to be determined *(Invited Paper)*, Nader Engheta, Univ. of Pennsylvania (USA) . . . . . [8269-19]

Flexible and stretchable plasmonics and metamaterials *(Invited Paper)*, Hatice Altug, Boston Univ. (USA) . . . . . [8269-20]

Invisibility cloaking for the light phase at visible frequencies, Tolga Ergin, Joachim Fischer, Martin Wegener, Karlsruher Institut für Technologie (Germany) . . . . . [8269-21]

Microscroll invisibility cloak, Philip A. Munoz, Harvard Univ. (USA); Ryan Iutzi, Massachusetts Institute of Technology (USA); Eric Mazur, Harvard Univ. (USA) . . . . . [8269-22]

Design of metamaterials with predetermined optical properties for broadband applications, Kuan-Ren Chen, Anatoliy V. Goncharenko, National Cheng Kung Univ. (Taiwan); Vladimir U. Nazarov, Research Ctr. for Applied Sciences (Taiwan) . . . . . [8269-23]

SESSION 7 . . . . . Tues. 3:30 to 6:00 pm

Modeling and Simulation of Photonic Crystal Structures

Dynamic and aperiodic nanophotonic structures *(Invited Paper)*, Shanhui Fan, Stanford Univ. (USA) . . . . . [8269-24]

Photon localization in randomly mixed photonic crystals, Jeongkug Lee, Seoul National Univ. (Korea, Republic of); Sunghwan Kim, Tufts Univ. (USA); Heonsu Jeon, Seoul National Univ. (Korea, Republic of) . . . . . [8269-25]

Fourier-Bessel expansions of localized light in disorder dielectric lattices, Scott R. Newman, Robert C. Gauthier, Carleton Univ. (Canada) . . . . . [8269-26]

Titanium dioxide square spiral photonic crystals: numerical analysis and experimental realization, Joshua D. Krabbe, Viktor A. Leontyev, Michael T. Taschuk, Univ. of Alberta (Canada); Andriy Kovalenko, National Research Council Canada (Canada); Michael Brett, Univ. of Alberta (Canada) . . . [8269-27]

A parametric study of extraordinary transmission through metallic photonic crystals targeting infrared photodetectors, Reyhaneh Soltanmoradi, Royal Institute of Technology (Sweden); Qin Wang, Jan Y. Andersson, Acreo AB (Sweden); Min Qiu, Royal Institute of Technology (Sweden) . . . . . [8269-28]

Photonic band gaps of increasingly isotropic crystals at high and low dielectric contrasts, Michael Pollard, Greg Parker, Martin Charlton, Univ. of Southampton (United Kingdom) . . . . . [8269-29]

From electromagnetically induced transparency to superscattering with a single structure: a coupled-mode theory for doubly resonant objects, Lieven Verslegers, Zongfu Yu, Zhichao Ruan, Peter B. Catrysse, Shanhui Fan, Stanford Univ. (USA) . . . . . [8269-30]

Wednesday 25 January

SESSION 8 . . . . . Wed. 8:00 to 10:00 am

Phononic Crystal Structures I

Title to be determined *(Invited Paper)*, Siavouche Nemat-Nasser, Univ. of California, San Diego (USA). . . . . [8269-31]

Nanostructured phononic materials for thermal management *(Invited Paper)*, Krishna Muralidharan, Pierre A. Deymier, The Univ. of Arizona (USA) . . . . . [8269-32]

Microfabricated GHz phononic crystals *(Invited Paper)*, Gianluca Piazza, Univ. of Pennsylvania (USA) . . . . . [8269-33]

Topologically evolved phononic materials: breaking the world record in band gap size *(Invited Paper)*, O. R. Bilal, Mahmoud I. Hussein, Univ. of Colorado at Boulder (USA) . . . . . [8269-34]

SESSION 9 . . . . . Wed. 10:30 am to 12:10 pm

Phononic Crystal Structures II

Phononic crystal strips for engineering micromechanical resonators *(Invited Paper)*, Jin-Chen Hsu, National Taiwan Univ. (Taiwan); Feng-Chia Hsu, Industrial Technology Research Institute (Taiwan); Pin Chang, National Yunlin Univ. of Science and Technology (Taiwan) . . . . . [8269-35]

Bending and directing of lamb waves using phononic crystal slabs, Saeed Mohammadi, Ali Adibi, Georgia Institute of Technology (USA). . . . . [8269-36]

Effect of Bragg and local resonance on the formation of phononic band gaps in a silicon plate with metallic pillars, Reza Pourabolghasem, Georgia Institute of Technology (USA); Abdelkrim Khelif, Georgia Tech-Lorraine (France); Ali Adibi, Georgia Institute of Technology (USA). . . . . [8269-37]

Anisotropic acoustic metamaterials: from transmission lines to pentamodes *(Invited Paper)*, Gregory Orris, U.S. Naval Research Lab. (USA) . . . . . [8269-38]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 10 . . . . . Wed. 1:30 to 3:10 pm

Optomechanical Structures

Classical and quantum applications of optomechanical crystals *(Invited Paper)*, Oskar J. Painter, California Institute of Technology (USA) . . . . . [8269-39]

Optomechanical cooling, amplification, and bistability in coupled-mode suspended waveguide geometries, David N. Woolf, Pui-Chuen Hui, Eiji Iwase, Alejandro Rodriguez, Mughees Khan, Harvard Univ. (USA); Steven Johnson, Massachusetts Institute of Technology (USA); Marko Loncar, Federico Capasso, Harvard Univ. (USA) . . . . . [8269-40]

Photonic and phononic properties of engineered nanostructures *(Invited Paper)*, Yan Pennec, Institut d'Electronique, de Microélectronique, et de Nanotechnologie (France) . . . . . [8269-41]

Multiphonon acousto-optic interactions in normal and oblique incidence inside a 1D phoxonic cavity, Gaetan Lévêque, Univ. des Sciences et Technologies de Lille (France); E. H. El Boudouti, Abdellatif Akjouj, Yan Pennec, Bahram Djafari-Rouhani, Institut d'Electronique, de Microélectronique, et de Nanotechnologie (France); Ioannis E. Psarobas, Nikos Papanikolaou, National Ctr. for Scientific Research Demokritos (Greece); Nikolaos Stefanou, Univ. of Athens (Greece); Vincent Laude, FEMTO-ST (France) . . . . . [8269-42]

SESSION 11 . . . . . Wed. 3:40 to 6:00 pm

Plasmonic Metamaterials

Orienting emission: quantifying and controlling excitons in layered materials *(Invited Paper)*, Rashid Zia, Brown Univ. (USA) . . . . . [8269-43]

Multipolar effects and strong coupling in hybrid plasmonic metamaterials, Arash Farhang, Ecole Polytechnique Fédérale de Lausanne (Switzerland); S. Anantha Ramakrishna, Indian Institute of Technology Kanpur (India); Olivier J. F. Martin, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8269-44]

Plasmonic nanoparticles for a bottom-up approach to fabricate optical metamaterials, José Dintinger, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Stefan Mühlig, Tobias Kienzler, Carsten Rockstuhl, Friedrich-Schiller-Univ. Jena (Germany); Toralf Scharf, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8269-45]

Optimal arrangement of meta-atoms composing metamaterials, Yi-Chen Chuang, Nanyang Technological Univ. (Singapore); Michael A. Fiddy, The Univ. of North Carolina at Charlotte (USA) . . . . . [8269-46]

Loss-compensation in metamaterials based on plasmonic nanoparticles, Salvatore Campione, Filippo Capolino, Univ. of California, Irvine (USA) [8269-47]

Infrared plasmonic metamaterials for energy and life sciences applications *(Invited Paper)*, Gennady B. Shvets, The Univ. of Texas at Austin (USA) . . . . . [8269-48]

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Resonant mode mapping in photonic crystal nanocavity by atomic force microscope nano-oxidation, Wen-Yen Chen, Min-Zhi Chen, Chao-Chia Cheng, Chun-Jung Wang, Jen-Inn Chyi, Tzu-Min Hsu, National Central Univ. (Taiwan) . . . . . [8269-70]

Reflection of the circular polarizer with metallic helical metamaterials, Yu Yang, Zhenyu Yang, Ming Zhao, Huazhong Univ. of Science and Technology (China) . . . . . [8269-71]

Surface plasmon propagation in novel multilayered metallic thin films, Fabio A. Ferri, Victor A. G. Rivera, Sergio Paulo A. Osorio, Otavio B. Silva, Antonio R. Zanatta, Ben-Hur V. Borges, John Weiner, Euclydes Marega, Univ. de São Paulo (Brazil) . . . . . [8269-72]

Theoretical analysis of the modal behavior of 2D random photonic crystals, Shimpei Hamada, Seiji Takeda, Keio Univ. (Japan); Pierre Viktorovitch, Ecole Centrale de Lyon (France); Minoru Obara, Keio Univ. (Japan) . . . . . [8269-73]

Economic fabrication of photonic crystal nanostructure at selected area using nanospherical-lens lithography, Jyun-Sen Huang, Hsin-Chan Chung, Yun-Chorng Chang, National Cheng Kung Univ. (Taiwan) . . . . . [8269-74]

Investigation of two-dimensional photonic crystal properties using approximate analytical methods, Inna Nusinsky, Amos A. Hardy, Tel Aviv Univ. (Israel) . . . . . [8269-75]

Fractal complementary bowtie aperture for confining and enhancing optical magnetic field, Yang Yang, Haitao Dai, Tianjin Univ. (China) . . [8269-76]

Integrated plasmonic Moiré cavity in photonic crystal cavity for luminescence enhancement, Sergio Paulo A. Osório, Otávio B. Silva, Fábio A. Ferri, Victor A. G. Rivera, Antonio R. Zanatta, Euclydes Marega, Jr., Univ. de São Paulo (Brazil) . . . . . [8269-77]

Polarization splitter based on a porous silicon waveguide, Yajun Liu, Zhenhong Jia, Xinjiang Univ. (China) . . . . . [8269-78]

Fabrication of nano-sized metamaterial by focused-ion-beam milling process and its optical characteristics, Junghee Kim, Yeonui Lee, Boyoung Kang, J. H. Woo, E. Y. Choi, E. S. Kim, Minji Gwon, Dong-Wook Kim, Jeong-Weon Wu, Ewha Womans Univ. (Korea, Republic of) . . . . . [8269-79]

Demonstration of self-imaging effect without paraxial approximation, Wangshi Zhao, Rochester Institute of Technology (USA); Xiaoyue Huang, Michigan Technological Univ. (USA); Zhaolin Lu, Rochester Institute of Technology (USA) . . . . . [8269-80]

The surface plasmon resonance sensor with the metallic nanostructure for biosensing, Byeong-Hyeon Lee, Geum-Yoon Oh, Hong-Seung Kim, Tae-Kyeong Lee, Chung-Ang Univ. (Korea, Republic of); Seon-Hoon Kim, Hyun-Chul Ki, Doo-Gun Kim, Korea Photonics Technology Institute (Korea, Republic of); Young-Wan Choi, Chung-Ang Univ. (Korea, Republic of) . [8269-81]

Dispersion engineering for surface waves on multilayer metal-insulator stacks, Ruoxi Yang, Zhaolin Lu, Rochester Institute of Technology (USA) . . . . . [8269-82]

Design of a metallic wire media hyperlens, Diana Strickland, Southwest Research Institute (USA); Ramakrishna Kotha, Arturo Ayon, The Univ. of Texas at San Antonio (USA); Jerome A. Helffrich, Southwest Research Institute (USA) . . . . . [8269-83]

Negative refraction in the third and fourth photonic bands of a two-dimensional elliptical rod photonic crystal in a centered rectangular lattice, Jeffrey R. Lutkenhaus, Kris Ohlinger, Hualiang Zhang, Yuankun Lin, Univ. of North Texas (USA) . . . . . [8269-84]

Optimization of the electromagnetic field decay length of metal nanoparticles for localized surface plasmon resonance sensing of heat shock protein 70, Ryan C. Denomme, Zachary Young, Patricia M. Nieva, Univ. of Waterloo (Canada) . . . . . [8269-85]

Morphological and optical studies of nanostructured broadband antireflection silicon thin films, Mingming Du, Kris Ohlinger, Jeffrey R. Lutkenhaus, Yuankun Lin, Univ. of North Texas (USA) . . . . . [8269-86]

Luminescence enhancement of Er^{3+} ions from electric multipole nanostructure arrays, Victor A. G. Rivera, Fabio A. Ferri, Sergio P. Osorio, Luiz A. Nunez, Euclydes Marega, Jr., Univ. de São Paulo (Brazil) . . . . . [8269-87]

Focusing surface plasmons on Er^{3+} ions with convex/concave plasmonic lenses, Victor A. G. Rivera, Fabio A. Ferri, Sergio P. Osorio, Luiz A. Nunez, Euclydes Marega, Jr., Univ. de São Paulo (Brazil) . . . . . [8269-88]

Enhancement of black silicon beyond band edge Eg into NIR due to optical antenna 2D cone grating structure, Hani E. Ahmar, The City College of New York (USA); Meng-Ju Sher, Eric Mazur, Harvard Univ. (USA); Robert Alfano, The City College of New York (USA) . . . . . [8269-89]

Subwavelength imaging achieved by indefinite metamaterial, Saptarshi Banerjee, Wangshi Zhao, Rochester Institute of Technology (USA); Xiaoyue Huang, Michigan Technological Univ. (USA); Zhaolin Lu, Rochester Institute of Technology (USA) . . . . . [8269-90]

Optical funneling and enhanced absorption in plasmonic nanogrooves, Haofei Shi, L. Jay Guo, Univ. of Michigan (USA) . . . . . [8269-91]

GaAs hollow nanopyramid arrays for III-V flexible thin film solar applications, Dong Liang, Yijie Huo, Yangsen Kang, Anjia Gu, Xingze Wang, Meiyueh Tan, Jieyang Jia, Zongfu Yu, Shuang Li, Shuang Wang, Yi Cui, Shanhui Fan, James Harris, Stanford Univ. (USA) . . . . . [8269-92]

Numerical study of helix photonic metamaterial, Yu-Ray Li, Hsiang-Hung Huang, Yu-Chueh Hung, National Tsing Hua Univ. (Taiwan) . . . . . [8269-93]

Characterization of guiding properties of metallic nanorod metamaterials, Yi-Chung Ling, Yu-Chueh Hung, National Tsing Hua Univ. (Taiwan) . . . [8269-94]

Phase measurement interferometric microscopy of stacked fishnet metamaterials, Takayuki Matsui, Atsushi Miura, Hisayoshi Fujikawa, Kazuo Sato, Toyota Central R&D Labs., Inc. (Japan); Hideki T. Miyazaki, Naoki Ikeda, Masayuki Ochiai, Yoshimasa Sugimoto, National Institute for Materials Science (Japan); Masanori Ozaki, Masanori Hangyo, Osaka Univ. (Japan); Kiyoshi Asakawa, Univ. of Tsukuba (Japan) . . . . . [8269-95]

Dual phononic and photonic strip waveguides, Yan Pennec, Institut d'Electronique, de Microélectronique, et de Nanotechnologie (France) . [8269-96]

Colorimetric polarization sensing with single plasmonic gold nanorods, Sushmita Biswas, Dhriti Nepal, Kyoungweon Park, Richard Vaia, Air Force Research Lab. (USA) . . . . . [8269-97]

Thursday 26 January

SESSION 12 . . . . . Thurs. 8:00 to 10:00 am

Nanoplasmonic Structures and Devices

Plasmonic interferometry: a versatile tool for high-throughput biochemical sensors and energy-efficient thin-film solar cells *(Invited Paper)*, Domenico Pacifici, California Institute of Technology (USA) . . . . . [8269-49]

Engineering photonic-plasmonic coupled resonances for optoelectronic device applications *(Invited Paper)*, Luca Dal Negro, Boston Univ. (USA) . . . . . [8269-50]

Highly efficient photon coupling into a plasmonic nanostructure using a fiber-coupled microspherical cavity, Keiji Sasaki, Hideaki Takashima, Yoshito Tanaka, Hideki Fujiwara, Hokkaido Univ. (Japan) . . . . . [8269-51]

Multispectral plasmonic absorbers for broadband and multispectral absorbtion, Sencer Ayas, Hasan Guner, Burak Turker, Okan O. Ekiz, Aykutlu Dana, Bilkent Univ. (Turkey) . . . . . [8269-52]

Control of the local SPP excitation with a magneto-optical nanoparticle, Rémi Vincent, Univ. de Bourgogne (France); Hugues Marinchio, Ecole Supérieure de Physique et de Chimie Industrielles (France); Juan Jose Saenz, Univ. Autónoma de Madrid (Spain); Rémi Carminati, Ecole Supérieure de Physique et de Chimie Industrielles (France) . . . . . [8269-53]

SESSION 13 . . . . . Thurs. 10:30 am to 12:10 pm

Plasmonic Antennas and Apertures

Widely tunable V-shaped plasmonic antennas for planar optics, Mikhail A. Kats, Patrice Genevet, Nanfang Yu, Guillaume Aoust, Romain Blanchard, Zeno Gaburro, Federico Capasso, Harvard Univ. (USA) . . . [8269-54]

Characterization of high order modes of plasmonic antenna formed by nanoparticle/thin film hybrid structures, Shiuan-Yeh Chen, Yaroslav Urzhumov, David R. Smith, Anne A. Lazarides, Duke Univ. (USA) . . . . . [8269-55]

Fabrication of arbitrary small conical shape metal nano-apertures on optical fiber facets, Junpeng Guo, Hai-Sheng Leong, Boyang Zhang, Robert G. Lindquist, The Univ. of Alabama in Huntsville (USA) . . . . . [8269-56]

Cavity resonances of plasmonic patch nanoantennas, Feng Wang, Ayan Chakrabarty, Fred Minkowski, Qi-Huo Wei, Kent State Univ. (USA) . . . . [8269-57]

Near-field optical study of strong coupling effects in a chain of gold nanorods integrated on silicon waveguides, Aniello Apuzzo, Univ. de Technologie Troyes (France) . . . . . [8269-58]

Lunch/Exhibition Break . . . . . 12:10 to 1:10 pm

SESSION 14 . . . . . Thurs. 1:10 to 3:00 pm

Design and Characterization of Plasmonic Structures

Optical properties of plasmonic structures based on biological and synthetically fabricated templates *(Invited Paper)*, Joseph W. Perry, Georgia Institute of Technology (USA) . . . . . [8269-59]

Holographic plasmonic quasi-crystal, Weidong Mao, Michael R. Wang, Univ. of Miami (USA). . . . . [8269-60]

Self-assembled plasmonic nanoclusters, Jonathan Fan, Yu He, Harvard Univ. (USA); Kui Bao, Rice Univ. (USA); Chihhui Wu, The Univ. of Texas at Austin (USA); Jiming Bao, Univ. of Houston (USA); Vinothan N. Manoharan, Harvard Univ. (USA); Gennady B. Shvets, The Univ. of Texas at Austin (USA); Peter J. Nordlander, Rice Univ. (USA); David Liu, Federico Capasso, Harvard Univ. (USA) . . . . . [8269-61]

Polarization controlled dipolar plasmon resonances in lithographically defined metal nanoparticle arrays, Michael Kaniber, Benedikt Mayer, Sebastian Dietl, Jonathan J. Finley, Technische Univ. München (Germany) . . . . . [8269-62]

Nanoptical characterization of plasmonic nanostructures and devices with single and multiprobe NSOM and apertureless NSOM, Aaron Lewis, Hebrew Univ. of Jerusalem (Israel) . . . . . [8269-63]

SESSION 15 . . . . . Thurs. 3:30 to 5:40 pm

Novel Phenomena in Plasmonic Structures

Photon confinement to the nanoscale: Potential applications to solar energy conversion and nanomedicine *(Invited Paper)*, Mostafa A. El-Sayed, Georgia Institute of Technology (USA) . . . . . [8269-64]

On-chip hybrid photonic-plasmonic sensors: theoretical design and experimental demonstration, Maysamreza Chamanzar, Ali Adibi, Georgia Institute of Technology (USA) . . . . . [8269-65]

Tunable plasmonic nanostructures for light trapping and strong field enhancement at the metal surface, Aleksandr Polyakov, Kevin F. Thompson, Howard A. Padmore, Stefano Cabrini, P. James Schuck, Lawrence Berkeley National Lab. (USA). . . . . [8269-66]

3D analysis of surface plasmon dispersion for SERS sensor based on inverted pyramid nanostructures, Swe Z. Oo, Martin D. B. Charlton, Univ. of Southampton (United Kingdom) . . . . . [8269-67]

Nonlinear plasmonics of metallic heptamers, Krishnan Thyagarajan, Simon Rivier, Olivier J. F. Martin, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8269-68]

Controlled coupling of guided surface plasmon polaritons to InGaAs quantum dots, Gregor Bracher, Konrad Schraml, Johannes Zellmer, Clemens Jakubeit, Maex Blauth, Benedikt Mayer, Jonathan Finley, Michael Kaniber, Technische Univ. München (Germany) . . . . . [8269-69]

Courses of Related Interest

SC608 Photonic Crystals: A Crash Course, from Bandgaps to Fibers (Johnson) Sunday, 1:30 to 5:30 pm

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8270

Sunday-Wednesday 22-25 January 2012 • Proceedings of SPIE Vol. 8270

High Contrast Metastructures

Conference Chairs: **Connie J. Chang-Hasnain,** Univ. of California, Berkeley (USA); **Fumio Koyama,** Tokyo Institute of Technology (Japan); **Alan Eli Willner,** The Univ. of Southern California (USA); **Weimin Zhou,** U.S. Army Research Lab. (USA)

Program Committee: **Markus-Christian Amann,** Walter Schottky Institute (Germany); **David Fattal,** Hewlett-Packard Labs. (USA); **Weiwei Hu,** Peking Univ. (China); **Ernst Bernhard Kley,** Friedrich-Schiller-Univ. Jena (Germany); **Philippe Lalanne,** Lab. Charles Fabry (France); **Rainer F. Mahrt,** IBM Zürich Research Lab. (Switzerland); **Jesper Moerk,** Technical Univ. of Denmark (Denmark); **Pierre Viktorovitch,** Ecole Centrale de Lyon (France); **Ming C. Wu,** Univ. of California, Berkeley (USA)

Sunday 22 January

SESSION 1 . . . . . Sun. 9:00 to 10:20 am

Harnessing Light

Session Chair: **Alan Eli Willner,** The Univ. of Southern California (USA)

High-contrast grating optoelectronics *(Invited Paper)*, Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA) . . . . . [8270-01]

Surface addressable photonic crystal membrane resonators: generic enablers for 3D harnessing of light *(Invited Paper)*, Pierre Viktorovitch, Corrado Sciancalepore, Ecole Centrale de Lyon (France); Taha Benyattou, Institut National des Sciences Appliquées de Lyon (France); Badhise Ben Bakir, CEA-LETI (France); Xavier Letartre, Ecole Centrale de Lyon (France) . . [8270-02]

Fabry-Perot phase selection rules for high-contrast gratings, Vadim Karagodsky, Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA) . . . . . [8270-03]

SESSION 2 . . . . . Sun. 10:50 am to 12:30 pm

Novel Filters

Session Chair: **Weimin Zhou,** U.S. Army Research Lab. (USA)

High contrast grating for spatial mode filtering and mode control of VCSELs *(Invited Paper)*, Fumio Koyama, Tokyo Institute of Technology (Japan) . . . . . [8270-04]

MEMS-actuated optical phased array with high contrast grating mirrors *(Invited Paper)*, Ming C. Wu, Univ. of California, Berkeley (USA) . . . . . [8270-05]

Novel direction selective filter elements based on high contrast gratings, Stefan Steiner, Stefanie Kroker, Thomas Käsebier, Ernst-Bernhard Kley, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8270-06]

Fabrication and characterization of Si/SiO_2 high contrast grating using nanoimprint lithography, Yuuki Hashizume, Yasumitsu Miyake, Akihiro Matsutani, Tokyo Institute of Technology (Japan); Hideo Ohtsuki, SAMCO, Inc. (Japan); Fumio Koyama, Tokyo Institute of Technology (Japan) . . . . . [8270-07]

Lunch Break . . . . . 12:30 to 2:00 pm

SESSION 3 . . . . . Sun. 2:00 to 3:20 pm

Slow Light

Session Chair: **Ming C. Wu,** Univ. of California, Berkeley (USA)

Slow-light HCG metastructure hollow-core waveguides *(Invited Paper)*, Weimin Zhou, Gerard Dang, Monica Taysing-Lara, U.S. Army Research Lab. (USA); Vadim Karagodsky, Tianbo Sun, Connie Chang-Hasnain, Univ. of California, Berkeley (USA) . . . . . [8270-08]

Low loss slow light in high contrast grating hollow core waveguide, Tianbo Sun, Vadim Karagodsky, Univ. of California, Berkeley (USA); Weimin Zhou, U.S. Army Research Lab. (USA); Connie Chang-Hasnain, Univ. of California, Berkeley (USA) . . . . . [8270-09]

Attenuation coefficient of periodic waveguides: fast to slow light transition *(Invited Paper)*, Philippe Lalanne, Lab. Charles Fabry (France). . . . . [8270-10]

SESSION 4 . . . . . Sun. 3:50 to 5:30 pm

Reflectors and Resonators

Session Chair: **Pierre Viktorovitch,** Ecole Centrale de Lyon (France)

High contrast gratings: from DUV polarizer to low noise infrared-mirrors *(Invited Paper)*, Ernst-Bernhard Kley, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8270-11]

VCSELs and silicon light sources exploiting SOI grating mirrors *(Invited Paper)*, Il-Sug Chung, Jesper Moerk, Technical Univ. of Denmark (Denmark) . . . . . [8270-12]

Wave-front-engineered grating mirror for VCSELs, Luca Carletti, Jesper Mork, Il-Sug Chung, Radu Malureanu, Technical Univ. of Denmark (Denmark) . . . . . [8270-13]

High frequency binary amorphous silicon grating working as wire grid polarizer for UV applications, Thomas Weber, Thomas Käsebier, Ernst-Bernhard Kley, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8270-14]

Monday 23 January

SESSION 5 . . . . . Mon. 9:00 to 10:20 am

Hollow Core Waveguide

Session Chair: **Fumio Koyama,** Tokyo Institute of Technology (Japan)

Signal propagation effects in HCG hollow-core waveguides *(Invited Paper)*, Alan E. Willner, Yang Yue, Hao Huang, Lin Zhang, The Univ. of Southern California (USA) . . . . . [8270-15]

Optical phased array for far field beam steering with varied HCG *(Invited Paper)*, Weiwei Hu, Peking Univ. (China); Connie Chang-Hasnain, Univ. of California, Berkeley (USA) . . . . . [8270-16]

Low-loss hollow-core waveguide using high-contrast sub-wavelength grating, James E. Ferrara, Jr., Weijian Yang, Anthony Yeh, Karen Grutter, Christopher Chase, Vadim Karagodsky, Devang Parekh, Yang Yue, Alan E. Willner, Ming C. Wu, Connie Chang-Hasnain, Univ. of California, Berkeley (USA) . . . . . [8270-17]

SESSION 6 . . . . . Mon. 10:50 am to 12:30 pm

Novel Functions

Session Chair: **Bernhard Kley,** Friedrich-Schiller-Univ. Jena (Germany)

Planar ultracompact silicon/polymer laser for the visible *(Invited Paper)*, Thilo Stoeferle, Nikolaj Moll, IBM Zürich Research Lab. (Switzerland); Thorsten Wahlbrink, Jens Bolten, AMO GmbH (Germany); Thomas Mollenhauer, AMO GmbH (USA); Ullrich Scherf, Bergische Univ. Wuppertal (Germany); Rainer F. Mahrt, IBM Zürich Research Lab. (Switzerland) . . . . . [8270-18]

A planar silicon lens for integrated free space optics *(Invited Paper)*, David Fattal, Jingjing Li, Zhen Peng, Marco Fiorentino, Raymond G. Beausoleil, Hewlett-Packard Labs. (USA) . . . . . [8270-19]

Novel high efficiency vertical to in-plane optical coupler, Li Zhu, Vadim Karagodsky, Connie Chang-Hasnain, Univ. of California, Berkeley (USA) . . . . . [8270-20]

Design of second order grating couplers to detect the angle and polarization of the laser beam, Tapas K. Saha, Mingyu Lu, Deyin Zhao, Weidong Zhou, The Univ. of Texas at Arlington (USA) . . . . . [8270-21]

Lunch Break . . . . . 12:30 to 2:00 pm

SESSION 7 . . . . . Mon. 2:00 to 3:00 pm

Optical Phase Engineering

Session Chair: **Rainer F. Mahrt,** IBM Zürich Research Lab. (Switzerland)

Optical phase shifting based on high contrast grating waveguide, Yunjie Li, Peking Univ. (China); Tianbo Sun, Univ. of California, Berkeley (USA); Te Chen, Consultant (China); Weiwei Hu, Peking Univ. (China); Connie Chang-Hasnain, Univ. of California, Berkeley (USA) . . . . . [8270-22]

Sub-diffraction engineering with high contrast dielectrics, Jingjing Li, Hewlett-Packard Labs. (USA) and The Univ. of Chicago at Illinois (USA); David Fattal, Marco Fiorentino, Raymond Beausoleil, Hewlett-Packard Labs. (USA) . . . . . [8270-23]

Diffractive optical elements based on subwavelength high contrast gratings, Stefanie Kroker, Thomas Käsebier, Stefan Steiner, Ernst-Bernhard Kley, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [8270-24]

SESSION 8 . . . . . Mon. 3:30 to 4:40 pm

Metastructures

Session Chair: **David Fattal,** Hewlett-Packard Labs. (USA)

Acrobatics for thermal emission using metastructures *(Invited Paper)*, Erez Hasman, Technion-Israel Institute of Technology (Israel) . . . . . [8270-25]

Low loss silica on silicon integrated waveguides, Ashley J. Maker, Andrea M. Armani, The Univ. of Southern California (USA) . . . . . [8270-26]

Suspended silica beam splitters on silicon with large core-clad index difference, Xiaomin Zhang, Andrea Armani, The Univ. of Southern California (USA) . . . . . [8270-27]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

Wednesday 25 January

POSTERS-WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Tuning the reflectivity of high contrast gratings based on silicon and silica by means of wet etching with hydrofluoric acid, Tassilo Jacobitz, Stefanie Kroker, Thomas Käsebier, Bernhard Kley, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8270-28]

Courses of Related Interest

SC608 Photonic Crystals: A Crash Course, from Bandgaps to Fibers (Johnson) Sunday, 1:30 to 5:30 pm

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8271

Tuesday-Wednesday 24-25 January 2012 • Proceedings of SPIE Vol. 8271

Quantum Dots and Nanostructures: Synthesis, Characterization, and Modeling IX

Conference Chairs: **Kurt G. Eyink,** Air Force Research Lab. (USA); **Frank Szmulowicz,** Univ. of Dayton Research Institute (USA); **Diana L. Huffaker,** Univ. of California, Los Angeles (USA)

Program Committee: **Massimo De Vittorio,** Univ. del Salento (Italy); **Vinod M. Menon,** Queen's College (USA); **Philip J. Poole,** National Research Council Canada (Canada); **Jian Xu,** The Pennsylvania State Univ. (USA)

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 1 . . . . . Tues. 1:00 to 3:00 pm

Hybrid Structures

Session Chairs: **Valery Zwiller,** Technische Univ. Delft (Netherlands); **Pavlos G. Lagoudakis,** Univ. of Southampton (United Kingdom)

Quantum optics with nanowire quantum dots *(Invited Paper)*, Valery Zwiller, Technische Univ. Delft (Netherlands) . . . . . [8271-01]

Hybrid optoelectronics for light harvesting and light emitting applications *(Invited Paper)*, Pavlos G. Lagoudakis, Univ. of Southampton (United Kingdom) . . . . . [8271-02]

Effect of silver nanoparticles on the spectral properties of rare-earth ions in a sodium borate glass, Victor O. Obadina, Rami R. Bommareddi, Alabama A&M Univ. (USA) . . . . . [8271-03]

Seeded CdSe/CdS nanorods for multi-photon absorption applications, Tze Chien Sum, Guichuan Xing, Nanyang Technological Univ. (Singapore); Sabyasachi Chakrabortty, National Univ. of Singapore (Singapore); Cheng Hon Alfred Huan, Nanyang Technological Univ. (Singapore); Yin Thai Chan, National Univ. of Singapore (Singapore) . . . . . [8271-04]

Optical properties of mesogen-coated gold nanoparticle self-assemblies, José Dintinger, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Bai-Jia Tang, Georg H. Mehl, The Univ. of Hull (United Kingdom); Xianbing Zeng, Goran Ungar, The Univ. of Sheffield (United Kingdom); Tobias Kienzler, Carsten Rockstuhl, Friedrich-Schiller-Univ. Jena (Germany); Toralf Scharf, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8271-05]

SESSION 2 . . . . . Tues. 3:30 to 5:30 pm

Collodial Quantum Dots

Session Chair: **Mitra Dutta,** Univ. of Illinois at Chicago (USA)

Quantum dot enabling coherence barcoding technology *(Invited Paper)*, Jian Xu, The Pennsylvania State Univ. (USA) . . . . . [8271-07]

Morphology, optical properties, charge transfer, and charge transport in nanocrystalline quantum dots *(Invited Paper)*, Mitra Dutta, Univ. of Illinois at Chicago (USA) . . . . . [8271-08]

Transport properties of mid infrared colloidal quantum dot films, Emmanuel P. Lhuillier, Sean Keuleyan, Philippe Guyot-Sionnest, The Univ. of Chicago (USA) . . . . . [8271-09]

Fourier spectroscopy on PbS quantum dots, Bruno Ullrich, Joanna Wang, Xiaoyin Xiao, Gail Brown, Air Force Research Lab. (USA) . . . . . [8271-10]

Trap state lifetime analysis of single CdSe/ZnS quantum dots on a thin conductive film, Hideki Fujiwara, Kun Sei, Hiroki Ohta, Takashi Chiba, Keiji Sasaki, Hokkaido Univ. (Japan) . . . . . [8271-11]

Wednesday 25 January

SESSION 3 . . . . . Wed. 8:00 to 10:20 am

Optical Devices I

Session Chairs: **Holger Eisele,** Technische Univ. Berlin (Germany); **Sven Hoefling,** Julius-Maximilians-Univ. Würzburg (Germany)

Atomic structure of submonolayer InAs/GaAs depositions for high-speed direct electro-optical data transmission in VCSELs *(Invited Paper)*, Holger Eisele, Andrea Lenz, Jonas Becker, Konstantin Zak, Lena Ivanova, Ernst Lenz, Mario Daehne, Jan-Hindrik Schulze, Tim D. Germann, Andre Strittmatter, Udo W. Pohl, Dieter D. Bimberg, Technische Univ. Berlin (Germany) . . . . . [8271-12]

Single photon sources for quantum information applications *(Invited Paper)*, Sven Höfling, Christian Schneider, Tobias Heindel, Matthias Lermer, Julius-Maximilians-Univ. Würzburg (Germany); T. B. Hoang, Technische Univ. Eindhoven (Netherlands); J. Beetz, Tristan Braun, Julius-Maximilians-Univ. Würzburg (Germany); Laurent Balet, Technische Univ. Eindhoven (Netherlands) and Ecole Polytechnique Fédérale de Lausanne (Switzerland); Nicolas Chauvin, Technische Univ. Eindhoven (Netherlands); Lianhe Li, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Stephan Reitzenstein, Julius-Maximilians-Univ. Würzburg (Germany); Andrea Fiore, Technische Univ. Eindhoven (Netherlands); Martin Kamp, Alfred W. B. Forchel, Julius-Maximilians-Univ. Würzburg (Germany) . . . . . [8271-13]

Reducing dephasing in coupled quantum dot-cavity systems by engineering the carrier wavefunctions, Anders Nysteen, Per Kaer, Jesper Moerk, Technical Univ. of Denmark (Denmark) . . . . . [8271-14]

A room temperature single photon source based on self-organized quantum dots, Tilmar Kümmell, Oleh Fedorych, Univ. Duisburg-Essen (Germany); Carsten Kruse, Detlef Hommel, Univ. Bremen (Germany); Gerd Bacher, Univ. Duisburg-Essen (Germany) . . . . . [8271-15]

Full characterization of an optical field from an InAs quantum dot, Sergey Polyakov, Edward B. Flagg, Tim Thomay, Alan L. Migdall, Glenn S. Solomon, National Institute of Standards and Technology (USA) . . . . . [8271-16]

Telecom band single quantum dots and dot ensembles at elevated temperature, Claus Hermannstaedter, Nahid A. Jahan, Jae-Hoon Huh, Hirotaka Sasakura, Hokkaido Univ. (Japan); Kouichi Akahane, Masahide Sasaki, National Institute of Information and Communications Technology (Japan); Ikuo Suemune, Hokkaido Univ. (Japan) . . . . . [8271-17]

SESSION 4 . . . . . Wed. 10:40 to 11:50 am

Novel Materials

Session Chair: **Jian Xu,** The Pennsylvania State Univ. (USA)

Evolution of micro-spikes on silicon surface etched by femtosecond laser with different fabrication conditions *(Invited Paper)*, YiMing Zhu, Univ. of Shanghai for Science and Technology (China) . . . . . [8271-18]

Supercontinuum laser for dense nanomaterials characterization and modeling, Romain Ceolato, Nicolas Riviere, ONERA (France); Béatrice Biscans, Ecole Nationale Supérieure des Ingénieurs en Arts Chimique et Technologiques (France) . . . . . [8271-19]

Influence of impurities on the luminescence of erbium-doped barium titanate nanophosphors, Geovana Webler, Maximiliano Zapata, Univ. Federal de Alagoas (Brazil); Glauco S. Maciel, Univ. Federal Fluminense (Brazil); Amitava Patra, Indian Association for the Cultivation of Science (India); Jandir M. Hickmann, Márcio A. R. C. Alencar, Univ. Federal de Alagoas (Brazil) . . [8271-20]

Lunch/Exhibition Break . . . . . 11:50 am to 1:00 pm

SESSION 5 . . . . . Wed. 1:00 to 3:40 pm

Growth and Characterization

Session Chair: **Gregory J. Salamo,** Univ. of Arkansas (USA)

Semiconductor quantum nanostructures by droplet epitaxy *(Invited Paper)*, Stefano Sanguinetti, Univ. degli Studi di Milano-Bicocca (Italy) . . . . . [8271-21]

Self-running gallium droplets on GaAs surface *(Invited Paper)*, Gregory J. Salamo, Univ. of Arkansas (USA) . . . . . [8271-22]

The impact of growth rate and barrier thickness on the thermal stability of photoluminescence for coupled InAs/GaAs quantum dot heterostructures with quaternary(InAlGaAs) capping, Arjun Mandal, Indian Institute of Technology Bombay (India); Utkarsha Verma, Indian Institute of Technology Rajasthan (India); Subhananda Chakrabarti, Indian Institute of Technology Bombay (India) . . . . . [8271-23]

Ground state energy trend in single and multilayered coupled InAs/GaAs QDs capped with InGaAs layers: effect of thickness of InGaAs layer and the RTA treatment, Suhas Jejurikar, Alpana Misra, Prasad Bhat, Subhananda Chakrabarti, Indian Institute of Technology Bombay (India) . . . . . [8271-24]

III-Sb semiconductor nanopillars grown by selective-area epitaxy, Andrew Lin, Ping-Show Wong, Joshua Shapiro, Baolai Liang, Diana Huffaker, Univ. of California, Los Angeles (USA) . . . . . [8271-25]

Carrier dynamic in a hybrid nanostructure with GaSb quantum dots coupled to an InGaAs/GaAs quantum well, Baolai Liang, Kalyan C. Nunna, Charles J. Reyner, Diana L. Huffaker, Univ. of California, Los Angeles (USA); Nicola Pavarelli, Kamil Gradkowski, Tomasz J. Ochalski, Guillaume Huyet, Tyndall National Institute (Ireland); Vitaliy G. Dorogan, Yuriy I. Mazur, Gregory J. Salamo, Univ. of Arkansas (USA) . . . . . [8271-26]

Increase in photoluminescence intensity of InAs columnar quantum dots on InP(001) substrate by increasing phosphorous composition in InGaAsP barrier layers, Shigekazu Okumura, Nami Yasuoka, Kenichi Kawaguchi, Yu Tanaka, Mitsuru Ekawa, Fujitsu Labs., Ltd. (Japan) . . . . . [8271-27]

SESSION 6 . . . . . Wed. 4:00 to 5:20 pm

Optical Devices II

Session Chair: **Baolai Liang,** Univ. of California, Los Angeles (USA)

Numerical simulation on photonic crystal waveguide based symmetric-Mach-Zehnder-type ultrafast all-optical switch using quantum dot semiconductor optical amplifier, Xiaoming Li, Tao Wang, Wei Yan, Haibo Zheng, Wuhan National Lab. for Optoelectronics (China) . . . . . [8271-28]

Improvement of temperature stability in columnar quantum dot by introducing side-barriers with lager bandgap energy for semiconductor optical amplifiers, Nami Yasuoka, Shigekazu Okumura, Hiroji Ebe, Yu Tanaka, Mutsuri Ekawa, Yoshiaki Nakata, Fujitsu Labs., Ltd. (Japan); Mitsuru Sugawara, QD Laser Inc. (Japan); Yasuhiko Arakawa, The Univ. of Tokyo (Japan) . [8271-29]

1.55μm InAs/GaAs quantum dot semiconductor saturable absorber mirror, Ziyang Zhang, The Univ. of Sheffield (United Kingdom); Andreas E. Oehler, Bojan Resan, Time-Bandwidth Products AG (Switzerland); Kejia Zhou, The Univ. of Sheffield (United Kingdom); Mario Mangold, Thomas Suedmeyer, Ursula Keller, ETH Zurich (Switzerland); Kurt J. Weingarten, Time-Bandwidth Products AG (Switzerland); Richard A. Hogg, The Univ. of Sheffield (United Kingdom) . . . . . [8271-30]

Optical noise and alpha-factor in inhomogeneous quantum dot ensemble, Artem V. Savelyev, Mikhail V. Maximov, Alexey E. Zhukov, Saint-Petersburg Academic Univ. (Russian Federation) . . . . . [8271-31]

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Computational analysis of the effects of gain material in engineered metal nanostructures, Jinsong Duan, Ruth Pachter, Air Force Research Lab. (USA) . . . . . [8271-06]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Monday-Thursday 23-26 January 2012 • Proceedings of SPIE Vol. 8272

Advances in Photonics of Quantum Computing, Memory, and Communication V

Conference Chairs: **Zameer Ul Hasan,** Temple Univ. (USA); **Philip R. Hemmer,** Texas A&M Univ. (USA); **Hwang Lee,** Louisiana State Univ. (USA); **Charles M. Santori,** Hewlett-Packard Labs. (USA)

Program Committee: **Dmitry Budker,** Univ. of California, Berkeley (USA); **Alan E. Craig,** Montana State Univ. (USA); **Jonathan P. Dowling,** Louisiana State Univ. (USA); **Gurudev Dutt,** Univ. of Pittsburgh (USA); **James D. Franson,** Univ. of Maryland, Baltimore County (USA); **David Hughes,** Air Force Research Lab. (USA); **Fedor Jelezko,** Univ. Stuttgart (Germany); **Seth Lloyd,** Massachusetts Institute of Technology (USA); **Aleksander K. Rebane,** Montana State Univ. (USA); **Selim M. Shahriar,** Northwestern Univ. (USA); **Alan Eli Willner,** The Univ. of Southern California (USA); **Jörg Wrachtrup,** Univ. Stuttgart (Germany); **Horace P. Yuen,** Northwestern Univ. (USA); **M. Suhail Zubairy,** Texas A&M Univ. (USA)

Monday 23 January

SESSION 1 . . . . . Mon. 1:30 to 3:00 pm

Nonbleaching and Ultrasmall Fluorescent Tags I

Joint Session with Conference 8233

Bringing color to electron microscopy with cathodoluminescent nanoparticles *(Invited Paper)*, David Glenn, Huiliang Zhang, Harvard-Smithsonian Ctr. for Astrophysics (USA); Narayanan Kasthuri, Alexei Trifonov, Richard Schalek, Jeff W. Lichtman, Harvard Univ. (USA); Ronald L. Walsworth, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [8272-01]

Rare-earth doped YAG nanoparticles for high- and super-resolution upconversion imaging *(Invited Paper)*, Roman L. Kolesov, Rolf Reuter, Kangwei Xia, Rainer Stoehr, Andrea Zappe, Jörg Wrachtrup, Univ. Stuttgart (Germany) . . . . . [8272-02]

Nanodiamonds pave the way for fluorescent quantum probes in biology *(Invited Paper)*, David A. Simpson, Liam P. McGuinness, Yan Yan, Alastair Stacey, Liam T. Hall, Dougal Maclaurin, Steven Prawer, Paul Mulvaney, The Univ. of Melbourne (Australia); Jörg Wrachtrup, Univ. Stuttgart (Germany); Frank Caruso, Robert E. Scholten, Lloyd Hollenberg, The Univ. of Melbourne (Australia). . . . . [8272-03]

SESSION 2 . . . . . Mon. 3:30 to 5:00 pm

Nonbleaching and Ultrasmall Fluorescent Tags II

Joint Session with Conference 8233

In vitro and in vivo applications of fluorescent nanodiamonds *(Invited Paper)*, Huan-Cheng Chang, Institute of Atomic and Molecular Sciences (Taiwan) . . . . . [8272-04]

Use of upconverting fluorescent nanoparticles for bioimaging *(Invited Paper)*, Yong Zhang, Niagara Muhammad Idris, Li-Ching Ong, Lei-Yin Ang, Sylvie Alonso, National Univ. of Singapore (Singapore) . . . [8272-05]

Tailoring rare earth doped nano-particles for applications from biology to quantum computing, Zameer U. Hasan, Aras Konjhodzic, Temple Univ. (USA) . . . . . [8272-06]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 3 . . . . . Tues. 10:30 am to 12:30 pm

Quantum Optics and Sensing with Spins in Diamond

Session Chair: **Charles M. Santori,** Hewlett-Packard Labs. (USA)

Electrical tunability and correlation spectroscopy of single-photon emission from chromium-based colour centres in diamond, Tina Muller, Clemens Matthiesen, Univ. of Cambridge (United Kingdom); Igor Aharonovich, Harvard Univ. (USA) and The Univ. of Melbourne (Australia); Yury Alaverdyan, Anthony N. Vamivakas, Univ. of Cambridge (United Kingdom); Stefania A. Castelletto, Swinburne Univ. of Technology (Australia); Steven Prawer, The Univ. of Melbourne (Australia); Mete Atature, Univ. of Cambridge (United Kingdom) . . . . . [8272-07]

Near-field coupling of a single NV center to a tapered fiber, Tim Schröder, Humboldt-Univ. zu Berlin (Germany); Masazumi Fujiwara, Tetsuya Noda, Hokkaido Univ. (Japan); Hong-Quan Zhao, Osaka Univ. (Japan); Oliver Benson, Humboldt-Univ. zu Berlin (Germany); Shigeki Takeuchi, Hokkaido Univ. (Japan). . . . . [8272-08]

Magnetic sensing using NV centers in diamond *(Invited Paper)*, Amir Yacoby, Michael Grinolds, Sungkun Hong, Patrick Maletinsky, Harvard Univ. (USA) . . . . . [8272-09]

Coherent control and projective readout of a solid-state spin quantum register *(Invited Paper)*, Hannes Bernien, Lucio Robledo, Ronald Hanson, Technische Univ. Delft (Netherlands) . . . . . [8272-10]

Single photon source by single NV center in diamond semiconductor *(Invited Paper)*, Norikazu Mizuochi, Osaka Univ. (Japan) . . . . . [8272-11]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 4 . . . . . Tues. 1:30 to 3:00 pm

Ultrasound Modulated Optical Tomography I

Joint Session with Conference 8223

Session Chairs: **Lihong V. Wang,** Washington Univ. in St. Louis (USA); **Philip R. Hemmer,** Texas A&M Univ. (USA)

Signals, noises, and detection schemes in ultrasonically modulated optical imaging *(Invited Paper)*, François Ramaz, Ecole Supérieure de Physique et de Chimie Industrielles (France); Michel Gross, Univ. Montpellier 2 (France); Claude Boccara, Ecole Supérieure de Physique et de Chimie Industrielles (France) . . . . . [8223-73]

Ultrasound-modulated optical tomography of biological tissue using spectral-hole burning *(Invited Paper)*, Xiao Xu, Honglin Liu, Washington Univ. in St. Louis (USA); Sri-Rajasekhar Kothapalli, Stanford Univ. (USA); Puxiang Lai, Yuta Suzuki, Lihong V. Wang, Washington Univ. in St. Louis (USA). . . . [8223-74]

Creating filters for shot-noise-limited Ultrasound Optical Tomography (UOT) *(Invited Paper)*, Mahmood Sabooni, Lund Univ. (Sweden); Huiliang Zhang, Texas A&M Univ. (USA); Lars Rippe, Lund Univ. (Sweden); Chulhong Kim, Washington Univ. in St. Louis (USA); Stefan Kroll, Lund Univ. (Sweden); Philip Hemmer, Texas A&M Univ. (USA) . . . . . [8272-12]

Rare-earth-doped materials with application to optical signal processing, quantum information science, and medical imaging technology *(Invited Paper)*, Rufus L. Cone, Charles W. Thiel, Montana State Univ. (USA); Yongchen Sun, The Univ. of South Dakota (USA); Thomas Böttger, Univ. of California, San Francisco (USA); Roger M. Macfarlane, Montana State Univ. (USA) . . . [8272-13]

Recent progress in ultrasound-mediated fluorescence *(Invited Paper)*, Baohong Yuan, Yuan Liu, The Univ. of Texas at Arlington (USA) . . . . . [8223-75]

The potential of ultrasound-modulated optical sensing in clinical monitoring *(Invited Paper)*, Terence S. Leung, Univ. College London (United Kingdom) . . . . . [8223-76]

SESSION 5 . . . . . Tues. 3:30 to 5:30 pm

Ultrasound Modulated Optical Tomography II

Joint Session with Conference 8223

Session Chairs: **Lihong V. Wang,** Washington Univ. in St. Louis (USA); **Philip R. Hemmer,** Texas A&M Univ. (USA)

Atom like centers in solids for nanophotonic and quantum devices, Zameer U. Hasan, Temple Univ. (USA) . . . . . [8272-14]

Acoustic radiation force assisted ultrasound modulated optical tomography *(Invited Paper)*, Mengxing Tang, Rui Li, Yi Cheng, Christopher W. Dunsby, Robert J. Eckersley, Daniel Elson, Imperial College London (United Kingdom) . . . . . [8223-77]

Improving signal-to-noise ratio and spatial resolution in ultrasound modulated optical tomography *(Invited Paper)*, Stephen P. Morgan, Haowen Ruan, Nam Trung Huynh, Melissa L. Mather, Diwei He, John Crowe, Felicity R. Rose, Barrie R. Hayes-Gill, The Univ. of Nottingham (United Kingdom) . . . . . [8223-78]

Creating filters for shot-noise-limited Ultrasound Optical Tomography (UOT) *(Invited Paper)*, Huiliang Zhang, Texas A&M Univ. (USA); Mahmood Sabooni, Lars Rippe, Lund Univ. (Sweden); Chulhong Kim, Washington Univ. in St. Louis (USA); Stefan Kroll, Lund Univ. (Sweden); Lihong V. Wang, Washington Univ. in St. Louis (USA); Philip R. Hemmer, Texas A&M Univ. (USA) . . . [8272-15]

Organic materials for spectral hole burning and non-hole burning narrowband optical filters *(Invited Paper)*, Anshel Gorokhovsky, College of Staten Island (USA) . . . . . [8272-16]

Sound light: rendering photoacoustics fluence-independent by adding acousto-optic modulation, Wiendelt Steenbergen, Altaf Hussain, Khalid Daoudi, Univ. Twente (Netherlands) . . . . . [8223-79]

Efficient high-etendue four-wave mixing in a spectral hole-burning medium *(Invited Paper)*, Byoung S. Ham, Inha Univ. (Korea, Republic of); Philip R. Hemmer, Texas A&M Univ. (USA) . . . . . [8272-17]

Non-invasive blood flow measurements using ultrasound modulated diffused light, Noam Racheli, Avihai Ron, Coby Metzger, Ilan Breskin, Michal Balberg, Revital Shechter, Ornim Medical Ltd. (Israel) . . . . . [8223-80]

Wednesday 25 January

SESSION 6 . . . . . Wed. 8:00 to 10:05 am

Quantum Computing with Photons and Coherent Effects

Session Chairs: **Charles M. Santori,** Hewlett-Packard Labs. (USA); **Hwang Lee,** Louisiana State Univ. (USA)

Realizing optimal physical approximation of the partial transpose *(Invited Paper)*, Hyang-Tag Lim, Yong-Su Kim, Young-Sik Ra, Pohang Univ. of Science and Technology (Korea, Republic of); Joonwoo Bae, Korea Institute for Advanced Study (Korea, Republic of); Yoon-Ho Kim, Pohang Univ. of Science and Technology (Korea, Republic of) . . . . . [8272-18]

Closing the detection loophole in EPR-steering experiments *(Invited Paper)*, Geoff J. Pryde, Griffith Univ. (Australia). . . . . [8272-19]

New results in fault-tolerant quantum computing *(Invited Paper)*, Gerald N. Gilbert, Yaakov S. Weinstein, The MITRE Corp. (USA). . . . . [8272-20]

Integrated quantum photonics *(Invited Paper)*, Jeremy L. O'Brien, Univ. of Bristol (United Kingdom) . . . . . [8272-21]

Coherent and squeezed vacuum light interferometry: parity detection hits the Heisenberg limit *(Invited Paper)*, Kaushik P. Seshadreesan, Petr M. Anisimov, Hwang Lee, Jonathan P. Dowling, Louisiana State Univ. (USA) . . . . . [8272-22]

SESSION 7 . . . . . Wed. 10:35 am to 12:20 pm

Quantum Memory and Other Quantum Phenomena

Session Chair: **Hwang Lee,** Louisiana State Univ. (USA)

Dynamics of generation and retrieval of stored excitations in rare-earth ion-doped crystal *(Invited Paper)*, Elizabeth A. Goldschmidt, Joint Quantum Institute (USA); Sarah E. Beavan, The Australian National Univ. (Australia); Sergey V. Polyakov, Alan L. Migdall, Joint Quantum Institute (USA); Matthew J. Sellars, The Australian National Univ. (Australia) . . . . . [8272-23]

Electromagnetically controlled storage and retrieval of microwave pulses with superconducting artificial atoms *(Invited Paper)*, Patrick M. Leung, Barry C. Sanders, Univ. of Calgary (Canada) . . . . . [8272-24]

Four-wave mixing storage *(Invited Paper)*, John C. Howell, Univ. of Rochester (USA) . . . . . [8272-25]

Reliable and efficient control of spectral qubits using optoelectronic devices: progress and perspectives, Jean-Marc Merolla, Luca Fufaro, Kien Phan Huy, Ismael Mbodji, Univ. de Franche-Comté (France); Serge Massar, Erik Woodhead, Laurent Olislager, Univ. Libre de Bruxelles (Belgium); Remo Giust, Univ. de Franche-Comté (France) . . . . . [8272-26]

Anderson localization and co-localization of spatially entangled photons, Ayman F. Abouraddy, Giovanni Di Guiseppe, Demetrios N. Christodoulides, Bahaa E. A. Saleh, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA). . . . . [8272-27]

Lunch Break . . . . . 12:20 to 1:30 pm

SESSION 8 . . . . . Wed. 1:30 to 3:10 pm

Quantum Spatial

Joint Session with Conference 8274

Realization of ultra-broadband entangled photons and application to quantum sensing *(Invited Paper)*, Shigeki Takeuchi, Ryo Okamoto, Masayuki Okano, Hokkaido Univ. (Japan); Akira Tanaka, Shanthi Subashchandran, Osaka Univ. (Japan); Sunao Kurimura, National Institute for Materials Science (Japan); Norihiko Nishizawa, Nagoya Univ. (Japan) . . . . . [8272-28]

Parallel generation of 15 quadripartite cluster entangled states over the optical frequency comb of a single optical parametric oscillator *(Invited Paper)*, Olivier Pfister, Matthew Pysher, Univ. of Virginia (USA); Yoshichika Miwa, The Univ. of Tokyo (Japan); Reihaneh Shahrokhshahi, Russell D. Bloomer, Univ. of Virginia (USA). . . . . [8272-29]

A compact source for quantum image processing with four-wave mixing in Rb85, Ulrich Vogl, Ryan Glasser, Paul D. Lett, National Institute of Standards and Technology (USA). . . . . [8274-11]

Controlling the degree of polarization of a coherent beam through spatial-polarization correlations, Kumel H. Kagalwala, Giovanni Di Giuseppe, Ayman F. Abouraddy, Bahaa E. A. Saleh, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8274-12]

SESSION 9 . . . . . Wed. 3:40 to 5:30 pm

Quantum Imaging

Joint Session with Conference 8274

Information in a photon *(Invited Paper)*, Robert W. Boyd, Univ. of Ottawa (Canada) . . . . . [8272-30]

Full-field quantum correlations in position, momentum, and intermediate bases *(Invited Paper)*, Miles J. Padgett, Jonathan Leach, David Ireland, Univ. of Glasgow (United Kingdom); Gerald S. Buller, Ryan E. Warburton, Frauke Izdebski, Heriot-Watt Univ. (United Kingdom); Stephen M. Barnett, Alison M. Yao, Univ. of Strathclyde (United Kingdom) . . . . . [8274-13]

Fiber transport of spatially entangled photons *(Invited Paper)*, Wolfgang Löffler, Eric R. Eliel, Han P. Woerdman, Leiden Univ. (Netherlands); Tijmen G. Euser, Michael Scharrer, Philip J. Russell, Max Planck Institute for the Science of Light (Germany) . . . . . [8274-14]

Two-photon cluster states using polarization and spatial modes, Enrique J. Galvez, Matthew Novenstern, William H. Schubert, Colgate Univ. (USA) . . . . . [8274-15]

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

UV laser beam switching system for Yb trapped ion quantum information processing, David R. Scherer, Joel M. Hensley, Krishnan R. Parameswaran, Douglas J. Bamford, Physical Sciences Inc. (USA); Emily Mount, Stephen Crain, Jungsang Kim, Duke Univ. (USA) . . . . . [8272-44]

Single-qubit quantum gates using magneto-optic Kerr effect, Pradeep Kumar, Indian Institute of Technology Kanpur (India) . . . . . [8272-45]

Decoy-state method for frequency-coded implementation of B92 QKD protocol, Pradeep Kumar, Sudeshna Bhattacharya, Pratyush Pandey, Indian Institute of Technology Kanpur (India). . . . . [8272-46]

Coherent switching and signal processing of stokes waves waveguide array, Igor V. Melnikov, L.S.E. Co. (Russian Federation) . . . . . [8272-47]

Polarization based quantum information in femtosecond laser written photonic circuits, Andrea Crespi, Roberta Ramponi, Roberto Osellame, Politecnico di Milano (Italy); Linda Sansoni, Giuseppe Vallone, Fabio Sciarrino, Paolo Mataloni, Univ. degli Studi di Roma La Sapienza (Italy) . . . . . [8272-48]

Thursday 26 January

SESSION 10 . . . . . Thurs. 8:00 to 10:20 am

Diamond Nanostructures and Photonics

Session Chairs: **Zameer Ul Hasan,** Temple Univ. (USA); **Charles M. Santori,** Hewlett-Packard Labs. (USA)

Suppression of phonon sidebands in the spectrum of nitrogen vacancy centers in diamond nano-crystals, Hong-Quan Zhao, Masazumi Fujiwara, Shigeki Takeuchi, Hokkaido Univ. (Japan) . . . . . [8272-31]

Coupling color centers to optical cavities in single crystal diamond *(Invited Paper)*, Jonathan C. Lee, Andrew P. Magyar, Igor Aharonovich, Evelyn L. Hu, Harvard Univ. (USA) . . . . . [8272-32]

Towards integrated optical quantum networks in diamond *(Invited Paper)*, Andrei Faraon, Charles M. Santori, Zhihong Huang, Hewlett-Packard Labs. (USA); Paul E. Barclay, Univ. of Calgary (Canada); Kai-Mei C. Fu, Victor Acosta, Raymond G. Beausoleil, Hewlett-Packard Labs. (USA) . . . . . [8272-33]

Diamond nanophotonics and quantum optics *(Invited Paper)*, Marko Loncar, Thomas M. Babinec, Birgit M. Hausmann, Jennifer T. Choy, Irfan Bulu, Michael J. Burek, Harvard Univ. (USA) . . . . . [8272-34]

Tuning nitrogen-vacancy centers to indistinguishability with the DC Stark effect *(Invited Paper)*, Lee C. Bassett, F. Joseph Heremans, Christopher G. Yale, Bob B. Buckley, David D. Awschalom, Univ. of California, Santa Barbara (USA) . . . . . [8272-35]

SESSION 11 . . . . . Thurs. 10:50 am to 12:30 pm

Quantum Optics with Artificial Atoms in Semiconductors

Session Chair: **Charles M. Santori,** Hewlett-Packard Labs. (USA)

All optical preparation, storage, and readout of a single spin in an individual quantum dot, Vase S. Jovanov, Florian Klotz, Stephan Kapfinger, Dominik Heiss, Daniel Rudolph, Max Bichler, Martin S. Brandt, Gerhard Abstreiter, Jonathan J. Finley, Technische Univ. München (Germany) . . . . . [8272-36]

Cavity-QED with quantum dots in oxide-apertured micropillars, Cristian Bonato, Morten Bakker, Jan Gudat, Leiden Univ. (Netherlands); Susanna M. Thon, Univ. of California, Santa Barbara (USA); Hyochul Kim, Univ. of Maryland, College Park (USA); Martin P. van Exter, Dirk Bouwmeetser, Leiden Univ. (Netherlands) . . . . . [8272-37]

Single-photon emitters based on fluorine implanted ZnMgSe/ZnSe quantum-wells nanostructures, Young Min Kim, Alexander Pawlis, Klaus Lischka, Univ. Paderborn (Germany); Jan A. Meijer, Ruhr-Univ. Bochum (Germany); Kaoru Sanaka, Darin Sleiter, Yoshi Yamamoto, Stanford Univ. (USA) . . . . . [8272-38]

Coherence properties of quantum dot resonance fluorescence, Clemens Matthiesen, Anthony N. Vamivakas, Peter Humphreys, Mete Atatüre, Univ. of Cambridge (United Kingdom) . . . . . [8272-39]

Telecommunication-wavelength quantum dot polarization entangled photon-pair source, Martin B. Ward, Toshiba Research Europe Ltd. (United Kingdom); Matthew C. Dean, Toshiba Research Europe Ltd. (United Kingdom) and Univ. of Cambridge (United Kingdom); R. Mark Stevenson, Anthony J. Bennett, David J. P. Ellis, Toshiba Research Europe Ltd. (United Kingdom); Ken Cooper, Ian Farrer, Christine A. Nicoll, David A. Ritchie, Univ. of Cambridge (United Kingdom); Andrew J. Shields, Toshiba Research Europe Ltd. (United Kingdom) . . . . . [8272-40]

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 12 . . . . . Thurs. 2:00 to 3:10 pm

Quantum Optics with Atoms in Solids

Session Chair: **Philip R. Hemmer,** Texas A&M Univ. (USA)

Laser frequency-stabilization via spectral hole burning in Eu^{3+}:Y_2SiO_5 *(Invited Paper)*, Michael J. Thorpe, Till Rosenband, National Institute of Standards and Technology (USA) . . . . . [8272-41]

Quantum memory in warm Rb vapor with buffer gas, Mark Bashkansky, Fredrik K. Fatemi, Igor Vurgaftman, U.S. Naval Research Lab. (USA) . . [8272-42]

Control of the exciton g-factor in InGaAs quantum dots by electrical and magnetic fields, Vase S. Jovanov, Thomas Eissfeller, Stephan Kapfinger, Emily C. Clark, Florian Klotz, Max Bichler, Technische Univ. München (Germany); Joris G. Keizer, Paul M. Koenraad, Technische Univ. Eindhoven (Netherlands); Gerhard Abstreiter, Jonathan J. Finley, Technische Univ. München (Germany) . . . . . [8272-43]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8273

Sunday-Tuesday 22-24 January 2012 • Proceedings of SPIE Vol. 8273

Advances in Slow and Fast Light V

Conference Chairs: **Selim M. Shahriar,** Northwestern Univ. (USA); **Frank A. Narducci,** Naval Air Systems Command (USA)

Program Committee: **Tony Abi-Salloum,** Widener Univ. (USA); **Shanhui Fan,** Stanford Univ. (USA); **Daniel Joseph Gauthier,** Duke Univ. (USA); **Kohzo Hakuta,** The Univ. of Electro-Communications (Japan); **Ortwin Hess,** Imperial College London (United Kingdom); **John C. Howell,** Univ. of Rochester (USA); **Jacob B. Khurgin,** The Johns Hopkins Univ. (USA); **Uriel Levy,** The Hebrew Univ. of Jerusalem (Israel); **Gour S. Pati,** Delaware State Univ. (USA); **Jacob Scheuer,** Tel Aviv Univ. (Israel)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:30 to 9:50 am

Slow and Fast Light in Resonant Systems

Implementation and applications of quantum Hall physics with optical photons, Mohammad Hafezi, Jun Chen, Joint Quantum Institute (USA); Mikhail D. Lukin, Eugene A. Demler, Harvard Univ. (USA); Alan L. Migdall, Jacob M. Taylor, Joint Quantum Institute (USA) . . . . . [8273-01]

Population oscillation induced slow light in a nonlinear photonic crystal microcavity *(Invited Paper)*, Patricio Grinberg, Juan Ariel Levenson, Alejandro M. Giacomotti, Kamel Bencheikh, Ctr. National de la Recherche Scientifique (France); Patrice Féron, Yannick Dumeige, Ecole Nationale Supérieure des Sciences Appliquées et de Technologie (France) . . . . . [8273-02]

Slow light enhancement of four-wave mixing in coupled silicon-on-insulator microrings *(Invited Paper)*, Jun Rong Ong, Shayan Mookherjea, Univ. of California, San Diego (USA) . . . . . [8273-03]

Dynamical trapping of light in coupled laser arrays: slow or fast?, Yuval Yifat, Jacob Scheuer, Tel Aviv Univ. (Israel); Christopher Long, Eli Kapon, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8273-04]

SESSION 2 . . . . . Sun. 10:20 am to 12:00 pm

Slow and Fast Light in Atomic Vapor

Atomic prism *(Invited Paper)*, John C. Howell, Univ. of Rochester (USA) . . . . . [8273-05]

Slow and stored light with atom-based squeezed light *(Invited Paper)*, Irina Novikova, The College of William & Mary (USA) . . . . . [8273-06]

Light matter interactions on a chip: a new integrated platform for slow and fast light *(Invited Paper)*, Uriel Levy, The Hebrew Univ. of Jerusalem (Israel) . . . . [8273-07]

Effect of Zeeman sublevels on light shifts in CPT-based Raman-Ramsey atomic clocks *(Invited Paper)*, Gour S. Pati, Delaware State Univ. (USA); Selim Shahriar, Northwestern Univ. (USA) . . . . . [8273-08]

Lunch Break . . . . . 12:00 to 1:00 pm

SESSION 3 . . . . . Sun. 1:00 to 3:30 pm

Slow and Fast Light Using SOA , SBS, and NLO

Slow and fast light in SOAs for microwave photonics applications *(Invited Paper)*, Perrine Berger, Thales Research & Technology (France) . . . . . [8273-09]

Sensitivity enhancement in a superluminal semiconductor optical amplifier ring laser *(Invited Paper)*, Sean Spillane, Los Gatos Research, Inc. (USA); Selim Shahriar, Northwestern Univ. (USA) . . . . . [8273-10]

Variable delay and sensing using stationary and localized Brillouin dynamic gratings *(Invited Paper)*, Avi Zadok, Yair Antman, Bar-Ilan Univ. (Israel); Nikolay Primerov, Luc Thévenaz, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Juan Sancho-Dura, Univ. Politécnica de Valencia (Spain) [8273-11]

A Brillouin gain based fast light fiber laser for sensing applications *(Invited Paper)*, Jacob Scheuer, Tel Aviv Univ. (Israel); Selim Shahriar, Northwestern Univ. (USA) . . . . . [8273-12]

Nonlinear wave-mixing processes via slow and fast light: recent developments *(Invited Paper)*, Yuri Rostovtsev, Univ. of North Texas (USA) . . . . . [8273-13]

Nonlinear optics at the few-photon level in photonic crystal fibers *(Invited Paper)*, Kartik Venkataraman, Pelican Imaging Corp. (USA); Pablo Londero, Univ. of Oxford (United Kingdom); Alexander L. Gaeta, Cornell Univ. (USA) . . . . . [8273-16]

SESSION 4 . . . . . Sun. 4:00 to 6:05 pm

Slow and Fast Light in Spectral Hole Burning Media and Nanofiber

Brillouin scattering for dynamic sensing *(Invited Paper)*, Moshe Tur, Tel Aviv Univ. (Israel) . . . . . [8273-14]

Increasing the scale factor of a ring laser gyro via spectral hole burning *(Invited Paper)*, Mary Salit, Kenneth Salit, Paul E. Bauhahn, Honeywell Aerospace Advanced Technology (USA) . . . . . [8273-15]

Toward deep tissue biomedical imaging with slow light and ultrasound *(Invited Paper)*, Philip R. Hemmer, Texas A&M Univ. (USA); Stefan Kroll, Lund Univ. (Sweden); Lihong V. Wang, Washington Univ. in St. Louis (USA); Huiliang Zhang, Harvard Univ. (USA); Mahmood Sabooni, Lars Rippe, Lund Univ. (Sweden); Chulhong Kim, Univ. at Buffalo (USA) . . . . . [8273-17]

Various applications of slow light in a rare-earth doped crystal *(Invited Paper)*, Byoung Seung Ham, Inha Univ. (Korea, Republic of) . . . . . [8273-18]

Manipulation of light propagation using optical-nanofiber cavities *(Invited Paper)*, Kali P. Nayak, Kohzo Hakuta, The Univ. of Electro-Communications (Japan) . . . . . [8273-19]

Monday 23 January

SESSION 5 . . . . . Mon. 8:00 to 10:30 am

Slow and Fast Light Using Photonic Crystal Structures

Slow-light in photonic crystal waveguides/fibers: dispersion tailoring schemes for obtaining a high group index with wide band and low GVD *(Invited Paper)*, Liyong Ren, Jian Liang, Xi'an Institute of Optics and Precision Mechanics (China); Maojin Yun, Qingdao Univ. (China); Chengju Ma, Xu Han, Yu Liu, Xi'an Institute of Optics and Precision Mechanics (China); Yasuo Tomita, The Univ. of Electro-Communications (Japan) . . . . . [8273-20]

The role of slow wave propagation in nonlinear photonic crystal waveguides *(Invited Paper)*, Gadi Eisenstein, Isabelle Cestier, Vardit Eckhouse, Amnon Willinger, Technion-Israel Institute of Technology (Israel); Sylvain Combrié, Gaelle Lehoucq, Alfredo De Rossi, Thales Research & Technology (France); Sourabh Roy, Marco Santagiustina, Univ. degli Studi di Padova (Italy) . . . . . [8273-21]

Ultra high Q photonic structures on silicon *(Invited Paper)*, Michal F. Lipson, Cornell Univ. (USA) . . . . . [8273-22]

Progress in hollow-core photonic crystal fibre for atomic vapour based coherent optics *(Invited Paper)*, Fetah A. Benabid, Yingying Y. Wang, Thomas D. Bradley, M. Alharbi, Univ. of Bath (United Kingdom) and Xlim Research Institute, CNRS-Univ. de Limoges (France) . . . . . [8273-23]

Slow and fast light in dispersion engineered photonic crystal cavities *(Invited Paper)*, Thomas F. Krauss, Univ. of St. Andrews (United Kingdom) . . . . . [8273-24]

Dark resonances in all-optical analogue to EIT: lossless intensity modulation, force enhancement, and optical antennas *(Invited Paper)*, Shanhui Fan, Stanford Univ. (USA) . . . . . [8273-25]

SESSION 6 . . . . . Mon. 11:00 am to 12:30 pm

Sensors Using Slow and Fast Light I

Dispersion in a four level n-scheme atomic system with co- and counter-propagating fields *(Invited Paper)*, Frank A. Narducci, Jon P. Davis, Naval Air Systems Command (USA) . . . . . [8273-26]

Effect of inhomogneous broadening and buffer-gas collisions on a DPAL based uperluminal laser for precision sensing *(Invited Paper)*, Tony Abi-Salloum, Widener Univ. (USA); Selim Shahriar, Northwestern Univ. (USA) . . . . . [8273-27]

Tuning the sensitivity of an optical cavity using slow and fast light *(Invited Paper)*, David D. Smith, The Univ. of New Mexico (USA) . . . . . [8273-28]

Rb-based superluminal DPAL laser: properties and applications to sensing, Joshua Yablon, Shih Tseng, Selim Shahriar, Northwestern Univ. (USA) [8273-29]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 7 . . . . . Mon. 1:30 to 2:45 pm

Sensors Using Slow and Fast Light II

Slow-light through wave-mixing in liquid crystal light-valves and interferometric applications *(Invited Paper)*, Stefania Residori, Institut Non Linéaire de Nice Sophia Antipolis (France) . . . . . [8273-30]

Slow light in fiber sensors *(Invited Paper)*, Michel J. F. Digonnet, He Wen, Matthew A. Terrel, Shanhui Fan, Stanford Univ. (USA) . . . . . [8273-31]

Improved spectral performance of Fourier transform interferometer utilizing slow light medium *(Invited Paper)*, Yundong Zhang, Harbin Institute of Technology (China) . . . . . [8273-32]

SESSION 8 . . . . . Mon. 3:15 to 6:00 pm

Theoretical Studies in Slow and Fast Light

New physics and new applications with slow light *(Invited Paper)*, Robert W. Boyd, Univ. of Rochester (USA) . . . . . [8273-33]

Microscopic and macroscopic descriptions of electromagnetic-field propagation in nonlinear dispersive and absorbing media *(Invited Paper)*, Verne L. Jacobs, U.S. Naval Research Lab. (USA) . . . . . [8273-34]

Pulse distortion in linear slow light systems: recent developments *(Invited Paper)*, Miguel González-Herráez, Univ. de Alcalá de Henares (Spain) . . . . . [8273-35]

Raman-active photonic crystal: dual wavelength slow light, optical memory, and signal processing, Igor V. Melnikov, E.L.S. Co. (Russian Federation) . . . . . [8273-36]

Slow light: Where does the energy hide? *(Invited Paper)*, Jacob B. Khurgin, The Johns Hopkins Univ. (USA) . . . . . [8273-37]

Propagation of slow whispering gallery modes along the optical fiber *(Invited Paper)*, Misha Sumetsky, OFS (USA) . . . . . [8273-38]

Universality in slow light spectra *(Invited Paper)*, Nir Davidson, Rami Pugatch, Weizmann Institute of Science (Israel); Dipankar Bhattacharyya, Santipur College (India); Ofer Firstenberg, Technion-Israel Institute of Technology (Israel) . . . . . [8273-39]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 9 . . . . . Tues. 10:30 am to 12:00 pm

Slow and Fast Light for Optical Communication, Optomechanics, and Microwave Photonics

Tunable optical tapped-delay-lines for signal processing applications *(Invited Paper)*, Alan E. Willner, The Univ. of Southern California (USA) . [8273-40]

Constant- and variable-chirp gratings for a broadband white light cavity for data buffering, Xue Liu, Honam Yum, Northwestern Univ. (USA); Philip R. Hemmer, Texas A&M Univ. (USA); Selim Shahriar, Northwestern Univ. (USA) . . . . . [8273-41]

Slow-light enhanced optomechanical interactions *(Invited Paper)*, Andrey A. Sukhorukov, The Australian National Univ. (Australia) . . . . . [8273-42]

Optomechanical light storage in a silica resonator *(Invited Paper)*, Hailin Wang, Univ. of Oregon (USA) . . . . . [8273-43]

Lunch/Exhibition Break . . . . . 12:00 to 1:15 pm

SESSION 10 . . . . . Tues. 1:15 to 2:55 pm

New Directions in Slow and Fast Light I

Recent progress in on-chip slow light devices *(Invited Paper)*, Toshihiko Baba, Yokohama National Univ. (Japan) . . . . . [8273-45]

Slow-light enhancement of gain in active photonic crystal waveguides *(Invited Paper)*, Jesper Moerk, S. Ek, Yaohui Chen, P. Lunnemann, F. Wang, Kresten Yvind, Technical Univ. of Denmark (Denmark) . . . . . [8273-44]

Light buckets: stopping light in light capacitors *(Invited Paper)*, Meir Orenstein, Technion-Israel Institute of Technology (Israel) . . . . . [8273-46]

EIT and quantum memory in nanomechanical systems *(Invited Paper)*, Girish S. Agarwal, Oklahoma State Univ. (USA) . . . . . [8273-47]

SESSION 11 . . . . . Tues. 3:25 to 5:55 pm

New Directions in Slow and Fast Light II

Enhancing the light-atom interactions using slow light: towards the concept of dense light *(Invited Paper)*, Luc Thévenaz, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8273-48]

Control of transparency: slow and fast light in room-temperature metastable helium-4 *(Invited Paper)*, Rupamanjari Ghosh, Jawaharlal Nehru Univ. (India) . . . . . [8273-49]

Recent development in slow light with topological electromagnetic modes *(Invited Paper)*, Zheng Wang, The Univ. of Texas at Austin (USA) . . . . . [8273-50]

Amplified stopped light in metamaterial waveguides *(Invited Paper)*, Kosmas L. Tsakmakidis, Imperial College London (United Kingdom); Edmund I. Kirby, Univ. of Surrey (United Kingdom); Tim Pickering, Ortwin Hess, Imperial College London (United Kingdom) . . . . . [8273-51]

Slow light in a symmetrically-pumped DFB fiber laser with a variable phase shift *(Invited Paper)*, Igor V. Melnikov, E.L.S. Co. (Russian Federation) . [8273-52]

Deterministic optical rogue waves *(Invited Paper)*, C. Bonatto, Univ. Politècnica de Catalunya (Spain); M. Feyereisen, Stephane Barland, Massimo Giudici, Institut Non Linéaire de Nice Sophia Antipolis (France); Cristina Masoller, Univ. Politècnica de Catalunya (Spain); J. R. Rios Leite, Univ. Federal de Pernambuco (Brazil); Jorge R. Tredicce, Institut Non Linéaire de Nice Sophia Antipolis (France) . . . . . [8273-53]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8274

Wednesday-Thursday 25-26 January 2012 • Proceedings of SPIE Vol. 8274

Complex Light and Optical Forces VI

Conference Chairs: **Enrique J. Galvez,** Colgate Univ. (USA); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom); **Jesper Glückstad,** Technical Univ. of Denmark (Denmark)

Conference Co-Chair: **Marat S. Soskin,** Institute of Physics (Ukraine)

Program Committee: **Nicholas P. Bigelow,** Univ. of Rochester (USA); **Shu-Chun Chu,** National Cheng Kung Univ. (Taiwan); **Kishan Dholakia,** Univ. of St. Andrews (United Kingdom); **Wolfgang A. Ertmer,** Leibniz Univ. Hannover (Germany); **Jean-Marc R. Fournier,** Ecole Polytechnique Fédérale de Lausanne (France); **David G. Grier,** New York Univ. (USA); **Ruediger Grunwald,** Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); **Gerard Nienhuis,** Leiden Univ. (Netherlands); **Miles J. Padgett,** Univ. of Glasgow (United Kingdom); **Monika A. Ritsch-Marte,** Innsbruck Medical Univ. (Austria); **Halina H. Rubinsztein-Dunlop,** The Univ. of Queensland (Australia); **Grover A. Swartzlander, Jr.,** Rochester Institute of Technology (USA); **Juan P. Torres,** ICFO - Instituto de Ciencias Fotónicas (Spain); **Ewan M. Wright,** College of Optical Sciences, The Univ. of Arizona (USA)

Wednesday 25 January

SESSION 1 . . . . . Wed. 8:00 to 10:10 am

Fundamental OAM

Light's orbital angular momentum: diffraction and applications *(Invited Paper)*, Jandir M. Hickmann M.D., Optics and Materials Group (Brazil) . . . . . [8274-01]

Mechanically induced image rotation: analogy of the Faraday effect for orbital angular momentum, Miles J. Padgett, Sonja Franke-Arnold, Graham M. Gibson, Univ. of Glasgow (United Kingdom); Robert W. Boyd, Univ. of Ottawa (Canada) . . . . . [8274-02]

Cholesteric polymers and the orbital angular momentum of light, Wolfgang Löffler, Han P. Woerdman, Leiden Univ. (Netherlands) . . . . . [8274-03]

Optical superchirality and electromagnetic angular momentum, David L. Andrews, Matt M. Coles, Univ. of East Anglia Norwich (United Kingdom) . . . . . [8274-04]

Measuring the orbital angular momentum density for a superposition of Bessel beams, Angela Dudley, Igor Litvin, Andrew Forbes, CSIR National Laser Ctr. (South Africa) . . . . . [8274-05]

A higher order Poincare sphere representation, Giovanni Milione, Robert R. Alfano, The City College of New York (USA) . . . . . [8274-06]

SESSION 2 . . . . . Wed. 10:40 am to 12:10 pm

Optical Forces

Current reversals in a deterministic optical rocking ratchet *(Invited Paper)*, Karen P. Volke-Sepúlveda, Alejandro V. Arzola, Jose L. Mateos, Univ. Nacional Autónoma de México (Mexico) . . . . . [8274-07]

Picolitre rheology of gaseous media using a rotating optically trapped birefringent microparticle, Yoshihiko Arita, Andrew McKinley, Michael Mazilu, Univ. of St. Andrews (United Kingdom); Halina Rubinsztein-Dunlop, The Univ. of Queensland (Australia); Kishan Dholakia, Univ. of St. Andrews (United Kingdom) . . . . . [8274-08]

Optical recoil of electromagnetic radiators with asymmetric radiation pattern, Jung-Hwan Song, Jonghwa Shin, Yong-Hee Lee, KAIST (Korea, Republic of) . . . . . [8274-09]

Optical negative force: tractor beam and beyond, Cheng-Wei Qiu, National Univ. of Singapore (Singapore); Andrey Novitsky, Technical Univ. of Denmark (Denmark) . . . . . [8274-10]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 3 . . . . . Wed. 1:30 to 3:10 pm

Quantum Spatial

Joint Session with Conference 8272

Realization of ultra-broadband entangled photons and application to quantum sensing *(Invited Paper)*, Shigeki Takeuchi, Ryo Okamoto, Masayuki Okano, Hokkaido Univ. (Japan); Akira Tanaka, Shanthi Subashchandran, Osaka Univ. (Japan); Sunao Kurimura, National Institute for Materials Science (Japan); Norihiko Nishizawa, Nagoya Univ. (Japan) . . . . . [8272-28]

Parallel generation of 15 quadripartite cluster entangled states over the optical frequency comb of a single optical parametric oscillator *(Invited Paper)*, Olivier Pfister, Matthew Pysher, Univ. of Virginia (USA); Yoshichika Miwa, The Univ. of Tokyo (Japan); Reihaneh Shahrokhshahi, Russell D. Bloomer, Univ. of Virginia (USA). . . . . [8272-29]

A compact source for quantum image processing with four-wave mixing in Rb85, Ulrich Vogl, Ryan Glasser, Paul D. Lett, National Institute of Standards and Technology (USA). . . . . [8274-11]

Controlling the degree of polarization of a coherent beam through spatial-polarization correlations, Kumel H. Kagalwala, Giovanni Di Giuseppe, Ayman F. Abouraddy, Bahaa E. A. Saleh, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8274-12]

SESSION 4 . . . . . Wed. 3:40 to 5:30 pm

Quantum Imaging

Joint Session with Conference 8272

Information in a photon *(Invited Paper)*, Robert W. Boyd, Univ. of Ottawa (Canada) . . . . . [8272-30]

Full-field quantum correlations in position, momentum, and intermediate bases *(Invited Paper)*, Miles J. Padgett, Jonathan Leach, David Ireland, Univ. of Glasgow (United Kingdom); Gerald S. Buller, Ryan E. Warburton, Frauke Izdebski, Heriot-Watt Univ. (United Kingdom); Stephen M. Barnett, Alison M. Yao, Univ. of Strathclyde (United Kingdom) . . . . . [8274-13]

Fiber transport of spatially entangled photons *(Invited Paper)*, Wolfgang Löffler, Eric R. Eliel, Han P. Woerdman, Leiden Univ. (Netherlands); Tijmen G. Euser, Michael Scharrer, Philip J. Russell, Max Planck Institute for the Science of Light (Germany) . . . . . [8274-14]

Two-photon cluster states using polarization and spatial modes, Enrique J. Galvez, Matthew Novenstern, William H. Schubert, Colgate Univ. (USA) . . . . . [8274-15]

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Enhanced near-field properties of a gap of TiO_2 nanosphere pairs for photocatalysis optical trap, Toshiyuki Honda, Mitsuhiro Terakawa, Minoru Obara, Keio Univ. (Japan) . . . . . [8274-34]

Tracking phase singularities in optical fields, Julia Borchardt, Michael Duparré, Stefan Skupin, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [8274-35]

Laser guidance-based cell sorting in a microfluidic biochip, Wan Qin, Lucas Schmidt, Zhen Ma, Hai Yao, Clemson Univ. (USA); Xiang Peng, Shenzhen Univ. (China); Xiaocong Yuan, Nankai Univ. (China); Bruce Gao, Clemson Univ. (USA) . . . . . [8274-36]

Observation of speckle instability in Kerr random media, Stefania Residori, Umberto Bortolozzo, Institut Non Linéaire de Nice Sophia Antipolis (France); Patrick Sebbah, L'Institut Langevin (France). . . . . [8274-37]

Structural features of the diffraction field, Javier Muñoz-Lopez, Gabriel Marinez-Niconoff, Patricia Martinez-Vara, Gerardo Diaz-Gonzalez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [8274-38]

Diffraction characteristics of optical and polarization vortices generated by an axially-symmetric polarizer, Moritsugu Sakamoto, Kazuhiko Oka, Ryuji Morita, Hokkaido Univ. (Japan) . . . . . [8274-39]

Identifying the topological charge of optical vortices through diffraction, David Meltzer, Martin G. Cohen, John Noe, Stony Brook Univ. (USA) . . [8274-40]

Broadband orbital angular momentum manipulation using liquid crystal thin films, Yanming Li, Jihwan Kim, Michael J. Escuti, North Carolina State Univ. (USA) . . . . . [8274-41]

Thursday 26 January

SESSION 5 . . . . . Thurs. 8:00 to 10:10 am

New Developments in Optical Trapping

Formation of optical flux lattices for ultra cold atoms *(Invited Paper)*, Gediminas Juzeliunas, Vilnius Univ. (Lithuania) . . . . . [8274-16]

Optical eigenmodes for imaging applications, Sebastian Kosmeier, Michael Mazilu, Anna Chiara De Luca, Tom Vettenburg, Kishan Dholakia, Univ. of St. Andrews (United Kingdom) . . . . . [8274-17]

Bio-optofluidics cell sorter, Jesper Glückstad, Technical Univ. of Denmark (Denmark) . . . . . [8274-18]

Combined acoustic and optical trapping, Gregor Thalhammer, Ruth Steiger, Stefan Bernet, Monika Ritsch-Marte, Innsbruck Medical Univ. (Austria) [8274-19]

Laser trapping-induced phase transition of individual smectic liquid crystal micro-droplet showing size-dependent dynamics, Anwar Usman, Wei-Yi Chiang, Takayuki Uwada, Hiroshi Masuhara, National Chiao Tung Univ. (Taiwan) . . . . . [8274-20]

Enhanced near field properties of gold nanoparticle pairs for size selective trap, Kodai Hirano, Mitsuhiro Terakawa, Minoru Obara, Keio Univ. (Japan). . . . . [8274-21]

SESSION 6 . . . . . Thurs. 10:40 to 11:40 am

Novel Aspects of Manipulation

Machine vision for a compact biophotonics workstation, Jesper Glückstad, Technical Univ. of Denmark (Denmark) . . . . . [8274-22]

The Bessel beam random access trap, Tobias Paprotta, Bweh Esembeson, Ludwig Eichner, Jens Schumacher, Thorlabs Inc. (USA); Steve C. Wasserman D.V.M., Massachusetts Institute of Technology (USA); Alex E. Cable, Thorlabs Inc. (USA). . . . . [8274-23]

Molecular interactions between carbon nanotubes and DNA, Tu Hong, Yunhao Cao, Yaqiong Xu, Vanderbilt Univ. (USA). . . . . [8274-24]

SESSION 7 . . . . . Thurs. 11:40 am to 12:10 pm

Complex Light I: Knots and Vortices

Optical vortex lines in self-focusing nonlinear media: loops, links, and knots *(Invited Paper)*, Anton S. Desyatnikov, Daniel Buccoliero, The Australian National Univ. (Australia); Mark R. Dennis, Univ. of Bristol (United Kingdom); Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [8274-25]

Lunch/Exhibition Break. . . . . 12:10 to 1:40 pm

SESSION 8 . . . . . Thurs. 1:40 to 3:30 pm

Complex Light II: Generation and Propagation

Tailored light fields for complex optical structuring and organisation *(Invited Paper)*, Cornelia Denz, Mike Wördemann, Christina Alpmann, Westfälische Wilhelms-Univ. Münster (Germany). . . . . [8274-26]

Fine topological structure of coherent complex light created by carbon nanocomposites in LC, Vladislav V. Ponevchinsky, Institute of Physics (Ukraine); Andrey I. Goncharuk, F. D. Ovcharenko Institute of Biocolloidal Chemistry (Ukraine); Serguey S. Minenko, Longin N. Lisetskii, Institute for Scintillation Materials (Ukraine); Nikolai I. Lebovka, F. D. Ovcharenko Institute of Biocolloidal Chemistry (Ukraine); Marat S. Soskin, Institute of Physics (Ukraine) . . . . . [8274-27]

Nonlinear mixing of optical vortices, Stefania Residori, Umberto Bortolozzo, Institut Non Linéaire de Nice Sophia Antipolis (France); Francesco Lenzini, Univ. degli Studi di Firenze (Italy) . . . . . [8274-28]

Generation of highly confined optical bottle beams by photonic nanojet effect, Myun-Sik Kim, Toralf Scharf, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Stefan Mühlig, Carsten Rockstuhl, Friedrich-Schiller-Univ. Jena (Germany); Hans Peter Herzig, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8274-29]

Experimental control over soliton interaction in optical fiber by pre-shaped input field, Esben R. Andresen, Institut Fresnel (France); John M. Dudley, Univ. de Franche-Comté (France); Dan Oron, Weizmann Institute of Science (Israel); Christophe Finot, Univ. de Bourgogne (France); Hervé Rigneault, Institut Fresnel (France) . . . . . [8274-30]

SESSION 9 . . . . . Thurs. 4:00 to 5:10 pm

Polarization Singularities and Vector Beams

Tangled nonlinear driven chain reactions of all optical singularities *(Invited Paper)*, Marat S. Soskin, Vasiliy Vasil'ev, Institute of Physics (Ukraine) . . . . . [8274-31]

Twisted longitudinally polarized field in focal region, Sunil Vyas, Yuichi Kozawa, Shunichi Sato, Tohoku Univ. (Japan). . . . . [8274-32]

Polarization singularities in optical Gaussian beams, Enrique J. Galvez, Shreeya Khadka, William H. Schubert, Sean Nomoto, Colgate Univ. (USA) . . . . . [8274-33]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8275

Wednesday-Thursday 25-26 January 2012 • Proceedings of SPIE Vol. 8275

Laser Refrigeration of Solids V

Conference Chairs: **Richard I. Epstein,** The Univ. of New Mexico (USA); **Mansoor Sheik-Bahae,** The Univ. of New Mexico (USA)

Program Committee: **Rudolf Binder,** College of Optical Sciences, The Univ. of Arizona (USA); **Steven R. Bowman,** U.S. Naval Research Lab. (USA); **Joaquín Fernández,** Univ. del País Vasco (Spain); **Zameer Ul Hasan,** Temple Univ. (USA); **Jacob B. Khurgin,** The Johns Hopkins Univ. (USA); **Roberto Onofrio,** Dartmouth College (USA); **Mauro Tonelli,** Univ. di Pisa (Italy)

Wednesday 25 January

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Novel photon blockade schemes for thermal link applications, Denis V. Seletskiy, The Univ. of New Mexico (USA) and Air Force Research Lab. (USA); Juanita Trevino, Seth D. Melgaard, Mansoor Sheik-Bahae, The Univ. of New Mexico (USA) . . . . . [8275-17]

Polarization-resolved optical meteorology for noncontact thermometry, Mohammadreza Ghasemkhani, Denis V. Seletskiy, Mansoor Sheik-Bahae, The Univ. of New Mexico (USA) . . . . . [8275-18]

Thursday 26 January

SESSION 1 . . . . . Thurs. 8:00 to 10:00 am

Optical Refrigeration in Rare-Earth Doped Systems

Session Chair: **Raman Kashyap,** Ecole Polytechnique de Montréal (Canada)

Optical cooling of Nd-doped solids *(Invited Paper)*, Angel J. Garcia-Adeva, Rolindes Balda, Sara Garcia-Revilla, Mohammad Al Saleh, Joaquin Fernandez, Univ. del País Vasco (Spain) . . . . . [8275-01]

Emission dynamics of holmium-doped potassium lead chloride *(Invited Paper)*, Nicholas J. Condon, Steven R. Bowman, Shawn P. O'Connor, U.S. Naval Research Lab. (USA); Richard S. Quimby, Worcester Polytechnic Institute (USA) . . . . . [8275-02]

High sensitivity spectroscopic and thermal characterization of cooling efficiency for optical refrigeration materials, Seth Melgaard, Denis Seletskiy, Mansoor Sheik-Bahae, The Univ. of New Mexico (USA); Mauro Tonelli, Alberto Di Lieto, Univ. di Pisa (Italy) . . . . . [8275-03]

Intracavity laser cooling using a VECSEL *(Invited Paper)*, Alexander R. Albrecht, The Univ. of New Mexico (USA); Denis V. Seletskiy, Air Force Research Lab. (USA); Alberto Di Lieto, Mauro Tonelli, Univ. di Pisa (Italy); Mansoor Sheik-Bahae, The Univ. of New Mexico (USA) . . . . . [8275-04]

All fiber approach to solid-state laser cooling *(Invited Paper)*, Dan T. Nguyen, Jie Zong, Dan L. Rhonehouse, Zhidong Yao, Andy Miller, Arturo Chavez-Pirson, NP Photonics, Inc. (USA); Christopher M. Shanor, Baijie Gu, Rolf Binder, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [8275-05]

SESSION 2 . . . . . Thurs. 10:30 am to 12:10 pm

Novel Approaches in Laser Cooling

Session Chair: **Steven R. Bowman,** U.S. Naval Research Lab. (USA)

Optical filtering of Stokes lines for cooling *(Invited Paper)*, Gaurav Bahl, Matthew Tomes, Tal Carmon, Univ. of Michigan (USA) . . . . . [8275-06]

Laser cooling of atoms by collisional redistribution of fluorescence *(Invited Paper)*, Ulrich Vogl, National Institute of Standards and Technology (USA) and Joint Quantum Institute (USA); Anne Sass, Martin Weitz, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) . . . . . [8275-07]

Laser cooling of solids by stimulated Raman scattering and fluorescence *(Invited Paper)*, Stephen C. Rand, Univ. of Michigan (USA) . . . . . [8275-08]

Pulsed laser cooling for cavity-optomechanical resonators *(Invited Paper)*, Alex Retzker, Shai Machnes, Martin B. Plenio, Javier Moreno, Univ. Ulm (Germany); Markus Aspelmeyer, Witlef Wieczorek, Univ. Wien (Austria) [8275-09]

Lunch/Exhibition Break . . . . . 12:10 to 1:40 pm

SESSION 3 . . . . . Thurs. 1:40 to 3:05 pm

Advances in Solid-State Laser Refrigeration I

Session Chair: **Angel J. Garcia-Adeva,** Univ. del País Vasco (Spain)

Laser cooling with lead-salt colloidal quantum dots doped in a glass host *(Invited Paper)*, Galina A. Nemova, Raman Kashyap, Ecole Polytechnique de Montréal (Canada) . . . . . [8275-10]

Thermal imaging with high spatial and temperature resolution, Denis V. Seletskiy, The Univ. of New Mexico (USA) and Air Force Research Lab. (USA); Seth D. Melgaard, Mansoor Sheik-Bahae, The Univ. of New Mexico (USA) . . . . . [8275-11]

Indium fluoride glass fiber, Mohammed Saad, IRphotonics Inc. (Canada) . . . . . [8275-12]

Peculiarities of optical cooling effect in ytterbium-doped ferroelectric lithium niobate crystal, Vahan G. Babajanyan, Institute for Physical Research (Armenia) . . . . . [8275-13]

SESSION 4 . . . . . Thurs. 3:35 to 4:45 pm

Advances in Solid-State Laser Refrigeration II

Session Chair: **Denis Seletskiy,** The Univ. of New Mexico (USA)

Heat removal technologies for use with optical refrigerators *(Invited Paper)*, Richard I. Epstein, Kevin J. Malloy, The Univ. of New Mexico (USA) . . . [8275-14]

Laser cooling and upconversion processes in crystals and glasses with high erbium concentrations *(Invited Paper)*, Zameer U. Hasan, Jonathan W. Lynch, Temple Univ. (USA) . . . . . [8275-15]

Development of highly doped passivation in the GaInP/GaAs double heterostructure for use in laser cooling, Daniel Bender, Jeffrey Cederberg, Sandia National Labs. (USA); Chengao Wang, Mansoor Sheik-Bahae, The Univ. of New Mexico (USA) . . . . . [8275-16]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Wednesday-Thursday 25-26 January 2012 • Proceedings of SPIE Vol. 8276

Vertical-Cavity Surface-Emitting Lasers XVI

Conference Chairs: **Chun Lei,** EMCORE Corp. (USA); **Kent D. Choquette,** Univ. of Illinois at Urbana-Champaign (USA)

Program Committee: **Kent M. Geib,** Sandia National Labs. (USA); **Martin Grabherr,** Philips Technologie GmbH U-L-M Photonics (Germany); **James K. Guenter,** Finisar Corp. (USA); **Karlheinz H. Gulden,** Oclaro, Inc. (Switzerland); **Jeong-Ki Hwang,** Avago Technologies Singapore (Singapore); **Fumio Koyama,** Tokyo Institute of Technology (Japan); **Kevin L. Lear,** Colorado State Univ. (USA); **James A. Lott,** VI Systems GmbH (Germany) and Technische Univ. Berlin (Germany); **Krassimir Panajotov,** Vrije Univ. Brussel (Belgium); **Jean-Francois Seurin,** Princeton Optronics, Inc. (USA); **Noriyuki Yokouchi,** The Furukawa Electric Co., Ltd. (Japan)

Wednesday 25 January

SESSION 1 . . . . . Wed. 8:20 to 10:00 am

20Gb/s VCSEL Modulation and Beyond

Session Chair: **Chun Lei,** EMCORE Corp. (USA)

The next generation of high speed VCSELs at Finisar *(Invited Paper)*, Luke A. Graham, Ralph Johnson, Gary D. Landry, Deepa Gazula, Hao Chen, Jim A. Tatum, James K. Guenter, Andrew N. MacInnes, Bobby Hawkins, Finisar Corp. (USA) . . . . . [8276-01]

Emcore's 1 to 25 Gb/s VCSELs, Neinyi Li, Chuan Xie, Wenlin Luo, Chris J. Helms, Chiyu Liu, Qi Sun, Li Wang, Chun Lei, Rich Carson, EMCORE Corp. (USA) . . . . . [8276-02]

Reliability study of 1060nm 25Gbps vcsel in terms of high speed modulation, Toshihito Suzuki, Suguru Imai, Shinichi Kamiya, Koji Hiraiwa, Masaki Funabashi, Yasumasa Kawakita, Hitoshi Shimizu, Takuya Ishikawa, Akihiko Kasukawa, The Furukawa Electric Co., Ltd. (Japan) . . . . . [8276-03]

980-nm VCSELs for optical interconnects at bandwidths beyond 40 Gb/s *(Invited Paper)*, Werner H. Hofmann, Technische Univ. Berlin (Germany) . . . . . [8276-04]

SESSION 2 . . . . . Wed. 10:30 am to 12:30 pm

Novel VCSEL Structures

Session Chair: **Kent D. Choquette,** Univ. of Illinois at Urbana-Champaign (USA)

VCSEL-based slow light photonics: switching, modulation, amplification, and beam steering *(Invited Paper)*, Fumio Koyama, Tokyo Institute of Technology (Japan) . . . . . [8276-05]

Recent advances on CW current injection blue VCSELs *(Invited Paper)*, Shing-Chung Wang, Tien-Chang Lu, Hao-Chung Kuo, National Chiao Tung Univ. (Taiwan) . . . . . [8276-06]

Long-wavelength high-contrast grating VCSEL *(Invited Paper)*, Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA). . . . . [8276-07]

High-power vertical-cavity surface-emitting lasers for solid-state laser pumping *(Invited Paper)*, Jean-Francois Seurin, Guoyang Xu, Alexander Miglo, Qing Wang, Robert Van Leeuwen, Yihan Xiong, Wei-Xiong Zou, Daizong Li, James D. Wynn, Viktor Khalfin, Chuni Ghosh, Princeton Optronics, Inc. (USA) . . . . . [8276-08]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 3 . . . . . Wed. 1:30 to 3:30 pm

Emerging VCSEL Applications

Session Chair: **Jean-Francois Seurin,** Princeton Optronics, Inc. (USA)

Long-wavelength VCSELs for sensing applications *(Invited Paper)*, Markus Ortsiefer, Vertilas GmbH (Germany) . . . . . [8276-09]

Design of high power VCSEL arrays, Holger Moench, Johanna Kolb, Pavel Pekarski, Jens Pollmann-Retsch, Martin Stroesser, Philips Research (Germany); Michael Miller, Philips Technologie GmbH U-L-M Photonics (Germany); Gero Heusler, Raimond Dumoulin, Xi Gu, Armand Pruijmboom, Philips Lighting B.V. (Netherlands) . . . . . [8276-10]

Surface topography and optical performance measurement of microlenses used in high power VCSEL systems, Iris Erichsen, Stefan Krey, TRIOPTICS GmbH (Germany). . . . . [8276-11]

Broadly tunable high repetition rate amplified 1310nm VCSELs for optical coherence tomography *(Invited Paper)*, Vijaysekhar Jayaraman, Praevium Research, Inc. (USA); James Jiang, Thorlabs Inc. (USA); Benjamin Potsaid, Massachusetts Institute of Technology (USA); Alex Cable, Thorlabs Inc. (USA); James Fujimoto, Massachusetts Institute of Technology (USA). . . . . [8276-12]

A compact, portable, and low cost generic interrogation strain sensor system using an embedded VCSEL, detector, and fibre Bragg grating, Graham C. B. Lee, Aston Univ. (United Kingdom); Bram Van Hoe, Univ. Gent (Belgium); Zhijun Yan, Kate Sugden, David Webb, Aston Univ. (United Kingdom); Geert Van Steenberge, Univ. Gent (Belgium) . . . . . [8276-13]

SESSION 4 . . . . . Wed. 4:00 to 6:20 pm

VCSEL Optical Interconnects

Session Chair: **James A. Lott,** VI Systems GmbH (Germany)

1060nm VCSEL development at Furukawa for parallel optical interconnect *(Invited Paper)*, Masaki Funabashi, Suguru Imai, Keishi Takaki, Shinichi Kamiya, Hitoshi Shimizu, Yasumasa Kawakita, Koji Hiraiwa, Junji Yoshida, Toshihito Suzuki, Takuya Ishikawa, Naoki Tsukiji, Akihiko Kasukawa, The Furukawa Electric Co., Ltd. (Japan) . . . . . [8276-14]

Commercial VCSELs and VCSEL arrays designed for FDR (14 Gbps) optical links *(Invited Paper)*, Roger King, Steffan Intemann, Stefan Wabra, Philips Technologie GmbH U-L-M Photonics (Germany) . . . . . [8276-15]

High speed tunable and fixed wavelength VCSELs for short reach optical links and interconnects *(Invited Paper)*, Anders Larsson, Johan Gustavsson, Åsa Haglund, Benjamin Kögel, Petter Westbergh, Erik Haglund, Chalmers Univ. of Technology (Sweden) . . . . . [8276-16]

Bidirectional multimode fiber interconnection *(Invited Paper)*, Rainer Michalzik, Alexander Kern, Dietmar Wahl, Univ. Ulm (Germany) . . . . . [8276-17]

Energy-efficient VCSELs for "green" data and computer communication, Philip Moser, Technische Univ. Berlin (Germany); James A. Lott, VI Systems GmbH (USA); Philip Wolf, Gunter Larisch, Alexey Payusov, Technische Univ. Berlin (Germany); Nikolay N. Ledentsov, Technische Univ. Berlin (USA); Werner Hofmann, Dieter Bimberg, Technische Univ. Berlin (Germany) . . . . . [8276-18]

Thursday 26 January

SESSION 5 . . . . . Thurs. 8:00 to 10:00 am

VCSEL Modal Properties

Session Chair: **Anders Larsson,**
Chalmers Univ. of Technology (Sweden)

Progress on single mode VCSELs for data- and tele-communications *(Invited Paper)*, Nikolay N. Ledentsov, James A. Lott, VI Systems GmbH (Germany) . . . . . [8276-19]

Reducing the spectral width of high speed oxide confined VCSELs using an integrated mode filter, Erik Haglund, Åsa Haglund, Johan Gustavsson, Benjamin Kögel, Petter Westbergh, Anders Larsson, Chalmers Univ. of Technology (Sweden) . . . . . [8276-20]

Planar single mode photonic crystal VCSELs, Kent D. Choquette, Meng Peun Tan, Ansas Matthias Kasten, Joshua Sulkin, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [8276-21]

Mode suppression in metal filled photonic crystal vertical cavity lasers *(Invited Paper)*, Lynford L. Goddard, Benjamin G. Griffin, Univ. of Illinois at Urbana-Champaign (USA). . . . . [8276-22]

Thermal characteristic of polarization switching in vertical-cavity surface-emitting lasers, Yu-Heng Wu, Yueh-Chen Li, Wang-Chuang Kuo, Tsu-Chiang Yen, National Sun Yat-Sen Univ. (Taiwan) . . . . . [8276-23]

SESSION 6 . . . . . Thurs. 10:30 am to 12:10 pm

Tunable VCSELs

Session Chair: **Lynford Goddard,**
Univ. of Illinois at Urbana-Champaign (USA)

Surface micromachined MEMS tunable VCSEL at 1550 nm with >60 nm single mode tuning, Christian Gierl, Technische Univ. Darmstadt (Germany); Tobias Gruendl, Technische Univ. München (Germany); Pierluigi Debernardi, Politecnico di Torino (Italy); Karolina Zogal, Hooman Davani, Technische Univ. Darmstadt (Germany); Christian Grasse, Gerhard Böhm, Walter Schottky Institut (Germany); Franko Küppers, Peter Meissner, Technische Univ. Darmstadt (Germany); Markus-Christian Amann, Walter Schottky Institut (Germany) . . . . . [8276-24]

Integrated MEMS-tunable VCSELs for reconfigurable optical interconnects, Benjamin W. Kögel, Chalmers Univ. of Technology (Sweden); Pierluigi Debernardi, Politecnico di Torino (Italy); Petter Westbergh, Johan S. Gustavsson, Åsa Haglund, Erik Haglund, Jörgen Bengtsson, Anders Larsson, Chalmers Univ. of Technology (Sweden) . . . . . [8276-25]

1.55-µm high-speed MEMS-tunable VCSEL, Karolina Zogal, Technische Univ. Darmstadt (Germany); Tobias Gruendl, Technische Univ. München (Germany); Christian Gierl, Hooman A. Davani, Technische Univ. Darmstadt (Germany); Christian Grasse, Markus-Christian Amann, Walter Schottky Institut (Germany); Franko Kueppers, Peter Meissner, Technische Univ. Darmstadt (Germany) . . . . . [8276-26]

850-nm VCSELs optimized for cryogenic data transmission, Darwin K. Serkland, Kent M. Geib, Gregory M. Peake, Gordon A. Keeler, Alan Y. Hsu, Sandia National Labs. (USA) . . . . . [8276-27]

Polarization investigation of a widely tunable high speed short-wavelength bulk-micromachined MEMS-VCSEL, Hooman Davani, Technische Univ. Darmstadt (Germany); Christian Grasse, Walter Schottky Institut (Germany); Benjamin Kögel, Chalmers Univ. of Technology (Sweden). . . . . [8276-28]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 7 . . . . . Thurs. 1:30 to 3:20 pm

VCSEL Characterization

Session Chair: **Darwin K. Serkland,** Sandia National Labs. (USA)

VCSEL beam control with collective and self-aligned polymer technologies *(Invited Paper)*, Véronique Bardinal, Benjamin Reig, David Barat, Thierry Camps, Lab. d'Analyse et d'Architecture des Systèmes (France); Pierluigi Debernardi, Politecnico di Torino (Italy); Olivier Soppera, Univ. de Haute Alsace (France); Jean-Baptiste Doucet, Emmanuelle Daran, Lab. d'Analyse et d'Architecture des Systèmes (France). . . . . [8276-29]

Impact of photon lifetime on thermal rollover in 850-nm high-speed VCSELs, Prashant P. Baveja, Univ. of Rochester (USA); Benjamin Kögel, Petter Westbergh, Johan S. Gustavsson, Åsa Haglund, Chalmers Univ. of Technology (Sweden); Drew N. Maywar, Rochester Institute of Technology (USA); Govind P. Agrawal, Univ. of Rochester (USA); Anders Larsson, Chalmers Univ. of Technology (Sweden) . . . . . [8276-30]

Multi-mode to single-mode switching caused by self-heating in bottom-emitting intra-cavity contacted 960 nm VCSELs, Sergey A. Blokhin, Connector Optics LLC (Russian Federation) and Ioffe Physico-Technical Institute (Russian Federation) and St. Petersburg Academic Univ. (Russian Federation); Nikolai A. Maleev, Alexander G. Kuzmenkov, Connector Optics LLC (Russian Federation) and Ioffe Physico-Technical Institute (Russian Federation); James A. Lott, VI Systems GmbH (Germany); Marina M. Kulagina, Yurii M. Zadiranov, Ioffe Physico-Technical Institute (Russian Federation); Andrey G. Gladyshev, Connector Optics LLC (Russian Federation) and Ioffe Physico-Technical Institute (Russian Federation); Alexey M. Nadtochiy, St. Petersburg Academic Univ. (Russian Federation) and Ioffe Physico-Technical Institute (Russian Federation); Ekaterina V. Nikitina, St. Petersburg Academic Univ. (Russian Federation); Vladimir G. Tikhomirov, Saint Petersburg Electrotechnical Univ. (Russian Federation); Nikolai N. Ledentsov, VI Systems GmbH (Germany) and Ioffe Physico-Technical Institute (Russian Federation); Viktor M. Ustinov, Ioffe Physico-Technical Institute (Russian Federation) . . . . . [8276-31]

Determination of optical loss in photonic crystal VCSELs, Kent D. Choquette, Dominic Siriani, Hyejin Jeong, Univ. of Illinois at Urbana-Champaign (USA) . . . . . [8276-32]

Implant confined 1850nm VCSELs, Matthew M. Dummer, Klein Johnson, Mary Hibbs-Brenner, William Hogan, Vixar Inc. (USA) . . . . . [8276-33]

Courses of Related Interest

SC1012	Coherent Mid-Infrared Sources and Applications (Vodopyanov) Sunday, 1:30 to 5:30 pm
SC818	Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm
SC747	Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Monday-Thursday 23-26 January 2012 • Proceedings of SPIE Vol. 8277

Novel In-Plane Semiconductor Lasers XI

Conference Chairs: **Alexey A. Belyanin,** Texas A&M Univ. (USA); **Peter M. Smowton,** Cardiff Univ. (United Kingdom)

Program Committee: **Martin Achtenhagen,** Brightline Photonics (USA); **Yasuhiko Arakawa,** The Univ. of Tokyo (Japan); **Dan Botez,** Univ. of Wisconsin-Madison (USA); **Federico Capasso,** Harvard School of Engineering and Applied Sciences (USA); **Claire F. Gmachl,** Princeton Univ. (USA); **Michael Kneissl,** Technische Univ. Berlin (Germany); **Hui Chun Liu,** National Research Council Canada (Canada); **Luke J. Mawst,** Univ. of Wisconsin-Madison (USA); **Jerry R. Meyer,** U.S. Naval Research Lab. (USA); **Jesper Moerk,** Technical Univ. of Denmark (Denmark); **Mario J. Paniccia,** Intel Corp. (USA); **Richard V. Penty,** Univ. of Cambridge (United Kingdom); **Johann Peter Reithmaier,** Univ. Kassel (Germany); **Nelson Tansu,** Lehigh Univ. (USA); **Shinji Tsuji,** Hitachi, Ltd. (Japan)

Monday 23 January

SESSION 1 . . . . . Mon. 8:00 to 10:00 am

New Material and Device Concepts I

Session Chair: **Peter M. Smowton,** Cardiff Univ. (United Kingdom)

Photo-pumped GaAs $_{1-x}$Bi $_x$ lasing operation with low-temperature-dependent oscillation wavelength *(Invited Paper)*, Yoriko Tominaga, Kunishige Oe, Masahiro Yoshimoto, Kyoto Institute of Technology (Japan). . . . . [8277-01]

Characteristics of diode laser structures on silicon substrates based on the Ga(NAsP)/(BGa)(AsP) materials combination, Stephan Rogowsky, Ralf Ostendorf, Gudrun Kaufel, Martina Baeumler, Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Sven Liebich, Martin Zimprich, Kerstin Volz, Wolfgang Stolz, Philipps-Univ. Marburg (Germany); Bernardette Kunert, NAsP III/V GmbH (Germany); Heiko Ranzinger, Edgar Lodermeier, Günther Benstetter, Fachhochschule Deggendorf (Germany) . . . . . [8277-02]

Carrier recombination and band alignment of GaAs$_{1-x}$Bi$_x$ emitters, Nadir Hossain, Igor P. Marko, Shirong Jin, Konstanze Hild, Zahida Batool, Stephen Sweeney, Univ. of Surrey (United Kingdom); Ryan Lewis, Daniel Beaton, Xiangfeng Lu, Thomas Tiedje, Univ. of Victoria (Canada) . . . . . [8277-03]

Electrically driven photonic crystal nanocavity lasers, LEDs, and modulators *(Invited Paper)*, Gary Shambat, Bryan Ellis, Jan Petykiewicz, Arka Majumdar, Stanford Univ. (USA); Marie Mayer, Univ. of California, Berkeley (USA); Tomas Sarmiento, James S. Harris, Jr., Stanford Univ. (USA); Eugene E. Haller, Univ. of California, Berkeley (USA); Jelena Vuckovic, Stanford Univ. (USA) . . . . . [8277-04]

Lateral cavity photonic crystal surface emitting laser with ultralow threshold, Wanhua Zheng, Wenjun Zhou, Yufei Wang, Feiya Fu, Hongwei Qu, Yejin Zhang, Institute of Semiconductors (China). . . . . [8277-05]

SESSION 2 . . . . . Mon. 10:30 am to 12:30 pm

Pushing Performance Limits I

Session Chair: **Shinji Tsuji,** Hitachi, Ltd. (Japan)

High-speed directly modulated buried heterostructure photonic crystal lasers *(Invited Paper)*, Shinji Matsuo, NTT Photonics Labs. (Japan) . . . [8277-06]

Red-emitting diode lasers with internal surface DBR gratings, David Feise, Wilfred John, Gunnar Blume, Ferdinand-Braun-Institut (Germany); Christian Kaspari, LayTec GmbH (Germany); Jörg Fricke, Katrin Paschke, Götz Erbert, Ferdinand-Braun-Institut (Germany) . . . . . [8277-07]

Very narrow linewidth and low frequency noise reduction of high power DFB laser diode for Cs pumping, Charles Cayron, Alcatel-Thales III-V Lab. (France); David Holleville, Observatoire de Paris (France); Michael Tran, Yannick Robert, Alain Enard, Eric Vinet, Michel Garcia, Michel Lecomte, Laurent Teisseire, Olivier Parillaud, Michel Krakowski, Alcatel-Thales III-V Lab. (France); Noel Dimarcq, Observatoire de Paris (France) . . . . . [8277-08]

830nm high power single mode DFB laser for high volume applications, Pierre Doussiere, Mark Tashima, Hery S. Djie, Kong-Weng Lee, Vince Wong, Victor V. Rossin, Erik P. Zucker, JDSU (USA). . . . . [8277-09]

AlGaInAs semi-insulating buried-heterostructure distributed reflector lasers for low-driving-current high-speed direct modulation *(Invited Paper)*, Takasi Simoyama, Manabu Matsuda, Shigekazu Okumura, Ayahito Uetake, Mitsuru Ekawa, Tsuyoshi Yamamoto, Fujitsu Labs., Ltd. (Japan) . . . . . [8277-10]

Lunch Break . . . . . 12:30 to 1:40 pm

SESSION 3 . . . . . Mon. 1:40 to 3:20 pm

Pushing Performance Limits II

Session Chair: **Richard V. Penty,** Univ. of Cambridge (United Kingdom)

Long-wavelength quantum dot FP and DFB lasers for high temperature applications *(Invited Paper)*, Takeo Kageyama, QD Laser Inc. (Japan); Kan Takada, The Univ. of Tokyo (Japan); Kenichi Nishi, QD Laser Inc. (Japan) and The Univ. of Tokyo (Japan); Masaomi Yamaguchi, QD Laser Inc. (Japan); Reio Mochida, QD Laser Inc. (Japan) and The Univ. of Tokyo (Japan); Yasunari Maeda, Hayato Kondo, Keizo Takemasa, QD Laser Inc. (Japan); Yu Tanaka, QD Laser Inc. (Japan) and Fujitsu Labs., Ltd. (Japan); Tsuyoshi Yamamoto, QD Laser Inc. (Japan) and Fujitsu Labs., Ltd. (Japan) and The Univ. of Tokyo (Japan); Mitsuru Sugawara, QD Laser Inc. (Japan) and The Univ. of Tokyo (Japan); Yasuhiko Arakawa, The Univ. of Tokyo (Japan) . . . . . [8277-11]

InAs/InP quantum dot based lasers and effect of optical feedback *(Invited Paper)*, Abderrahim Ramdane, Kamel Merghem, Ricardo Rosales, Sheherazade Azouigui, Ctr. National de la Recherche Scientifique (France); Qin Zou, TELECOM & Management SudParis (France); Anthony Martinez, Ctr. National de la Recherche Scientifique (France); Alain Accard, Francois Lelarge, III-V Lab. (France) . . . . . [8277-12]

Generation of picosecond pulses and optical frequency combs with multi-section 1065nm ridge waveguide diode lasers, Andreas Klehr, Sven Schwertfeger, Armin Liero, Thomas Hoffmann, Jörg Fricke, Hans Wenzel, Götz Erbert, Günther Tränkle, Ferdinand-Braun-Institut (Germany) . . . . . [8277-13]

Mode-locked tapered multi-section quantum-dot laser for high peak power and sub-picosecond pulse generation, Myke Ruiz, Michael Tran, Yannick Robert, Eric Vinet, Michel Krakowski, Alcatel-Thales III-V Lab. (France); Lukas Drzewietzki, Stefan Breuer, Wolfgang E. Elsaesser, Technische Univ. Darmstadt (Germany); Mattia Rossetti, Paolo Bardella, Tianhong Xu, Ivo Montrosset, Politecnico di Torino (Italy); Igor Krestnikov, Daniil A. Livshits, Innolume GmbH (Germany) . . . . . [8277-14]

SESSION 4 . . . . . Mon. 3:50 to 5:50 pm

Nitrides

Session Chair: **Michael Kneissl,** Technische Univ. Berlin (Germany)

Sub-300 nm AlGaN lasers on bulk AlN substrates *(Invited Paper)*, Thomas Wunderer, Christopher L. Chua, Zhihong Yang, John E. Northrup, Palo Alto Research Center, Inc. (USA); Michael Kneissl, Technische Univ. Berlin (Germany); Gregory A. Garrett, Paul H. Shen, Michael Wraback, U.S. Army Research Lab. (USA); Baxter Moody, H. Spalding Craft, Raoul Schlesser, Rafael F. Dalmau, Zlatko Sitar, HexaTech, Inc. (USA); Noble M. Johnson, Palo Alto Research Center, Inc. (USA) . . . . . [8277-15]

(Al,In)GaN laser diodes with optimized ridge structures, Katarzyna A. Holc, Klaus Koehler, Wilfried Pletschen, Joachim Wagner, Ulrich Schwarz, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [8277-16]

Recent development of green and blue InGaN-based laser diodes on nonpolar/semipolar substrates *(Invited Paper)*, Mathew C. Schmidt, Christiane Poblenz, You-Da Lin, Bryan Ellis, Chendong Bai, Paul Rudy, Michael R. Krames, James W. Raring, Soraa, Inc. (USA) . . . . . [8277-17]

Engineering of AlGaN-Delta-GaN quantum wells gain media for mid- and deep-ultraviolet lasers, Jing Zhang, Lehigh Univ. (USA); Hongping Zhao, Case Western Reserve Univ. (USA); Nelson Tansu, Lehigh Univ. (USA) . . . . . [8277-18]

Beyond blue pico laser: development of high power blue and low power direct green, Clemens Vierheilig, Christoph Eichler, Alfred Lell, Jens Müller, Fabian Kopp, Sönke Tautz, Bernhard Stojetz, Georg Brüderl, Adrian Avramescu, Teresa Lermer, Jelena Ristic, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany). . . . . [8277-77]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 5 . . . . . Tues. 10:30 am to 12:10 pm

Quantum Cascade Lasers

Session Chair: **Alexey A. Belyanin,** Texas A&M Univ. (USA)

Quantum cascade lasers as mid-IR frequency combs *(Invited Paper)*, Jérôme Faist, Andreas Hugi, Sabine Riedi, Mattias Beck, ETH Zurich (Switzerland); H. C. Liu, Shanghai Jiao Tong Univ. (China); Stephane Blaser, Alpes Lasers SA (Switzerland). . . . . [8277-20]

Terahertz quantum cascade lasers based on symmetric InGaAs/GaAsSb active regions, Christoph Deutsch, Hermann Detz, Alexander Benz, Aaron M. Andrews, Pavel Klang, Werner Schrenk, Karl Unterrainer, Gottfried Strasser, Technische Univ. Wien (Austria). . . . . [8277-21]

Terahertz intersubband polariton electroluminescence at room temperature, Markus Geiser, Giacomo Scalari, Fabrizio Castellano, Mattias Beck, Jerome Faist, ETH Zurich (Switzerland) . . . . . [8277-22]

Emergence of free carrier absorption in heterostructure devices *(Invited Paper)*, Andreas Wacker, Lund Univ. (Sweden) . . . . . [8277-23]

Lunch/Exhibition Break . . . . . 12:10 to 1:40 pm

SESSION 6 . . . . . Tues. 1:40 to 3:10 pm

Multi-wavelength and Tunable QCLs

Session Chair: **Dan Botez,** Univ. of Wisconsin-Madison (USA)

Multi-wavelength operation of quantum cascade lasers using gratings with an aperiodic basis *(Invited Paper)*, Romain Blanchard, Stefan Menzel, Harvard Univ. (USA); Christian J. Pflügl, Laurent Diehl, EOS Photonics (USA); Yong Huang, Jae-Hyun Ryou, Russell D. Dupuis, Georgia Institute of Technology (USA); Luca Dal Negro, Boston Univ. (USA); Federico Capasso, Harvard Univ. (USA) . . . . . [8277-24]

Quantum cascade laser external cavity tuning solution for 1660 to 720 wavenumbers operation with only three gain blocks, Antoine Muller, Tobias Gresch, Stephane Blaser, Alpes Lasers SA (Switzerland). . . . . [8277-25]

New performance in mode hop-free mid-IR external cavity quantum cascade lasers, Michael Radunsky, Michael B. Pushkarsky, Jenny Pushkarskaya, Eric Kim, David F. Arnone, Timothy Day, Daylight Solutions Inc. (USA) . . . . . [8277-26]

Dual color quantum cascade laser module, Ralf Ostendorf, Christian Schilling, Stefan Hugger, Benno Roesener, Marcel Rattunde, Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [8277-27]

SESSION 7 . . . . . Tues. 3:40 to 5:30 pm

Tunable QCLs and New Designs

Session Chair: **Jerry R. Meyer,** U.S. Naval Research Lab. (USA)

Key design-concepts for mid-infrared and THz quantum-cascade lasers: dual upper-states and indirect pumping *(Invited Paper)*, Masamichi Yamanishi, Tadataka Edamura, Kazuue Fujita, Tatsuo Dougakiuchi, Hamamatsu Photonics K.K. (Japan) . . . . . [8277-28]

Room-temperature watt-level emission at 3.3µm in Sb-free InGaAs-AlAs quantum-cascade lasers, Alfredo Bismuto, Mattias Beck, Jerome Faist, ETH Zurich (Switzerland). . . . . [8277-29]

Broadband continuous-wave tuning of external cavity anticrossed dual-upper-state quantum cascade lasers, Tatsuo Dougakiuchi, Kazuue Fujita, Tadataka Edamura, Masamichi Yamanishi, Shinichi Furuta, Atsushi Sugiyama, Hamamatsu Photonics K.K. (Japan) . . . . . [8277-30]

Tapered active-region mid-infrared quantum cascade lasers for complete suppression of carrier-leakage currents, Dan Botez, Jeremy Kirch, Chun-Chieh Chang, Luke Mawst, Univ. of Wisconsin-Madison (USA). . . . . [8277-31]

Dual-wavelength homogeneous mid-infrared quantum cascade laser, Mohammed I. Hossain, Purdue Univ. (USA); Alexey Belyanin, Texas A&M Univ. (USA); Deborah L. Sivco, A. Michael Sergent, Alcatel-Lucent Bell Labs. (USA); Oana Malis, Purdue Univ. (USA) . . . . . [8277-32]

Wednesday 25 January

SESSION 8 . . . . . Wed. 8:00 to 10:00 am

New Material and Device Concepts II

Session Chair: **Luke J. Mawst,** Univ. of Wisconsin-Madison (USA)

1300-nm InAs/GaAs quantum-dot lasers monolithically grown on Ge and Si substrates for Si photonics *(Invited Paper)*, Hui-Yun Liu, Ting Wang, Andrew C. Lee, Frank Tutu, Francesca Pozzi, Alwyn J. Seeds, Univ. College London (United Kingdom). . . . . [8277-33]

Molecular beam epitaxy grown GaInAsSbBi alloys on GaSb substrates for mid-infrared laser diode applications, Dongsheng Fan, Zhaoquan Zeng, Zhiming M. Wang, Univ. of Arkansas (USA); Shane R. Johnson, Arizona State Univ. (USA); Shui-Qing Yu, Gregory J. Salamo, Univ. of Arkansas (USA) . . . . . [8277-34]

Temperature dependence of 2.3µm and 2.6µm GaInAsSb based BTJ-VCSELs and edge emitting lasers, Barnabas A. Ikyo, Igor P. Marko, Konstanze Hild, Alfred R. Adams, Stephen J. Sweeney, Univ. of Surrey (United Kingdom); Shamsul Arafin, Marcus C. Amann, Technische Univ. München (Germany) . . . . . [8277-35]

Recent progress in lattice-matched Ga(NAsP)-based laser structures monolithically integrated on (001) Si substrate *(Invited Paper)*, Wolfgang Stolz, NAsP III/V GmbH (Germany) . . . . . [8277-36]

Strained confinement layers in InP quantum dot lasers, Stella N. Elliott, Peter M. Smowton, Cardiff Univ. (United Kingdom); Andrey B. Krysa, The Univ. of Sheffield (United Kingdom) . . . . . [8277-37]

SESSION 9 . . . . . Wed. 10:30 am to 12:10 pm

External Cavity

Session Chair: **Johann Peter Reithmaier,** Univ. Kassel (Germany)

Broadband modeless cw semiconductor laser: design and coherence properties, Arnaud Garnache, Univ. Montpellier 2 (France). . . . . [8277-38]

All semiconductor high power fs laser system with variable repetition rate, Jan C. Balzer, Tobias Schlauch, Ruhr-Univ. Bochum (Germany); Thomas Hoffmann, Andreas Klehr, Goetz Erbert, Ferdinand-Braun-Institut (Germany); Martin R. Hofmann, Ruhr-Univ. Bochum (Germany). . . . . [8277-39]

Continuously current-tunable narrow line-width miniaturized external cavity diode laser at 633 nm, Bernd Sumpf, Ahmad Bawamia, Gunnar Blume, Bernd Eppich, Arnim Ginolas, Stefan Spiessberger, Madlen Thomas, Götz Erbert, Ferdinand-Braun-Institut (Germany) . . . . . [8277-40]

High power single mode InGaAsP/InP laser diode for pulse operation, Evgenii Kotelnikov, Alexei Katsnelson, Igor Kudryashov, Princeton Lightwave, Inc. (USA). . . . . [8277-41]

Single transverse mode wide stripe grating coupled surface emitting laser diodes with external volume Bragg grating cavity, George B. Venus, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Oleg V. Smolski, The Univ. of North Carolina at Charlotte (USA); Ivan B. Divliansky, Daniel Ott, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Vadim I. Smirnov, OptiGrate Corp. (USA); Eric G. Johnson, The Univ. of North Carolina at Charlotte (USA); Leonid B. Glebov, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8277-42]

Lunch/Exhibition Break . . . . . 12:10 to 1:40 pm

SESSION 10 . . . . . Wed. 1:40 to 3:20 pm

QCL: Novel Cavities and Mode Coupling

Session Chair: **Romain Blanchard,** Harvard Univ. (USA)

Deformed microcavity for whispering gallery mode lasers with directional emissions *(Invited Paper)*, Qijie Wang, Nanyang Technological Univ. (Singapore) . . . . . [8277-43]

Quantum cascade lasers with active photonic crystal structure for high-average-power operation in a single spatial mode, Jeremy Kirch, Sangho Kim, Luke J. Mawst, Dan Botez, Univ. of Wisconsin-Madison (USA); Thomas Earles, Intraband, LLC (USA). . . . . [8277-44]

Mode locking and phase coherence in quantum cascade lasers *(Invited Paper)*, Alexey A. Belyanin, Aleksander K. Wojcik, Texas A&M Univ. (USA); Pietro Malara, Romain Blanchard, Federico Capasso, Harvard Univ. (USA) . . . . . [8277-45]

Analysis of multiple lateral mode emission of quantum cascade lasers based on near field intensity profiles, Michel Kinzer, Quankui Yang, Stefan Hugger, Marie Brunner, Frank Fuchs, Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [8277-46]

SESSION 11 . . . . . Wed. 3:50 to 5:50 pm

Mid-infrared Lasers

Session Chair: **Gene Tsvid,** AdTech Optics, Inc. (USA)

Room-temperature type-I GaSb-lasers in the 3.0 - 3.6µm wavelength range *(Invited Paper)*, Kristijonas Vizbaras, Augustinas Vizbaras, Alexander Andrejew, Christian Grasse, Stephan Sprengel, Markus-Christian Amann, Walter Schottky Institut (Germany) . . . . . [8277-47]

Optically pumped type-II Mid-IR tunable DFB laser, Xiang He, Steven R. J. Brueck, The Univ. of New Mexico (USA); Ron Kaspi, Air Force Research Lab. (USA) . . . . . [8277-48]

Mid-IR interband cascade lasers operating at very low input powers *(Invited Paper)*, Chul Soo Kim, Chadwick L. Canedy, William W. Bewley, Charles D. Merritt, Joshua Abell, Igor Vurgaftman, Jerry R. Meyer, Mijin Kim, U.S. Naval Research Lab. (USA). . . . . [8277-49]

High performance interband cascade lasers at 3.8 microns, John D. Bruno, John L. Bradshaw, Kevin M. Lascola, Richard P. Leavitt, John T. Pham, Fredrick J. Towner, Maxion Technologies, Inc. (USA); Igor Vurgaftman, Chadwick L. Canedy, William W. Bewley, Chul Soo Kim, Mijin Kim, Charles D. Merritt, Jerry R. Meyer, U.S. Naval Research Lab. (USA). . . . . [8277-50]

Interband photoluminescence in InAs quantum wells, Michael L. Tilton, Ron Kaspi, Andrew Ongstad, Gregory C. Dente, Chi Yang, Air Force Research Lab. (USA) . . . . . [8277-51]

POSTERS-WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Optically pumped mid-infrared in-plane DBR laser, Chi Yang, Ron Kaspi, Michael L. Tilton, Gregory C. Dente, Joesph R. Chavez, Andrew P. Ongstad, Air Force Research Lab. (USA). . . . . [8277-68]

Stacking-layer-number dependence of highly stacked InAs quantum dot laser diodes fabricated using strain-compensation technique, Kouichi Akahane, Naokatsu Yamamoto, Tetsuya Kawanishi, National Institute of Information and Communications Technology (Japan); Sergio Bietti, Univ. degli Studi di Milano-Bicocca (Italy). . . . . [8277-69]

Nonequilibrium Green's function analysis of terahertz quantum cascade laser based on three-well scattering-assisted injection scheme for high temperature operations, Tao Liu, Qijie Wang, Nanyang Technological Univ. (Singapore); Tillmann Kubis, Purdue Univ. (USA) . . . . . [8277-70]

Modeling Distributed-Feedback GaAs-Based and InP-Based Lasers for Computing Coupling Coefficients, Meng-Mu Shih, Univ. of Florida (USA) . . . . . [8277-71]

Direct intensity modulation of three-guide coupled rectangular ring laser having bidirectional lasing characteristics, Doo Gun Kim, Seon Hoon Kim, Hyun Chul Ki, Won-Gun Jang, Dong-Kil Lee, Hyo Jin Kim, Hwe Jong Kim, Korea Photonics Technology Institute (Korea, Republic of); Geum-Yoon Oh, Young-Wan Choi, Chung-Ang Univ. (Korea, Republic of); Nadir Dagli, Univ. of California, Santa Barbara (USA) . . . . . [8277-72]

Measurement of differential carrier lifetime of undoped and modulation p-doped quantum dot lasers, Kejia Zhou, Siming C. Chen, David T. Childs, Richard A. Hogg, The Univ. of Sheffield (United Kingdom). . . . . [8277-73]

Self-pulsation in two-section laser with an air gap, Chien Chung Lin, National Chiao Tung Univ. (Taiwan). . . . . [8277-74]

Current injection and optical pumping characteristic to T-shaped GaAs single quantum wire laser, Changsu Kim, Toshimitsu Mochizuki, Masahiro Yoshita, The Univ. of Tokyo (Japan); Makoto Okano, Kyoto Univ. (Japan); Shaoqiang Chen, Hidefumi Akiyama, The Univ. of Tokyo (Japan). . . . . [8277-75]

Antireflection coatings in semiconductor lasers: effects on power emission and external cavity lasing, Quamrul Huda, John Tulip, Wolfgang Jaeger, Univ. of Alberta (Canada) . . . . . [8277-76]

Thursday 26 January

SESSION 12 . . . . . Thurs. 8:00 to 10:00 am

High Power I

Session Chair: **Gary A. Evans,** Photodigm, Inc. (USA)

Numerical studies of thermal lensing effects on high-CW-power single-spatial-mode diode lasers *(Invited Paper)*, Anatoly P. Napartovich, Nikolay N. Elkin, Dmitry V. Vysotsky, Troitsk Institute for Innovation and Fusion Research (Russian Federation); Dan Botez, Luke J. Mawst, Univ. of Wisconsin-Madison (USA) . . . . . [8277-52]

Near-field evolution in strongly pumped broad area diode lasers, Martin Hempel, Jens W. Tomm, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Martina Bäumler, Helmer Konstanzer, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Jayanta Mukherjee, Univ. of Surrey (United Kingdom); Thomas Elsässer, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) . . . [8277-53]

100,000 h estimated lifetime of 100-µm-stripe width 650 nm broad area lasers at an output power of 1.2 W, Bernd Sumpf, Jörg Fricke, Peter Ressel, Ferdinand-Braun-Institut (Germany); Martin Zorn, JENOPTIK Diode Lab GmbH (Germany); Götz Erbert, Günther Tränkle, Ferdinand-Braun-Institut (Germany) . . . . . [8277-54]

Performance limitation and mitigation of longitudinal spatial hole burning in high-power diode lasers, Zhigang Chen, Ling Bao, John Bai, Mike Grimshaw, Rob J. Martinsen, Mark A. DeVito, Jim Haden, nLIGHT Corp. (USA); Paul O. Leisher, Rose-Hulman Institute of Technology (USA). . . . . [8277-55]

High-power operation of wide-striped InGaN laser diode array *(Invited Paper)*, Katsuya Samonji, Shinji Yoshida, Hiroyuki Hagino, Kazuhiko Yamanaka, Shinichi Takigawa, Panasonic Corp. (Japan) . . . . . [8277-19]

SESSION 13 . . . . . Thurs. 10:30 am to 12:00 pm

High Power II

Session Chair: **Paul O. Leisher,**
Rose-Hulman Institute of Technology (USA)

Wavelength tunable high-power single-mode 1060-nm DBR Lasers *(Invited Paper)*, Jin Li, Dmitri V. Kuksenkov, Wayne Liu, Yabo Li, Nick J. Visovsky, Dragan Pikula, Albert P. Heberle, Gordon C. Brown, Garrett A. Piech, Douglas L. Butler, Chung-En Zah, Corning Incorporated (USA). . . . . [8277-56]

High efficiency laser sources usable for single mode fiber coupling and frequency doubling, Patrick Friedmann, Jeanette Schleife, Marilena Herbstritt, Jürgen Gilly, Márc T. Kelemen, m2k-laser GmbH (Germany) . . . . . [8277-57]

Short pulse generation by Q-switching two section tapered lasers, Pawel Adamiec, Antonio Consoli, Jose Manuel G. Tijero, Ignacio Esquivias, Univ. Politécnica de Madrid (Spain); Sven Schwertfeger, Andreas Klehr, Hans Wenzel, Götz Erbert, Ferdinand-Braun-Institut (Germany). . . . . [8277-58]

Laser diodes with distributed feedback for application as subnanosecond fiber laser seeder, Evgeny A. Zibik, Wolfgang Kaiser, Oclaro, Inc. (Switzerland); Anthony Bertrand, Multitel A.S.B.L. (Belgium); Julien Boucart, Achim Thies, Oclaro, Inc. (Switzerland); Ian Davies, David C. Inder, Christopher Button, Oclaro, Inc. (United Kingdom); Yves Hernandez, Multitel A.S.B.L. (Belgium); Norbert Lichtenstein, Oclaro, Inc. (Switzerland) . . . . . [8277-59]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 14 . . . . . Thurs. 1:30 to 3:00 pm

High-performance and High-power Mid-IR Lasers I

Session Chair: **Qijie Wang,** Nanyang Technological Univ. (Singapore)

Manufacture of high performance quantum cascade lasers with highly strained materials on InP *(Invited Paper)*, Xiaojun Wang, AdTech Optics, Inc. (USA) . . . . . [8277-60]

Low-dissipation continuous-wave mid-infrared emitting DFB quantum cascade lasers, Borislav Hinkov, Alfredo Bismuto, Romain Terazzi, Yargo Bonetti, Mattias Beck, ETH Zurich (Switzerland); Stéphane Blaser, Alpes Lasers SA (Switzerland); Jerome Faist, ETH Zurich (Switzerland) . . . . . [8277-61]

High-power quantum-cascade-laser tapered oscillators at 9.6 microns, Anish K. Goyal, Melissa Spencer, MIT Lincoln Lab. (USA); Stefan Menzel, Harvard School of Engineering and Applied Sciences (USA); Christine A. Wang, Michael K. Connors, Antonio Sanchez, George W. Turner, MIT Lincoln Lab. (USA); Federico Capasso, Harvard School of Engineering and Applied Sciences (USA) . . . . . [8277-62]

Watt-level power from quantum cascade lasers in the second atmospheric window of 8-12 microns, Gene Tsvid, Xiaojun Wang, Jenyu Fan, AdTech Optics, Inc. (USA); Claire F. Gmachl, Princeton Univ. (USA); Mariano Troccoli, AdTech Optics, Inc. (USA). . . . . [8277-63]

SESSION 15 . . . . . Thurs. 3:30 to 4:50 pm

High-performance and High-power Mid-IR Lasers II

Session Chair: **Xiaojun Wang,** AdTech Optics, Inc. (USA)

16 emitters quantum cascade laser phased array, Guy-Mael De Naurois, Mathieu Carras, Bouzid Simozrag, Olivier Patard, Francois Alexandre, Xavier Marcadet, Alcatel-Thales III-V Lab. (France). . . . . [8277-64]

Passive coherent beam combining of quantum-cascade lasers with a Dammann grating, Guillaume Bloom, Christian Larat, Eric Lallier, Gaëlle Lehoucq, Shailendra Bansropun, Mane-Si Laure Lee-Bouhours, Brigitte Loiseaux, Thales Research & Technology (France); Mathieu Carras, Xavier Marcadet, Alcatel-Thales III-V Lab. (France); Gaëlle Lucas-Leclin, Patrick Georges, Lab. Charles Fabry (France) . . . . . [8277-65]

Ultra-low beam divergence and improved efficiency in optically pumped mid-IR lasers, Ron Kaspi, Michael L. Tilton, Andrew P. Ongstad, Gregory C. Dente, Joseph R. Chavez, Chi Yang, Air Force Research Lab. (USA) . . [8277-66]

28-dB gain mid-infrared optical amplification using resonant quantum cascade laser optical amplifier, Xing Chen, Dingkai Guo, David Shyu, Liwei Cheng, Fow-Sen Choa, Univ. of Maryland, Baltimore County (USA); Sudhir B. Trivedi, Brimrose Corp. of America (USA). . . . . [8277-67]

Courses of Related Interest

SC1012 Coherent Mid-Infrared Sources and Applications (Vodopyanov) Sunday, 1:30 to 5:30 pm

SC818 Laser Beam Quality (Paschotta) Sunday, 8:30 am to 12:30 pm

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8278

Tuesday-Thursday 24-26 January 2012 • Proceedings of SPIE Vol. 8278

Light-Emitting Diodes: Materials, Devices, and Applications for Solid State Lighting XVI

Conference Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **Heonsu Jeon,** Seoul National Univ. (Korea, Republic of); **Li-Wei Tu,** National Sun Yat-Sen Univ. (Taiwan)

Conference Co-Chair: **Norbert Linder,** OSRAM Opto Semiconductors GmbH (Germany)

Program Committee: **Gerd Bacher,** Univ. Duisburg-Essen (Germany); **Shoou-Jinn Chang,** National Cheng Kung Univ. (Taiwan); **Mitch M. C. Chou,** National Sun Yat-Sen Univ. (Taiwan); **Michael Heuken,** AIXTRON AG (Germany); **Satoshi Kamiyama,** Meijo Univ. (Japan); **Jong Kyu Kim,** Pohang Univ. of Science and Technology (Korea, Republic of); **Markus Klein,** OSRAM Opto Semiconductors GmbH (Germany); **Michael R. Krames,** Soraa, Inc. (USA); **Hao-Chung Kuo,** National Chiao Tung Univ. (Taiwan); **Kei May Lau,** Hong Kong Univ. of Science and Technology (Hong Kong, China); **Kurt J. Linden,** Spire Corp. (USA); **Hans Nikol,** Philips Lighting B.V. (Netherlands); **Joongseo Park,** LG Electronics Inc. (Korea, Republic of); **E. Fred Schubert,** Rensselaer Polytechnic Institute (USA); **Ross P. Stanley,** Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland)

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 1 . . . . . Tues. 10:30 to 11:45 am

Solid State Lighting and Human Life

Session Chair: **Klaus P. Streubel,** OSRAM GmbH (Germany)

Spectral design flexibility of LED brings better life *(Invited Paper)*, Haiyan Ou, Dennis D. Corell, Peter B. Poulsen, Yiyu Ou, Carsten Dam-Hansen, Paul Michael Petersen, Technical Univ. of Denmark (Denmark); Dan Friis, RGB Lamps (Denmark) . . . . . [8278-01]

Opportunities and risks with blue enhanced light sources, Dieter Lang, OSRAM GmbH (Germany). . . . . [8278-02]

Smart dimming circuit used in solid-state lightings suitable for skygazer, Keiichi Sakai, Kochi Univ. of Technology (Japan) . . . . . [8278-03]

Secondary optical design for safety light curtains, Yu-Hsiang Hsu, Yi-Yung Chen, Jong-Woei A. Whang, National Taiwan Univ. of Science and Technology (Taiwan) . . . . . [8278-04]

Lunch/Exhibition Break . . . . . 11:45 am to 1:30 pm

SESSION 2 . . . . . Tues. 1:30 to 3:30 pm

Novel Substrates for LED Growth

Session Chair: **Kei May Lau,** Hong Kong Univ. of Science and Technology (Hong Kong, China)

High efficient semipolar LEDs with a small droop *(Invited Paper)*, Shuji Nakamura, Univ. of California, Santa Barbara (USA) . . . . . [8278-05]

Towards general lighting with GaN-on-Si *(Invited Paper)*, Alois J. Krost, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . . . [8278-06]

High performance ThinGaN® LED with buried n-contact epitaxially grown on Si(111) substrate *(Invited Paper)*, Peter Stauss, Patrick Rode, Philipp Drechsel, Werner Bergbauer, OSRAM Opto Semiconductors GmbH (Germany); Ulrich Steegmueller, OSRAM Opto Semiconductors Inc. (Germany); S. Fritze, Armin Dadgar, Alois J. Krost, Juergen Christen, Otto-von-Guericke-Univ. Magdeburg (Germany); T. Markurt, T. Schulz, Martin Albrecht, Leibniz-Institut für Kristallzüchtung (Germany) . . . . . [8278-07]

Spontaneous emission characteristics of InGaN quantum wells light-emitting diodes on Ternary InGaN substrates, Jing Zhang, Nelson Tansu, Lehigh Univ. (USA) . . . . . [8278-08]

New MOCVD production platforms for white lighting, Brian Dlugosch, Christof Sommerhalter, AIXTRON, Inc. (USA); Bernd Schineller, Michael Heuken, AIXTRON SE (Germany) . . . . . [8278-09]

SESSION 3 . . . . . Tues. 4:00 to 5:30 pm

Solid State Lighting and Phosphors

Session Chair: **Hans Nikol,** Philips Lighting B.V. (Netherlands)

High performace LED phosphors for the BLU, automobile, and lighting applications *(Invited Paper)*, Cheolsoo Yoon, SAMSUNG Electronics Co., Ltd. (Korea, Republic of). . . . . [8278-10]

Development and optimization of new phosphors for LED-based lighting *(Invited Paper)*, Anant A. Setlur, GE Global Research (USA). . . . . [8278-11]

Cluster LEDs mixing optimization by lens design techniques, Ming-Chin Chien, Chung-Hao Tien, Song-Bor Chiang, National Chiao Tung Univ. (Taiwan) . . . . . [8278-12]

Infrared excited Yb: Er: Y_2O_2S phosphors with intense emission for lighting applications, Gangadharan Ajith Kumar, Madhab Pokhrel, Dhiraj K. Sardar, The Univ. of Texas at San Antonio (USA) . . . . . [8278-13]

Wednesday 25 January

SESSION 4 . . . . . Wed. 8:15 to 10:30 am

Internal Quantum Efficiency and Droop Effect in LEDs I

Session Chair: **E. Fred Schubert,** Rensselaer Polytechnic Institute (USA)

Understanding the relationship between IQE and defects in nitride-based LEDs *(Invited Paper)*, Hiroshi Amano, Nagoya Univ. (Japan) . . . . . [8278-14]

First-principles studies of the causes of droop *(Invited Paper)*, Chris G. Van de Walle, Univ. of California, Santa Barbara (USA); Emmanouil Kioupakis, Univ. of Michigan (USA) . . . . . [8278-15]

Comparative study of efficiency droop in (Al,In)GaN LEDs and laser diodes *(Invited Paper)*, Ulrich Schwarz, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [8278-16]

Effects of polarization-field tuning in GaInN light-emitting diodes, Jiuru Xu, Martin F. Schubert, Di Zhu, Jaehee Cho, E. Fred Schubert, Rensselaer Polytechnic Institute (USA); Hyun-Wook Shim, Cheolsoo Sone, Samsung Electro-Mechanics (Korea, Republic of) . . . . . [8278-17]

Effect of dislocation density on efficiency curves in InGaN/GaN multiple quantum well light-emitting diodes, Yoshiyuki Harada, Toshiki Hikosaka, Shigeya Kimura, Maki Sugai, Hajime Nago, Koichi Tachibana, Naoharu Sugiyama, Shinya Nunoue, Toshiba Corp. (Japan). . . . . [8278-18]

Quantum efficiency characterizations of staggered InGaN quantum wells light-emitting diodes by temperature-dependent electroluminescence measurement, Guangyu Liu, Jonathan D. Poplawsky, Jing Zhang, Volkmar Dierolf, Lehigh Univ. (USA); Hongping Zhao, Case Western Reserve Univ. (USA); Nelson Tansu, Lehigh Univ. (USA) . . . . . [8278-19]

SESSION 5 . . . . . Wed. 11:00 am to 12:00 pm

UV LEDs

Session Chair: **Gerd Bacher,** Univ. Duisburg-Essen (Germany)

Deep UV LEDs with high IQE based on AlGaN alloys with strong band structure potential fluctuations *(Invited Paper)*, Theodore D. Moustakas, The Boston Univ. Photonics Ctr. (USA). . . . . [8278-20]

Influence of QW composition on the efficiency of AlGaN-based LEDs emitting at 350 nm, Thorsten Passow, Richard Gutt, Michael Kunzer, Wilfried Pletschen, Lutz Kirste, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Kamran Forghani, Ferdinand Scholz, Univ. Ulm (Germany); Klaus Köhler, Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [8278-21]

Toward blue emission in ZnO based LED, Bruno Viana, Ecole Nationale Supérieure de Chimie de Paris (France) . . . . . [8278-22]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 6 . . . . . Wed. 1:30 to 3:15 pm

Novel Techniques and Structures for LEDs

Session Chair: **Mitch M. C. Chou,** National Sun Yat-Sen Univ. (Taiwan)

GaN-based microcavity polariton light emitting diodes *(Invited Paper)*, Tien-Chang Lu, Shing-Chung Wang, National Chiao Tung Univ. (Taiwan); Yoshihisa Yamamoto, Stanford Univ. (USA) . . . . . [8278-23]

3D nanostructures for enhanced light extraction in vertical light-emitting diodes *(Invited Paper)*, Jun Ho Son, Jong-Lam Lee, Pohang Univ. of Science and Technology (Korea, Republic of) . . . . . [8278-24]

Optical mode pattern study of GaN LEDs with and without top nano-gratings, Greg Chavoor, Xiaomin Jin, California Polytechnic State Univ., San Luis Obispo (USA); Xing-Xing Fu, Xiang-Ning Kang, Bei Zhang, Guo-Yi Zhang, Peking Univ. (China) . . . . . [8278-25]

Light-emitting diodes with surface gratings of different periods for light extraction, Che-Hao Liao, Cheng-Hung Lin, Horng-Shyang Chen, Chih-Yen Chen, Chieh Hsieh, Po-Han Chang, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan). . . . . [8278-26]

Power enhancement of 380 nm UV-LED with hexagonal pyramid structures by AlN sacrificial layer, Tzu-Chien Hung, Po-Min Tu, Shih-Cheng Huang, Chia-Hui Shen, Chih-Peng Hsu, Advanced Optoelectronic Technology, Inc. (Taiwan) . . . . . [8278-27]

SESSION 7 . . . . . Wed. 3:45 to 5:45 pm

LED Fabrication and Properties I

Session Chair: **Ross P. Stanley,** Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland)

Steps toward understanding the growth and physics of visible group III-N LEDs *(Invited Paper)*, Daniel D. Koleske, Sandia National Labs. (USA) . [8278-28]

Emission efficiency dependence on the overgrown p-GaN thickness in a high-indium InGaN/GaN quantum-well light-emitting diode, Horng-Shyang Chen, Chih-Yen Chen, Che-Hao Liao, Kuang-Yu Chen, Wen-Ming Chang, Jeng-Jie Huang, Yu-Feng Yao, Yean-Woei Kiang, Chih-Chung Yang, National Taiwan Univ. (Taiwan) . . . . . [8278-29]

Glass encapsulation in LED module *(Invited Paper)*, Jau-Sheng Wang, Shun-Yuan Huang, Wei-Chih Cheng, Wood-Hi Cheng, National Sun Yat-Sen Univ. (Taiwan) . . . . . [8278-30]

LED conversion systems: designed for high brightness performance, Alexander Baumgartner, Hailing Cui, Kirstin Petersen, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [8278-31]

Innovative methodology for testing the reliability of LED based systems, Nicola Trivellin, LightCube (Italy); Matteo Meneghini, Gaudenzio Meneghesso, Enrico Zanoni, Univ. degli Studi di Padova (Italy) . . . . . [8278-32]

V-doped AZO thin films and its application on GaN-based LEDs, Yu Shan Wei, Yen-Shuo Liu, Cheng-Yi Liu, National Central Univ. (Taiwan) . . . . [8278-64]

POSTERS-WEDNESDAY. . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Spectroscopic study and white-light simulation in praseodymium-doped fluorogermanate glass as single-phosphor for white LEDs, Artur S. Gouveia-Neto, Nathalia P. Rios, Luciano A. Bueno, Univ. Federal Rural de Pernambuco (Brazil) . . . . . [8278-52]

Characterization of four-color multi-package white light-emitting diodes combined with various green monochromatic phosphor-converted light-emitting diodes, Ji Hye Oh, Keyong Nam Lee, Young Rag Do, Kookmin Univ. (Korea, Republic of). . . . . [8278-53]

Effects of 2D SiO_2 and SiN_x photonic crystal on extracted light from $Y_3Al_5O_{12}:Ce^{3+}$ ceramic plate phosphor, Hoo Keun Park, Jeong Rok Oh, Young Rag Do, Kookmin Univ. (Korea, Republic of) . . . . . [8278-54]

Blue excitability of green $Zn_2SiO_4:Mn^{2+}$ phosphor and its LED application, Hyung Seok Lim, Pukyong National Univ. (Korea, Republic of) . . . . . [8278-55]

Yellow γ-$Ca_2SiO_4:Ce^{3+}$ phosphor for white-light-emitting diode, Ji Hoon Kim, Pukyong National Univ. (Korea, Republic of) . . . . . [8278-56]

Abnormal red-emission $EuSi_2O_2N_2$ phosphors for white-light-emitting diode, Jiang Lan, Pukyong National Univ. (Korea, Republic of). . . . . [8278-57]

Museum lighting for golden artifacts, with low correlated color temperature, high color uniformity and high color rendering index, using diffusing color mixing of red, cyan, and white-light-emitting diodes, Anders Thorseth, Dennis D. Corell, Peter B. Poulsen, Søren S. Hansen, Carsten Dam-Hansen, Technical Univ. of Denmark (Denmark). . . . . [8278-58]

Optimization of light quality from color mixing light-emitting diode systems for general lighting, Anders Thorseth, Technical Univ. of Denmark (Denmark) . . . . . [8278-59]

Light emitting diode in stationary transportation applications: wavelength response to varying temperature, Giuseppe Schirripa Spagnolo, Donato Papalillo, Univ. degli Studi di Roma Tre (Italy). . . . . [8278-60]

Fabrication of random nanostructures for light extraction of organic light-emitting diodes, Jin-Wook Shin, Doo-Hee Cho, Jaehyun Moon, Seongwoo Choi, Jun-Han Han, Chul Woong Joo, Jin Woo Huh, Joohyun Hwang, Electronics and Telecommunications Research Institute (Korea, Republic of); Young Wook Park, Tae Hyun Park, Byeong-Kwon Ju, Korea Univ. (Korea, Republic of); Hye Yong Chu, Jeong-Ik Lee, Electronics and Telecommunications Research Institute (Korea, Republic of). . . . . [8278-61]

Electrical and optical properties of vertical GaN light-emitting diodes with deep-pillar nanostructures, Ki Seob Shin, Jae In Sim, Ho-Myoung An, Korea Univ. (Korea, Republic of); Sejong Oh, Michael Yoo, Verticle Corp. (Korea, Republic of); Tae Geun Kim, Korea Univ. (Korea, Republic of) . . . . . [8278-62]

Efficiency-droop mechanism in vertical red light-emitting diodes using electrical-to-optical impulse responses, Jin-Wei Shi, F. M. Kuo, Che-Wei Lin, Wei Chen, National Central Univ. (Taiwan); Ming-Lun Lee, Southern Taiwan Univ. of Technology (Taiwan); L. J. Yan, Jinn-Kong Sheu, National Cheng Kung Univ. (Taiwan) . . . . . [8278-63]

Dependence of efficiency-droop effect on the location of high indium layer in staggered InGaN quantum wells, Yung-Chi Yao, Yi-Ching Chen, Ya-Ju Lee, National Taiwan Normal Univ. (Taiwan). . . . . [8278-65]

Thursday 26 January

SESSION 8 . . . . . Thurs. 8:30 to 10:00 am

Nanophotonics for Phosphors

Session Chair: **Satoshi Kamiyama,** Meijo Univ. (Japan)

Colloidal quantum dots in lighting and LEDs *(Invited Paper)*, Vladimir Bulovic, Massachusetts Institute of Technology (USA) . . . . . [8278-33]

Quantum dot color converting LED for back light applications *(Invited Paper)*, Eunjoo Jang, Samsung Advanced Institute of Technology (Korea, Republic of) . . . . . [8278-34]

Power conversion and luminous efficiency performance of nanophosphor quantum dots on color-conversion LEDs for high-quality general lighting, Talha Erdem, Sedat Nizamoglu, Hilmi Volkan Demir, Bilkent Univ. (Turkey) . . . . . [8278-35]

Enhanced photoluminescence using photonic crystal phosphors, Kyungtaek Min, Yun-Kyoung Choi, Heonsu Jeon, Seoul National Univ. (Korea, Republic of) . . . . . [8278-36]

SESSION 9 . . . . . Thurs. 10:30 am to 12:00 pm

Nanostructures for LEDs

Session Chair: **Kurt J. Linden,** Spire Corp. (USA)

Near-infrared (1.46 µm) operation of In-rich InGaN-based nanocolumn LEDs *(Invited Paper)*, Katsumi Kishino, Jumpei Kamimura, Kouich Kamiyama, Akihiko Kikuchi, Takuto Suzuki, Sophia Univ. (Japan) . . . . . [8278-37]

Nitride-based devices employing nanotechnology for photon management *(Invited Paper)*, Jr-Hau He, National Taiwan Univ. (Taiwan) . . . . . [8278-38]

Electrically driven nanoarrow array green LED, Jet-Rung Chang, Shih-Pang Chang, National Chiao Tung Univ. (Taiwan); Yuh-Jen Cheng, Academia Sinica (Taiwan); Yi-Chen Chen, Yun-Jing Li, Kuok-Pan Sou, Hao-Chung Kuo, Chun-Yen Chang, National Chiao Tung Univ. (Taiwan) . . . . . [8278-39]

Top-down fabrication of GaN-based nanorod LEDs and lasers, George T. Wang, Qiming Li, Jonathan J. Wierer, Jeffrey J. Figiel, Jeremy B. Wright, Igal Brener, Ting-Shan Luk, Sandia National Labs. (USA) . . . . . [8278-40]

Lunch/Exhibition Break . . . . . 12:00 to 1:20 pm

SESSION 10 . . . . . Thurs. 1:20 to 3:35 pm

Internal Quantum Efficiency and Droop Effect in LEDs II

Session Chair: **Michael R. Krames,** Soraa, Inc. (USA)

The efficiency droop in GaInN light-emitting diodes *(Invited Paper)*, E. Fred Schubert, Jaehee Cho, Rensselaer Polytechnic Institute (USA). [8278-41]

Droop in III-Nitride LEDs: review and recent progress *(Invited Paper)*, Aurelien David, Soraa, Inc. (USA) . . . . . [8278-42]

Simulation of light-emitting diodes for new physics understanding and device design *(Invited Paper)*, Sergey Y. Karpov, Kirill Bulashevich, Oleg Khokhlev, Igor Evstratov, STR Group-Soft Impact Ltd. (Russian Federation) . . . . . [8278-43]

Efficiency droop alleviation of InGaN/GaN blue LEDs with super-lattice active structure, Shih-Pang Chang, Jet-Rung Chang, Yi-Chen Chen, Kuok-Pan Sou, National Chiao Tung Univ. (Taiwan); Hung-Chih Yang, Ta-Cheng Hsu, Epistar Corp. (Taiwan); Hao-Chung Kuo, Chun-Yen Chang, National Chiao Tung Univ. (Taiwan) . . . . . [8278-44]

Investigation of efficiency droop for UV LED with N-type AlGaN layer, Po-Min Tu, Shih-Cheng Huang, Shun-Kuei Yang, Ya-Wen Lin, Tzu-Chien Hung, Chih-Peng Hsu, Advanced Optoelectronic Technology, Inc. (Taiwan) . . [8278-45]

Investigation of optical properties and relative carrier dynamics of various LEDs using time resolved electroluminescence system, Yang-Seok Yoo, Yong-Hoon Cho, KAIST (Korea, Republic of) . . . . . [8278-46]

SESSION 11 . . . . . Thurs. 4:00 to 5:45 pm

LED Fabrication and Properties II

Session Chair: **Jong Kyu Kim,** Pohang Univ. of Science and Technology (Korea, Republic of)

Improved light output power of GaN-based vertical LEDs through efficient current injection and spreading *(Invited Paper)*, Tae-Yeon Seong, Korea Univ. (Korea, Republic of) . . . . . [8278-47]

GaN-based LEDs with air voids prepared by laser scribing and chemical etching *(Invited Paper)*, Shoou-Jinn Chang, National Cheng Kung Univ. (Taiwan) . . . . . [8278-48]

Photoelectrochemical liftoff of patterned sapphire substrate, Chieh Hsieh, Che-Hao Liao, Cheng-Hung Lin, Horng-Shyang Chen, Chih-Yen Chen, Chih-Chung Yang, National Taiwan Univ. (Taiwan). . . . . [8278-49]

GaN epilayer transferring to Cu substrate from sapphire substrate using Ga_2O_3 sacrificial layer, Ray-Hua Horng, Dong-Sing Wuu, Sin-Liang Ou, Hsu-Hung Hsueh, National Chung Hsing Univ. (Taiwan) . . . . . [8278-50]

Cu-electroplating substrate for fabrication of vertical thin-GaN LED structure, Yi-Chin Lin, Cheng-Yi Liu, National Central Univ. (Taiwan). . [8278-51]

Courses of Related Interest

SC052 Light-Emitting Diodes (Schubert) Monday, 8:30 am to 12:30 pm

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8279

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Emerging Liquid Crystal Technologies VII

Conference Chair: **Liang-Chy Chien,** Kent State Univ. (USA)

Conference Co-Chair: **Dirk J. Broer,** Technische Univ. Eindhoven (Netherlands)

Program Committee: **Vladimir G. Chigrinov,** Hong Kong Univ. of Science and Technology (Hong Kong, China); **Harry J. Coles,** Univ. of Cambridge (United Kingdom); **Gregory Philip Crawford,** Univ. of Notre Dame (USA); **Andy Y. Fuh,** National Cheng Kung Univ. (Taiwan); **Otto Wolfgang Haase,** Technische Univ. Darmstadt (Germany); **Jun-ichi Hanna,** Tokyo Institute of Technology (Japan); **Hirotsugu Kikuchi,** Kyushu Univ. (Japan); **Heinz-Siegfried Kitzerow,** Univ. Paderborn (Germany); **Shunsuke Kobayashi,** Tokyo Univ. of Science (Japan); **Seung Hee Lee,** Chonbuk National Univ. (Korea, Republic of); **Antonio Martins Figueiredo Neto,** Univ. de São Paulo (Brazil); **Xiangtong Li,** Oplink Communications, Inc. (USA); **Kristiaan Neyts,** Univ. Gent (Belgium); **Masanori Ozaki,** Osaka Univ. (Japan); **Ci-Ling Pan,** National Tsing Hua Univ. (Taiwan); **Ryo Sakurai,** Bridgestone Corp. (Japan); **Ivan I. Smalyukh,** Univ. of Colorado at Boulder (USA); **Richard L. Sutherland,** Mount Vernon Nazarene Univ. (USA); **Ming Hsien Wu,** Hamamatsu Corp. (USA); **Shin-Tson Wu,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Hiroshi Yokoyama,** Kent State Univ. (USA); **Tae-Hoon Yoon,** Pusan National Univ. (Korea, Republic of)

Sunday 22 January

SESSION 1 . . . . . Sun. 1:30 to 3:30 pm

New Materials and Effects

Session Chair: **Dirk J. Broer,** Technische Univ. Eindhoven (Netherlands)

Electro-optics and optical latching in the SmAPf banana phase *(Invited Paper)*, David M. Walba, Tao Gong, Univ. of Colorado at Boulder (USA); Amaranatha Reddy, PPG Industries (USA); Matthew A. Glaser, Chenhui Zhu, Yongqiang Shen, Noel A. Clark, Univ. of Colorado at Boulder (USA). . . [8279-01]

Pre-organized liquid crystals: biaxial nature of laterally connected dimer *(Invited Paper)*, Isa Nishiyama, DIC Corp. (Japan); Yuka Tabe, Waseda Univ. (Japan); Jun Yamamoto, Yoichi Takanishi, Yoko Ishii, Kyoto Univ. (Japan); Hiroshi Yokoyama, Kent State Univ. (USA). . . . . [8279-02]

High birefringent nematic liquid crystals: compounds and mixtures *(Invited Paper)*, Przemyslaw Kula, Roman S. Dabrowski, Jerzy Dziaduszek, Katarzyna Garbat, Military Univ. of Technology (Poland) . . . . . [8279-03]

Lyotropic chromonic liquid crystals under confinement: monodomain formation and defect dynamics *(Invited Paper)*, Mohan Srinivasarao, Xuxia Yao, Jung O. Park, Georgia Institute of Technology (USA); Alejandro D. Rey, McGill Univ. (Canada) . . . . . [8279-04]

SESSION 2 . . . . . Sun. 4:00 to 6:00 pm

Photonic Crystals

Session Chair: **Ivan Smalyukh,** Univ. of Colorado at Boulder (USA)

Optofluidic tuning of photonic crystal lasers *(Invited Paper)*, Anders Kristensen, Thomas Buss, Mads Brøkner Christiansen, Cameron Smith, Niels Asger Mortensen, Technical Univ. of Denmark (Denmark) . . . . . [8279-05]

Natural photonic crystals: formation, structure, function *(Invited Paper)*, Michael H. Bartl, The Univ. of Utah (USA). . . . . [8279-06]

Liquid crystalline structures for transformation optics *(Invited Paper)*, Oleg D. Lavrentovich, Jie Xiang, Heung-Shik Park, Sergij V. Shiyanovskii, Kent State Univ. (USA); Yurii A. Nastishin, Institute of Physical Optics (Ukraine) . . . . . [8279-07]

Preparation of porous polymer materials for bulky liquid crystal devices *(Invited Paper)*, Toshiaki Nose, Toshifumi Ito, Ryouta Ito, Michinori Honma, Akita Prefectural Univ. (Japan); Takeshi Watanabe, Kenji Ito, Susumu Yanagihara, Yurikogyo Co., Ltd. (Japan). . . . . [8279-08]

Monday 23 January

SESSION 3 . . . . . Mon. 8:00 to 9:00 am

Lasers

Session Chair: **Anders Kristensen,** Technical Univ. of Denmark (Denmark)

Continuous wave mirrorless lasing in cholesteric liquid crystals *(Invited Paper)*, Bahman Taheri, Antonio F. Munoz Flores, AlphaMicron, Inc. (USA); Michael E. McConney, Air Force Research Lab. (USA); Tamas Kosa, P. Luchette, Ludmila Sukhomlinova, AlphaMicron, Inc. (USA); Timothy J. White, Timothy J. Bunning, Air Force Research Lab. (USA). . . . . [8279-09]

Electrically and all-optically controllable random lasers based on dye-doped liquid crystal films *(Invited Paper)*, Chia-Rong Lee, Jia-De Lin, Bo-Yuang Huang, National Cheng Kung Univ. (Taiwan). . . . . [8279-10]

SESSION 4 . . . . . Mon. 9:00 to 10:15 am

Polarizers and Spatial Light Modulators

Session Chair: **Michael J. Escuti,** North Carolina State Univ. (USA)

Recent applications of liquid crystal spatial light modulators *(Invited Paper)*, Le Li, Kent Optronics, Inc. (USA). . . . . [8279-11]

Thin film polarizer based on photo-curable chromonic liquid crystalline solutions *(Invited Paper)*, Hye-Jin Yang, Sora Yoon, Yun-Ju Bae, Chonbuk National Univ. (Korea, Republic of); Seung-Han Shin, Korea Institute of Industrial Technology (Korea, Republic of); Kwang-Un Jeong, Myong-Hoon Lee, Chonbuk National Univ. (Korea, Republic of) . . . . . [8279-12]

Multi-twist retarders for broadband polarization transformation, Ravi K. Komanduri, Jihwan Kim, Kris F. Lawler, Michael J. Escuti, North Carolina State Univ. (USA) . . . . . [8279-13]

SESSION 5 . . . . . Mon. 10:45 am to 12:15 pm

Semiconductors

Session Chair: **Rudolf Zentel,** Johannes Gutenberg Univ. Mainz (Germany)

Liquid crystallinity in organic semiconductors *(Invited Paper)*, Jun-ichi Hanna, Tokyo Institute of Technology (Japan) . . . . . [8279-14]

Binary systems of discotic liquid crystalline semiconductors toward solution-processing thin film devices *(Invited Paper)*, Yo Shimizu, Yukimasa Matsuda, Fabien Nekelson, Yasuo Miyake, National Institute of Advanced Industrial Science and Technology (Japan); Akihiko Fujii, Masanori Ozaki, Osaka Univ. (Japan) . . . . . [8279-15]

Directed assembly and in situ manipulation of semiconductor quantum dots in liquid crystal matrices *(Invited Paper)*, Sayantani Ghosh, Univ. of California, Merced (USA). . . . . [8279-16]

Lunch Break . . . . . 12:15 to 1:15 pm

SESSION 6 . . . . . Mon. 1:15 to 3:00 pm

Tunable Filters

Session Chair: **Bahman Taheri,** AlphaMicron, Inc. (USA)

Characterization and applications of liquid crystals in the THz frequency range *(Invited Paper)*, Ci-Ling Pan, National Tsing Hua Univ. (Taiwan); Ru-Pin Pan, National Chiao Tung Univ. (Taiwan) . . . . . [8279-17]

Magnetically tunable metallic photonic crystals infiltrated with liquid crystal in terahertz range *(Invited Paper)*, Chih-Chang Shih, Yow-Gwo Wang, Hsin-Ying Wu, Tsung-Ta Tang, Chia-Jen Lin, National Chiao Tung Univ. (Taiwan); Ci-Ling Pan, National Tsing Hua Univ. (Taiwan); Ru-Pin Pan, National Chiao Tung Univ. (Taiwan). . . . . [8279-18]

Thermally responsive polymer/liquid crystal gels exhibiting large scale color changing in cholesterics *(Invited Paper)*, Lalgudi E. Natarjan, Michael E. McConney, Madeline Dunning, Vincent P. Tondiglia, Timothy J. White, Timothy J. Bunning, Air Force Research Lab. (USA). . . . . [8279-19]

Observation of PDLCs by SHG laser scanning microscopy using a liquid crystal vector beam generator, Ayano Tanabe, Makoto Kurihara, Yuka Saito, Nobuyuki Hashimoto, Citizen Holdings Co. Ltd. (Japan); Yuichi Kozawa, Shunichi Sato, Tohoku Univ. (Japan); Terumasa Hibi, Tomomi Nemoto, Hokkaido Univ. (Japan) . . . . . [8279-20]

SESSION 7 . . . . . Mon. 3:30 to 6:00 pm

Actuators and Sensors

Session Chair: **Mohan Srinivasarao,**
Georgia Institute of Technology (USA)

A continous flow synthesis of micrometer sized actuators from liquid crystalline elastomers *(Invited Paper)*, Rudolf Zentel, Christian Ohm, Eva Fleischmann, Johannes Gutenberg Univ. Mainz (Germany); Christophe A. Serra, Univ. de Strasbourg (France). . . . . [8279-21]

Switchable and responsive liquid crystal-functionalized microfibers produced via coaxial electrospinning *(Invited Paper)*, Jan P. F. Lagerwall, Seoul National Univ. (Korea, Republic of) . . . . . [8279-22]

Thermal conductivity of native and oxidized lyotropic-like low-density lipoprotein solutions studied by using the Z-scan technique *(Invited Paper)*, Priscila Santos, Andrea Monteiro, Antonio Figueiredo Neto, Univ. de São Paulo (Brazil) . . . . . [8279-23]

Photo-responsive surface topology in chiral nematic media *(Invited Paper)*, Danqing Liu, Dirk Broer, Jaap den Toonder, Technische Univ. Eindhoven (Netherlands) . . . . . [8279-24]

The activated morphology of grain boundaries in nematic solid sheets *(Invited Paper)*, Carl Modes, Univ. of Cambridge (United Kingdom). . . . [8279-25]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

SESSION 8 . . . . . Tues. 10:30 am to 12:00 pm

Nonlinear Optics and Beam Steering Devices

Session Chair: **Le Li,** Kent Optronics, Inc. (USA)

All-optical nonlinear photonic liquid crystal devices *(Invited Paper)*, Andrey E. Miroshnichenko, The Australian National Univ. (Australia); Etienne Brasselet, Univ. Bordeaux 1 (France); Yuri Kivshar, The Australian National Univ. (Australia) . . . . . [8279-26]

Laser beam steering (and beyond) with polarization gratings: review and prospects *(Invited Paper)*, Matthew N. Miskiewicz, Jihwan Kim, Michael J. Escuti, North Carolina State Univ. (USA). . . . . [8279-27]

Electrical tuning of index-guiding photonic liquid crystal fibers, Slawomir Ertman, Tomasz R. Wolinski, Warsaw Univ. of Technology (Poland) . . . [8279-28]

Threshold-less liquid crystal reorientation under a strong focalized optical field for optical manipulation, Francesco Aieta, Univ. Politecnica delle Marche (Italy) and Harvard Univ. (USA); Francesco Simoni, Univ. Politecnica delle Marche (Italy) . . . . . [8279-29]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 9 . . . . . Tues. 1:30 to 2:45 pm

Blue Phases and Displays

Session Chair: **Jan P. F. Lagerwall,**
Martin-Luther Univ. Halle-Wittenberg (Germany)

Simulation of a cholesteric blue phase in a thin cell: exotic defect structures and their response to an electric field *(Invited Paper)*, Jun-ichi Fukuda, National Institute of Advanced Industrial Science and Technology (Japan); Slobodan Zumer, Univ. of Ljubljana (Slovenia) . . . [8279-30]

Novel materials for polymer-stabilized blue phase *(Invited Paper)*, Michael Wittek, Merck KGaA (Germany). . . . . [8279-31]

Electro-optic and photonic properties of aerosils-dispersed blue phase liquid crystals, Jeoung-Yeon Hwang, Liang-Chy Chien, Kent State Univ. (USA) . . . . . [8279-32]

SESSION 10 . . . . . Tues. 3:15 to 4:45 pm

Self-assembly of Photonic Materials

Session Chair: **Oleg D. Lavrentovich,** Kent State Univ. (USA)

Anomalous deformation of smectic bubbles under DC electric field *(Invited Paper)*, Yuka Tabe, Waseda Univ. (Japan) . . . . . [8279-33]

Shape-controlled self-assembly of plasmonic colloidal nanoparticles and microparticles in liquid crystals *(Invited Paper)*, Julian S. Evans, Bohdan Senyuk, Ivan Smalyukh, Univ. of Colorado at Boulder (USA) . . . . . [8279-34]

Defect-driven structures for self-assembly *(Invited Paper)*, Mark J. Bowick, Syracuse Univ. (USA) . . . . . [8279-35]

SESSION 11 . . . . . Tues. 4:45 to 6:15 pm

Liquid Crystal Alignment

Session Chair: **Tae-Hoon Yoon,**
Pusan National Univ. (Korea, Republic of)

Photoalignment and photopatterning in liquid crystal photonics *(Invited Paper)*, Vladimir G. Chigrinov, Hong Kong Univ. of Science and Technology (Hong Kong, China) . . . . . [8279-36]

Controlling the alignment of liquid crystals by nanoparticle-doped and UV-treated polyimide alignment films *(Invited Paper)*, Shie-Chang Jeng, National Chiao Tung Univ. (Taiwan); Shug-June Hwang, National United Univ. (Taiwan); Tai-An Chen, Han-Shiang Liu, National Chiao Tung Univ. (Taiwan) . . . . [8279-37]

New developments in nanoparticle-liquid crystal composites: from magic-sized semiconductor nanoclusters to alignment pattern formation by nanoparticle stencilling *(Invited Paper)*, Javad Mirzaei, Ryan Sawatzky, Univ. of Manitoba (Canada); Martin Urbanski, Univ. Paderborn (Germany); Anshul Sharma, Univ. of Manitoba (Canada); Kui Yu, National Research Council Canada (Canada); Heinz S. Kitzerow, Univ. Paderborn (Germany); Torsten Hegmann, Univ. of Manitoba (Canada). . . . . [8279-38]

Conference 8279

Wednesday 25 January

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Tunable multi-spatial frequency optical profilometry using single liquid crystal cell with micro-pinhold array, Hak-Rin Kim, Kyung-Il Joo, Chang-sub Park, Kyung-Woo Park, Min-Kyu Park, Hee Yeon Noh, Shin-Won Kang, Kyungpook National Univ. (Korea, Republic of) . . . . . [8279-39]

Synthesis and mesomorphism of new 2-methoxy-3-cyanopyridine mesogens, Airody V. Adhikari, National Institute of Technology, Karnataka (India) . . . . . [8279-40]

Analysis of nanoparticles in controlling the vertical alignment of nematic liquid crystals, Amit Choudhary, Guoqiang Li, Univ. of Missouri-St. Louis (USA) . . . . . [8279-41]

Characterization of a PDLC mixed with crystal violet dye, José Fabián Villa-Manríquez, Mauricio Ortiz-Gutiérrez, Univ. Michoacana de San Nicolás de Hidalgo (Mexico); Mario Pérez-Cortés, Univ. Autónoma de Yucatán (Mexico); Juan Carlos Ibarra-Torres, Univ. de Guadalajara (Mexico); Arturo Olivares-Pérez, Manuel Jorge Ordoñez-Padilla, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [8279-42]

Tunable optical filter based on nanocomposite (liquid crystal)/(porous silicon), Georgiy V. Tkachenko, Kharkov National Univ. of Radio Electronics (Ukraine); Igor A. Sukhoivanov, Univ. de Guanajuato (Mexico); Oleksiy V. Shulika, Kharkov National Univ. of Radio Electronics (Ukraine); Volodymyr Tkachenko, Univ. degli Studi di Napoli Federico II (Italy) . . . . . [8279-43]

Pretile angle control of liquid crystal from homogeneous to homeotropic alignment using photocurable pre-polymer, Daeseung Kang, Jeong-Hun Lee, Soongsil Univ. (Korea, Republic of) . . . . . [8279-44]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Wednesday-Thursday 25-26 January 2012 • Proceedings of SPIE Vol. 8280

Advances in Display Technologies II

Conference Chairs: **Liang-Chy Chien,** Kent State Univ. (USA); **Sin-Doo Lee,** Seoul National Univ. (Korea, Republic of); **Ming Hsien Wu,** Hamamatsu Corp. (USA)

Program Committee: **Karlheinz Blankenbach,** Pforzheim Univ. (Germany); **Pierre M. Boher,** ELDIM (France); **Cheng-Huan Chen,** National Tsing Hua Univ. (Taiwan); **Chin Hsin Chen,** National Chiao Tung Univ. (Taiwan); **Janglin Chen,** Industrial Technology Research Institute (Taiwan); **Jurgen Daniel,** Palo Alto Research Center, Inc. (USA); **Paul S. Drzaic,** Apple Inc. (USA); **Mark Fihn,** Veritas et Visus (USA); **Norbert Fruehauf,** Univ. Stuttgart (Germany); **Nobuyuki Hashimoto,** Citizen Holdings Co. Ltd. (Japan); **Klaus Hecker,** Verband Deutscher Maschinen-und Anlagenbau e. V. (Germany); **Jason C. Heikenfeld,** Univ. of Cincinnati (USA); **Alex Henzen,** IRX-Innovations B.V. (Netherlands); **Yi-Pai Huang,** National Chiao Tung Univ. (Taiwan); **Koichi Kanzaki,** Consultant (Japan); **Takashi Kitamura,** Chiba Univ. (Japan); **Byoungho Lee,** Seoul National Univ. (Korea, Republic of); **Kars-Michiel H. Lenssen,** Philips Research Nederland B.V. (Netherlands); **Keith Rollins,** DuPont Teijin Films U.K. Ltd. (United Kingdom); **Ryo Sakurai,** Bridgestone Corp. (Japan); **Robert A. Sprague,** SiPix Imaging Inc. (USA); **Andrew J. Steckl,** Univ. of Cincinnati (USA); **Christopher Williams,** Logystyx UK Ltd. (United Kingdom); **Pochi Yeh,** Univ. of California, Santa Barbara (USA); **Tae-Hoon Yoon,** Pusan National Univ. (Korea, Republic of)

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

TECHNICAL GROUP . . . . . Tues. 7:30 to 9:00 pm

Holography

Session Chair: **Hans I. Bjelkhagen,** Glyndwr Univ. (United Kingdom) and Technium OpTIC (United Kingdom)

The Holography Technical Group is involved with the whole record of research, engineering, recording materials, and applications of holography. The main fields of interest are display holograms, commercial and artistic, holographic optical elements (HOEs), holographic interferometry and holographic non-destructive testing (HNDT), computer-generated holography (CGH), electro and digital holography, holographic microscopy, and holographic data storage (HDS).

This meeting will focus on recent developments and directions, in particular, in regard to new materials, color display holography, digital holography, CGHs and HOEs.

Wednesday 25 January

SESSION 1 . . . . . Wed. 8:30 to 10:10 am

Projection Displays I

Session Chair: **Ming Hsien Wu,** Hamamatsu Corp. (USA)

Recycling of light in LEDs with brightness increase and etendue reduction *(Invited Paper)*, Kenneth K. Li, Wavien, Inc. (USA) . . . . . [8280-01]

Arc lamps for high power digital projection, Kenneth K. Li, George X. Ouyang, Wavien, Inc. (USA) . . . . . [8280-02]

MgO:PPLN based green lasers for portable laser projectors, Yang Lu, Qingyang Xu, C2C Link Corp. (Canada); Yi Gan, Chang-Qing Xu, McMaster Univ. (Canada) . . . . . [8280-03]

MgO:PPLN frequency doubling optical chips for green light generation: from lab research to mass production *(Invited Paper)*, Chang-Qing Xu, Yi Gan, Jian Sun, McMaster Univ. (Canada) . . . . . [8280-04]

SESSION 2 . . . . . Wed. 10:40 am to 12:10 pm

LC Technologies I

Session Chair: **Vladimir G. Chigrinov,** Hong Kong Univ. of Science and Technology (Hong Kong, China)

Fast switching liquid crystal display modes *(Invited Paper)*, Lachezar Komitov, Göteborg Univ. (Sweden); Gurumurthy Hegde, Univ. Malaysia Pahang (Malaysia). . . . . [8280-05]

Unusually large surface electroclinic effects in liquid crystals and the implications for ferroelectric liquid crystal displays *(Invited Paper)*, Karl Saunders, California Polytechnic State Univ., San Luis Obispo (USA) . . [8280-06]

Dual mode operation of a splay liquid crystal device stabilized by polymer walls *(Invited Paper)*, Jung-Wook Kim, Dong Han Song, Min-Gyeong Jo, Ki-Han Kim, Ji-Hoon Lee, Tae-Hoon Yoon, Pusan National Univ. (Korea, Republic of) . . . [8280-07]

Lunch/Exhibition Break . . . . . 12:10 to 1:40 pm

SESSION 3 . . . . . Wed. 1:40 to 3:20 pm

3D Displays

Session Chair: **Ming Hsien Wu,** Hamamatsu Corp. (USA)

A fast-switching contrast-enhanced liquid crystal polarization modulator for high-end single-lens stereoscopic 3D projector applications *(Invited Paper)*, Jesper Osterman, LC-Tec Displays AB (Sweden); Chris Ward, Lightspeed Design, Inc. (USA); Terry Scheffer, Motif, Inc. (USA) . . . . . [8280-08]

Optical characterization of different types of 3D displays *(Invited Paper)*, Pierre M. Boher, Thierry Leroux, Thibault Bignon, ELDIM (France) . . . . [8280-09]

Effect of Petzval curvature in integral imaging display, Ganbat Baasantseren, Lodoiravsal Choimoo, National Univ. of Mongolia (Mongolia); Jae-Hyeung Park, Chungbuk National Univ. (Korea, Republic of) . . . . . [8280-10]

Three-dimensional floating display by a concave cylindrical mirror and rotational wedge prisms, Gilbae Park, Jonghyun Kim, Keehoon Hong, Byoungho Lee, Seoul National Univ. (Korea, Republic of) . . . . . [8280-11]

SESSION 4 . . . . . Wed. 3:50 to 4:50 pm

Projection Displays II

Session Chair: **Chin Hsin Chen,** National Chiao Tung Univ. (Taiwan)

Performance of correlated speckle patterns for speckle reduction in laser projectors, Sigbjørn V. Egge, Ulf L. Österberg, Astrid Aksnes, Norwegian Univ. of Science and Technology (Norway) . . . . . [8280-12]

High luminance tapered diode lasers for flying-spot display applications, Gunnar Blume, David Feise, Ferdinand-Braun-Institut (Germany); Christian Kaspari, LayTec AG (Germany); Alexander Sahm, Katrin Paschke, Ferdinand-Braun-Institut (Germany) . . . . . [8280-13]

Collimation of asymmetric laser diode at 405 nm using multimode fiber for speckle reduction through diffractive diffusers, Weston Thomas, Christopher Middlebrook, Michigan Technological Univ. (USA) . . . . . [8280-14]

SESSION 5 . . . . . Wed. 4:50 to 5:50 pm

LC Technologies II

Session Chair: **Tae-Hoon Yoon,**
Pusan National Univ. (Korea, Republic of)

Vertical-field-driven polymer-stabilized blue-phase liquid crystal display mode by using two prism sheets for lower operating voltage, higher brightness, and hysteresis-free switching, Hak-Rin Kim, Yong-Hun Kim, Kyungpook National Univ. (Korea, Republic of); Sung-Taek Hur, Kyung Hee Univ. (Korea, Republic of); Ji-Sub Park, Do Hyuk Park, Kyungpook National Univ. (Korea, Republic of); Suk-Won Choi, Kyung Hee Univ. (Korea, Republic of) . . . . . [8280-15]

Temperature independent low voltage polymer stabilized blue phase liquid crystalline, Emine Kemiklioglu, Kent State Univ. (USA) . . . . . [8280-16]

Pixel structure for higher optical efficiency in the patterned vertical alignment LC mode, Byung Wok Park, Eun-Young Jeon, Ki-Han Kim, Jung-Wook Kim, Dong Han Song, Ji-Hoon Lee, Tae-Hoon Yoon, Pusan National Univ. (Korea, Republic of); Gak Seok Lee, Ki-Chul Shin, Hee Seop kim, Samsung Electronics Co., Ltd. (Korea, Republic of) . . . . . [8280-17]

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Flexible signboards based on optical waveguides, Suntak Park, Min-Su Kim, Seung Koo Park, Ki-Uk Kyung, Electronics and Telecommunications Research Institute (Korea, Republic of) . . . . . [8280-28]

Volume diffraction of nanostructured optical media, Seunghoon Han, Wan Joo Maeng, Chang-Gyun Shin, Hong-Seok Lee, Sangyoon Lee, Samsung Advanced Institute of Technology (Korea, Republic of) . . . . . [8280-29]

Extremely simple holographic projection of color images, Michal Makowski, Izabela Ducin, Karol Kakarenko, Andrzej Kolodziejczyk, Maciej Sypek, Warsaw Univ. of Technology (Poland) . . . . . [8280-30]

Polymer waveguide technology for flexible display applications, Ichiro Fujieda, Yuuto Okuda, Ritsumeikan Univ. (Japan) . . . . . [8280-31]

Thursday 26 January

SESSION 6 . . . . . Thurs. 8:00 to 9:20 am

Backlight Units

Session Chair: **Pierre M. Boher,** ELDIM (France)

Strategy for developing high efficiency backlight module for LCD *(Invited Paper)*, Cheng-Huan Chen, Po-Hung Yao, National Tsing Hua Univ. (Taiwan) . . . . . [8280-18]

Modernizing the technology for controlling light, both laser and broadband, with diffractive waveplates *(Invited Paper)*, Nelson Tabiryan, Sarik R. Nersisyan, Svetlana V. Serak, BEAM Engineering for Advanced Measurements Co. (USA); Timothy J. White, Timothy J. Bunning, Air Force Research Lab. (USA); Diane M. Steeves, Brian R. Kimball, U.S. Army Natick Soldier Research, Development and Engineering Ctr. (USA) . . . . . [8280-19]

Integrated optical means based on waveguide for hologram recording, Kyungsuk P. Pyun, Samsung Advanced Institute of Technology (Korea, Republic of); Andrew A. Putilin, P.N. Lebedev Physical Institute (Russian Federation); Alexander Morozov, Samsung Electronics Co., Ltd. (Russian Federation); GeeYoung Sung, Sangyoon Lee, Samsung Advanced Institute of Technology (Korea, Republic of) . . . . . [8280-20]

SESSION 7 . . . . . Thurs. 9:20 am to 12:40 pm

Emerging Devices and Applications

Session Chair: **Andrew J. Steckl,** Univ. of Cincinnati (USA)

Design and implementation of wearable head-up display for mobile phone applications, Yuzuru Takashima, Toan Tran, Lambertus Hesselink, Stanford Univ. (USA) . . . . . [8280-21]

Transfer-printing of colloidal quantum dots for full-color light-emitting display *(Invited Paper)*, Byoung Lyong Choi, Tae-Ho Kim, Kyung-Sang Cho, Eun Kyung Lee, Jung Woo Kim, Sang Yoon Lee, Jong Min Kim, Samsung Advanced Institute of Technology (Korea, Republic of) . . . . . [8280-22]

Designing low permeability optical grade silicone systems, Michelle Velderrain, NuSil Technology LLC (USA) . . . . . [8280-23]

Versatile electrowetting display arrays: from small to large pixels on fixed and flexible substrates, Han You, Andrew J. Steckl, Univ. of Cincinnati (USA) . . . . . [8280-24]

Electrically-tunable optical zoom system using liquid crystal lenses *(Invited Paper)*, Yi-Hsin Lin, Ming-Syuan Chen, Hung-Chun Lin, National Chiao Tung Univ. (Taiwan) . . . . . [8280-25]

A thin porous substrate using bonded particles for reverse-emulsion electrophoretic displays, Sang-Joon J. Lee, San Jose State Univ. (USA); Mateusz Bryning, Remy Cromer, Zikon, Inc. (USA); Manuel Ahumada, Michelle Hartono, San Jose State Univ. (USA) . . . . . [8280-26]

High performance natural semiconductors for green organic electronics development *(Invited Paper)*, Mihai Irimia-Vladu, Eric D. Glowacki, Gundula Voss, Lucia Leonat, Günther Schwabegger, Marius Bodea, Helmut Sitter, Siegfried G. Bauer, Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria) . . . . . [8280-27]

Courses of Related Interest

SC011 Design of Efficient Illumination Systems (Cassarly) Monday, 1:30 to 5:30 pm

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8281

Sunday-Wednesday 22-25 January 2012 • Proceedings of SPIE Vol. 8281

Practical Holography XXVI: Materials and Applications

Conference Chairs: **Hans I. Bjelkhagen,** Glyndwr Univ. (United Kingdom); **V. Michael Bove, Jr.,** MIT Media Lab. (USA)

Program Committee: **Gerald L. Heidt,** Wasatch Photonics, Inc. (USA); **Fujio Iwata,** Toppan Printing Co., Ltd. (Japan); **Tung H. Jeong,** Lake Forest College (USA); **Raymond K. Kostuk,** The Univ. of Arizona (USA); **Gaylord E. Moss,** MossOptics (USA); **Albert O. Okorogu,** The Aerospace Corp. (USA); **Nadya O. Reingand,** CeLight, Inc. (USA); **Martin J. Richardson,** De Montfort Univ. (United Kingdom); **Chris Slinger,** QinetiQ Ltd. (United Kingdom); **Fred D. Unterseher,** Columbia Career Ctr. (USA); **Ichirou Yamaguchi,** RIKEN (Japan); **Toyohiko Yatagai,** Utsunomiya Univ. (Japan)

Sunday 22 January

SESSION 1 . . . . . Sun. 8:30 to 10:10 am

Materials

PVA glue as a recording holographic medium, Santa Toxqui-López, Arturo Olivares-Pérez, Bernardina Pinto-Iguanero, Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [8281-01]

Photosensitive holographic material with a medium of fluorescent ink, Arturo Olivares-Pérez, Santa Toxqui-López, Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Mauricio Ortiz-Gutiérrez, Gabriel Mellado-Villaseñor, Univ. Michoacana de San Nicolás de Hidalgo (Mexico). . . . . [8281-02]

Photochromic materials for holography: issues and constraints, Andrea Bianco, Giorgio Pariani, INAF - Osservatorio Astronomico di Brera (Italy); Rossella Castagna, Chiara Bertarelli, Politecnico di Milano (Italy) . . . . . [8281-03]

Performances of new green sensitive liquid photopolymers for volume phase holographic gratings, Alessio Zanutta, Andrea Bianco, Giorgio Pariani, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [8281-04]

Holograms with nitrocellulose and $FeCl_3$, Valentin Dorantes-Garcia, Arturo Olivares-Pérez, Manuel Jorge Ordóñez-Padilla, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [8281-05]

SESSION 2 . . . . . Sun. 10:40 am to 12:20 pm

Digital Holography and Scene Capture I

Wide viewing-zone-angle hologram generation using phase-shift hologram capturing method for holographic media communications, Ryutaro Oi, Yasuyuki Ichihashi, Kenji Yamamoto, Takanori Senoh, Taiichiro Kurita, National Institute of Information and Communications Technology (Japan). . . . . [8281-06]

Measurements of accommodation responses to horizontally scanning holographic display, Masahito Yokouchi, Yasuhiro Takaki, Tokyo Univ. of Agriculture and Technology (Japan) . . . . . [8281-07]

Depth perception and user interface in digital holographic television, James Barabas, Sundeep Jolly, Daniel E. Smalley, V. Michael Bove, Jr., MIT Media Lab. (USA) . . . . . [8281-08]

Transmission of hologram data and 3D image reconstruction using white LED light, Koki Sato, Masataka Tozuka, Shonan Institute of Technology (Japan); Kunihiko Takano, Tokyo Metropolitan College of Industrial Technology (Japan); Makoto Ohki, Shonan Institute of Technology (Japan) . . . . . [8281-09]

Across light and through colour, Maria Isabel Azevedo, De Montfort Univ. (United Kingdom). . . . . [8281-10]

Lunch Break . . . . . 12:20 to 1:50 pm

SESSION 3 . . . . . Sun. 1:50 to 5:00 pm

Digital Holography and Scene Capture II

Instantaneous shape measurement of moving surface with high accuracy by one-shot digital holography, Kunihiro Sato, Yoshihide Iwayama, Univ. of Hyogo (Japan) . . . . . [8281-11]

Real-time recording and reconstruction of moving 3D images using electronic holography, Kazutoshi Furuichi, Kunihiro Sato, Univ. of Hyogo (Japan). . . . . [8281-12]

Full parallax computer generated hologram using GPU-accelerated ray tracing method, Tsubasa Ichikawa, Yuji Sakamoto, Hokkaido Univ. (Japan) . . . . . [8281-13]

Multi-color full field imaging in low coherence digital holographic microscopy, Zahra Monemhaghdoust, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Frederic Montfort, Yves Emery, Lyncée Tec SA (Switzerland); Christian Depeursinge, Christophe Moser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [8281-14]

Ray-casting CRT algorithm for holographic 3D display with full parallax occlusion effect, Xinan Liang, Yuechao Pan, Xuewu Xu, A*STAR - Data Storage Institute (Singapore) . . . . . [8281-15]

Shading of holographic reconstructed image by two-dimensional amplitude modulation of zone plates, Takayuki Kurihara, Yasuhiro Takaki, Tokyo Univ. of Agriculture and Technology (Japan) . . . . . [8281-16]

A hard-threshold based sparse inverse imaging algorithm for optical scanning holography reconstruction, Fengjun Zhao, Xiaochao Qu, Xidian Univ. (China); Xing Zhang, Institute of Automation (China); Ting-Chung Poon, Virginia Polytechnic Institute and State Univ. (USA); Jimin Liang, Xidian Univ. (China) . . . . . [8281-17]

Phase retrieval of THz radiation using set of 2D spatial intensity measurements with different wavelengths, Nikolay V. Petrov, Victor G. Bespalov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) . . . . . [8281-18]

Monday 23 January

SESSION 4 . . . . . Mon. 8:00 to 10:20 am

Applications in Storage, Printing, and Optics

Applying field mapping refractive beam shapers to improve holographic techniques, Alexander V. Laskin, Vadim Laskin, AdlOptica Optical Systems GmbH (Germany). . . . . [8281-19]

In-line hologram reconstruction with Hartley transform and iteration, Meric Ozcan, Sabanci Univ. (Turkey) . . . . . [8281-20]

Novel modulation techniques for coaxial holographic data encoding, Po Sheun Chung, City Univ. of Hong Kong (Hong Kong, China); Wei Jia, Shanghai Institute of Optics and Fine Mechanics (China); Zhongyu Chen, Tsing Chung, Fung Wen, Yuk Tak Chow, City Univ. of Hong Kong (Hong Kong, China) . . . . . [8281-21]

The volume hologram printer to record the wavefront of a 3D object, Osamu Miyamoto, Takeshi Yamaguchi, Hiroshi Yoshikawa, Nihon Univ. (Japan). . . . . [8281-22]

Adaptation of holoprinter technology to fabricate a holoscreen for a fixed-frame animated 3D holographic display, Javid Khan, Holoxica Ltd. (United Kingdom); Alan Greenaway, Heriot-Watt Univ. (United Kingdom); Ian Underwood, The Univ. of Edinburgh (United Kingdom); Richard Melling, View Holographics (United Kingdom) . . . . . [8281-23]

Holographic fabrication of graded index materials for transformation optics applications, Kris Ohlinger, Univ. of North Texas (USA); Zsolt Poole, Univ. of Pittsburgh (USA); Yuankun Lin, Huiliang Zhang, Univ. of North Texas (USA); Kevin Chen, Univ. of Pittsburgh (USA) . . . . . [8281-24]

A compact holographic recording setup for tuning pitch using polarizing prisms, Jihwan Kim, Ravi K. Komanduri, Michael J. Escuti, North Carolina State Univ. (USA) . . . . . [8281-25]

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

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8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

TECHNICAL GROUP . . . . . Tues. 7:30 to 9:00 pm

Holography

Session Chair: **Hans I. Bjelkhagen,** Glyndwr Univ. (United Kingdom) and Technium OpTIC (United Kingdom)

The Holography Technical Group is involved with the whole record of research, engineering, recording materials, and applications of holography. The main fields of interest are display holograms, commercial and artistic, holographic optical elements (HOEs), holographic interferometry and holographic non-destructive testing (HNDT), computer-generated holography (CGH), electro and digital holography, holographic microscopy, and holographic data storage (HDS).

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Wednesday 25 January

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

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Hologram pattern of the electromagnetic wave diffraction from a pyramidal horn antenna, Makoto Ohki, Shonan Institute of Technology (Japan); Kunihiko Takano, Tokyo Metropolitan College of Industrial Technology (Japan); Masataka Tozuka, Koki Sato, Shonan Institute of Technology (Japan); Shogo Kozaki, Gunma Univ. (Japan) . . . . . [8281-26]

Two-dimensional signal processing using morphological filter for holographic memory, Yo Kondo, Yusuke Shigaki, Manabu Yamamoto, Tokyo Univ. of Science (Japan) . . . . . [8281-27]

Acceleration of calculation method for CGH with spherical basic object light by using graphic processing units, Kohei Hosoyachi, Yuji Sakamoto, Hokkaido Univ. (Japan) . . . . . [8281-28]

Read/write characteristics of reflection type hologram memory using spherical reference beam, Akihito Nakajima, Shohei Ozawa, Kai Yamada, Manabu Yamamoto, Hideki Akamatsu, Kaito Okubo, Tokyo Univ. of Science (Japan) . . . . . [8281-29]

Calculation method for reconstruction at arbitrary depth in CGH with Fourier transform optical system, Yusuke Sato, Yuji Sakamoto, Hokkaido Univ. (Japan) . . . . . [8281-30]

Enlargement of visual field considering depth of object for eyepiece-type electro holography, Chanyoung Yang, Yuji Sakamoto, Hokkaido Univ. (Japan) . . . . . [8281-31]

Computer-generated holograms at arbitrary positions using multi-view images, Yusuke Ohsawa, Yuji Sakamoto, Hokkaido Univ. (Japan) . . . . [8281-32]

Image-type high-definition CGHs encoded by optimized error diffusion, Hiroshi Yamashita, Kyoji Matsushima, Sumio Nakahara, Kansai Univ. (Japan) . . . . . [8281-33]

Advanced rendering techniques for producing specular smooth surfaces in polygon-based high-definition computer holography, Hirohito Nishi, Kyoji Matsushima, Sumio Nakahara, Kansai Univ. (Japan) . . . . . [8281-34]

Study of holograms made with saccharides and iron ions, Manuel Jorge Ordóñez-Padilla, Arturo Olivares-Pérez, Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Mauricio Ortiz-Gutiérrez, Univ. Michoacana de San Nicolás de Hidalgo (Mexico); Valentin Dorantes-García, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [8281-35]

Analysis of albumin hologram, Manuel Jorge Ordóñez-Padilla, Arturo Olivares-Pérez, Luis R. Berriel-Valdos, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Mauricio Ortiz-Gutiérrez, José F. Villa-Manríquez, Univ. Michoacana de San Nicolás de Hidalgo (Mexico). . . . . [8281-36]

Interferometric measurement of refraction index of dye-doped photopolymer, Gabriel Mellado-Villaseñor, Mauricio Ortiz-Gutiérrez, Univ. Michoacana de San Nicolás de Hidalgo (Mexico); Mario Pérez-Cortés, Univ. Autónoma de Yucatán (Mexico); Juan Carlos Ibarra-Torres, Univ. de Guadalajara (Mexico); Arturo Olivares-Pérez, Santa Toxqui-López, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [8281-37]

The mechanism to record the hologram with nitrocellulose and $FeCl_3$, Arturo Olivares-Perez, Rosaura Vallejo-Mendoza, Nikolai A. Korneev, Valentin Dorantes-Garcia, Manuel Jorge Ordóñez-Padilla, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [8281-38]

The behavior of the diffraction efficiency of a function of thickness using holographic gratings as material registration with gum Arabic ammonium dichromate, Bernardina Pinto-Iguanero, Benemérita Univ. Autónoma de Puebla (Mexico); Arturo Olivares-Pérez, Santa Toxqui-López, Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [8281-39]

Fabrication of the multi-level phase type hologram for display using the Laser Direct Write Lithography System, Nakano Seiji, Sumio Nakahara, Shoso Singubara, Kansai Univ. (Japan) . . . . . [8281-40]

Multiplex and multilevel optical recording for optical mass storage by retardagraphy, Hiroki Sekiguchi, Daisuke Barada, Takanori Ochiai, Utsunomiya Univ. (Japan); Takashi Fukuda, National Institute of Advanced Industrial Science and Technology (Japan); Shigeo Kawata, Toyohiko Yatagai, Utsunomiya Univ. (Japan) . . . . . [8281-41]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Tuesday-Thursday 24-26 January 2012 • Proceedings of SPIE Vol. 8282

Broadband Access Communication Technologies VI

Conference Chairs: **Benjamin Dingel,** Nasfine Photonics, Inc. (USA); **Raj Jain,** Washington Univ. in St. Louis (USA); **Katsutoshi Tsukamoto,** Osaka Univ. (Japan)

Program Committee: **Abdel-Karim Al-Tamimi,** Yarmouk Univ. (Jordan); **Arjan Durresi,** Indiana Univ.-Purdue Univ. Indianapolis (USA); **David W. Faulkner,** British Telecom Research Labs. (United Kingdom); **Mahbub Hassan,** The Univ. of New South Wales (Australia); **Mohsen Kavehrad,** The Pennsylvania State Univ. (USA); **Rangaraj Madabhushi,** Madabhushi Consultants, LLC (USA); **Nicholas Madamopoulos,** The City College of New York (USA); **Dalma Novak,** Pharad, LLC (USA); **Jean-Charles Point,** JCP-Consult (France); **Ken-ichi Sato,** Nagoya Univ. (Japan); **Chakchai So-In,** Khon Kaen Univ. (Thailand); **Peter Van Daele,** Univ. Gent (Belgium); **Jeroen S. Wellen,** Alcatel-Lucent (Netherlands)

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. for details.

Optical Communications Plenary Session

Tues. 10:30 am to 12:10 pm

Session Chairs: **Benjamin B. Dingel,** Nasfine Photonics, Inc. (USA); **Guifang Li,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Space-division multiplexed transmission over few-mode- and coupled-core fiber based on coherent MIMO digital signal processing *(Invited Paper)*, Roland Ryf, Alcatel-Lucent Bell Labs. (USA). . . . . [8284-01]

112-Gb/s PM-QPSK transmission systems with reach lengths enabled by optical fibers with ultra-low loss and very large effective area *(Invited Paper)*, John D. Downie, Corning Incorporated (USA) . . . . [8284-02]

Optical coherent technologies in next generation access networks *(Invited Paper)*, Katsumi Iwatsuki, NTT Network Innovation Labs. (Japan) . . . . . [8282-01]

Optics-bloodstream for future data networks *(Invited Paper)*, Cedric F. Lam, Google Inc. (USA) . . . . . [8283-01]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 1 . . . . . Tues. 1:30 to 3:15 pm

Advanced Signal Processing

Joint Session with Conference 8284

Session Chairs: **Katsutoshi Tsukamoto,** Osaka Univ. (Japan); **Dieter Stefan Jäger,** Univ. Duisburg-Essen (Germany)

Optical signal processing for wireless transmission *(Invited Paper)*, Tetsuya Kawanishi, National Institute of Information and Communications Technology (Japan) . . . . . [8282-02]

Adjustable transfer function optical filter for microwave applications, Nicholas Madamopoulos, Jia Kuang, The City College of New York (USA) . . . . . [8282-03]

Multi-input injection locking in single mode Fabry-Perot laser diodes and its application in optical signal processing, Bikash Nakarmi, Mohammad Rakib-Uddin, Yong Hyub Won, KAIST (Korea, Republic of) . . . . . [8284-03]

Super receiver design for super-channel coherent optical systems, Cheng Liu, Jie Pan, Thomas F. Detwiler, Andrew J. Stark, Yu-Ting Hsueh, Gee-Kung Chang, Stephen E. Ralph, Georgia Institute of Technology (USA) . . . . . [8284-04]

Uncooled MIMO WDM system using advanced receiver signal processing techniques, S. H. Lee, Richard V. Penty, Ian H. White, Univ. of Cambridge (United Kingdom); David G. Cunningham, Avago Technologies Ltd. (United Kingdom) . . . . . [8284-05]

SESSION OF INTEREST . . . . . Tues. 3:40 to 5:40 pm

Coding and Modulation Format

Joint Session between Conferences 8283 and 8284

Session Chairs: **Atul K. Srivastava,** OneTerabit (USA); **John C. Cartledge,** Queen's Univ. (Canada)

Advanced modulation formats for high-capacity transmission system at 100 G and beyond *(Invited Paper)*, Jianjun Yu, ZTEK Corp., Inc. (USA) [8283-02]

Energy-efficient hybrid coded modulations enabling terabit optical ethernet *(Invited Paper)*, Ivan B. Djordjevic, The Univ. of Arizona (USA). . . . . [8283-03]

Efficient multiplexing and demultiplexing of orbital angular momentum beams, Kevin M. Birnbaum, Baris I. Erkmen, Jet Propulsion Lab. (USA); Nisar Ahmed, Irfan M. Fazal, Jian Wang, Jeng-Yuan Yang, Yan Yang, Bishara Shamee, Alan E. Willner, The Univ. of Southern California (USA); Samuel J. Dolinar, Jr., Jet Propulsion Lab. (USA). . . . . [8284-06]

Continuous phase modulation parameter optimization for DWDM systems, Thomas F. Detwiler, Alexander Blanquet, Andrew J. Stark, Georgia Institute of Technology (USA); Bert E. Basch, Verizon Labs., Inc. (USA); Stephen E. Ralph, Georgia Institute of Technology (USA) . . . . . [8284-07]

Wednesday 25 January

SESSION 2 . . . . . Wed. 8:00 to 10:20 am

High-Capacity Coherent Optical Technologies

Joint Session with Conference 8284

Session Chairs: **Roland Ryf,** Alcatel-Lucent Bell Labs. (USA); **Benjamin B. Dingel,** Nasfine Photonics, Inc. (USA)

Optical OFDM based on the fractional Fourier transform *(Invited Paper)*, Gabriella Cincotti, Univ. degli Studi di Roma Tre (Italy) . . . . . [8284-08]

Reconfigurable optical transmitters and receivers *(Invited Paper)*, Wolfgang Freude, Rene Schmogrow, David Hillerkuss, Joachim Meyer, Michael Dreschmann, Karlsruher Institut für Technologie (Germany); Bernd Nebendahl, Agilent Technologies Deutschland GmbH (Germany); Michael Huebner, Jürgen Becker, Christian Koos, Juerg Leuthold, Karlsruher Institut für Technologie (Germany) . . . . . [8284-09]

Coherent OCDMA communication systems *(Invited Paper)*, Xu Wang, Heriot-Watt Univ. (United Kingdom) . . . . . [8282-04]

Performance of 32-Gbaud PDM-QPSK in nonlinear transport regimes with different phase recovery methods, Andrew J. Stark, Yu-Ting Hsueh, Thomas F. Detwiler, Cheng Liu, Georgia Institute of Technology (USA); Mark Filer, Sorin Tibuleac, ADVA Optical Networking North America, Inc. (USA); Gee-Kung Chang, Stephen E. Ralph, Georgia Institute of Technology (USA) . . . . . [8284-10]

Performance of PM-QPSK and PM-16QAM coherent optical fiber communication systems *(Invited Paper)*, John C. Cartledge, Queen's Univ. (Canada) . . . . . [8284-11]

VCSEL-based optical transceiver module operating at 25-Gb/s and using a single CMOS IC, Gil Afriat, Lior Horwitz, Dror Lazar, Assaf Issachar, Alexander Pogrebinsky, Adee Ran, Ehud Shoor, Roi Bar, Rushdy Saba, Intel Israel (74) Ltd. (Israel) . . . . . [8282-05]

SESSION 3 . . . . . Wed. 10:40 am to 12:40 pm

Next-Generation Devices and Components

Joint Session with Conferences 8283 and 8284

Session Chairs: **Guifang Li,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Werner Weiershausen,** Deutsche Telekom AG (Germany)

Microring resonator for optical access networks *(Invited Paper)*, Michal F. Lipson, Cornell Univ. (USA) . . . . . [8282-06]

Power balancing effect on the performance of IMPACC modulator under critical coupling (CC), over coupling (OC), and under coupling (UC) conditions at high frequency, Benjamin B. Dingel, Nasfine Photonics, Inc. (USA); Nicholas Madamopoulos, The City College of New York (USA); Andru Prescod, Corning Incorporated (USA) . . . . . [8282-07]

InP-based Mach Zehnder modulators for next generation systems *(Invited Paper)*, Eiichi Yamada, Yasuo Shibata, Hiroyuki Ishii, NTT Photonics Labs. (Japan) . . . . . [8284-12]

SOA-based Mamyshev-type regeneration: towards an all-optical error correction? *(Invited Paper)*, Hacene Chaouch, College of Optical Sciences, The Univ. of Arizona (USA); Franko Küppers, Technische Univ. Darmstadt (Germany) . . . . . [8283-04]

Integrated photonic components for 100G and beyond *(Invited Paper)*, Atul K. Srivastava, OneTerabit (USA) . . . . . [8283-05]

Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

SESSION 4 . . . . . Wed. 1:40 to 3:20 pm

Special Session on Optical Technologies for Mobile Microwave Access

Session Chairs: **Raj Jain,** Washington Univ. in St. Louis (USA); **Katsutoshi Tsukamoto,** Osaka Univ. (Japan)

LTE enhanced packet core: overview and recent enhancements *(Invited Paper)*, Subir Varma, Tellabs, Inc. (USA) . . . . . [8282-08]

Optical transport technologies in mobile broadband radio systems *(Invited Paper)*, Yukio Horiuchi, KDDI R&D Labs., Inc. (Japan) . . . . . [8282-09]

Transportation of a microwave environment over networks and the applications *(Invited Paper)*, Yozo Shoji, National Institute of Information and Communications Technology (Japan) . . . . . [8282-10]

Virtualized packet optical integrated transport network *(Invited Paper)*, Mallikarjun Tatipamula, Ericsson, Inc. (USA) . . . . . [8282-11]

SESSION 5 . . . . . Wed. 3:50 to 5:25 pm

Radio-over Fiber Communication and Access Pricing

Session Chairs: **Katsutoshi Tsukamoto,** Osaka Univ. (Japan); **Andru J Prescod,** Corning Incorporated (USA)

TUBE: pricing by timing *(Invited Paper)*, Sangtae Ha, Carlee Joe-Wong, Soumya Sen, Mung Chiang, Princeton Univ. (USA) . . . . . [8282-12]

Multi-gigabit millimeterwave radio-over-fiber communication systems and networks *(Invited Paper)*, Andreas Stöhr, Univ. Duisburg-Essen (Germany) . . . . . [8282-13]

Analog photonic link by using DFB lasers operated in the low laser threshold current region and external modulation, Alejandro García Juárez, Univ. de Sonora (Mexico); Ignacio Enrique Zaldivar Huerta, Instituto Nacional de Astrofísica Óptica y Electrónica (Mexico); Jorge Rodríguez Asomoza, Univ. de las Américas Puebla (Mexico); María del Rocío Gómez Colín, Armando Gregorio Rojas Hernández, Dainet Berman Mendoza, Roberto Gómez Fuentes, Alicia Vera Marquina, Univ. de Sonora (Mexico) . . . . . [8282-14]

Evaluation of a costless 60-GHz OFDM based indoor wireless over multimode fiber green system employing a photonic integrated smart antenna *(Invited Paper)*, Spiros S. Mikroulis, Technological Education Institute of Athens (Greece); Panos Sotiropoulos, Technological Education Institute of Athens (Greece) and Hellenic Telecommunications Organization SA (Greece); George Agapiou, Hellenic Telecommunications Organization SA (Greece) . . . . . [8282-15]

Thursday 26 January

SESSION 6 . . . . . Thurs. 8:00 to 10:10 am

Metro and Alternative Access Technologies (Visible Light Communication)

Joint Session with Conference 8283

Session Chairs: **Atul K. Srivastava,** OneTerabit (USA); **Raj Jain,** Washington Univ. in St. Louis (USA)

An efficient solution for building high-bandwidth active metro and access networks *(Invited Paper)*, Peter Hostalka, Huawei Technologies Co., Ltd. (Germany); L. Pang, A. Shen, Huawei Technologies Co., Ltd. (China) . . [8283-06]

Service driven packet-optical convergence for data-center campus applications and metro applications *(Invited Paper)*, Hans-Juergen Schmidtke, Juniper Networks, Inc. (USA) . . . . . [8283-07]

Visible light communication in dynamic environment using image/high-speed communication hybrid sensor, Keita Maeno, Mehrdad Panahpour Tehrani, Toshiaki Fujii, Hiraku Okada, Masayuki Tanimoto, Takaya Yamazato, Nagoya Univ. (Japan); Tomohiro Yendo, Nagaoka Univ. of Technology (Japan) . . . . . [8282-16]

Energy-efficient lighting and communications, Mohsen Kavehrad, The Pennsylvania State Univ. (USA) . . . . . [8282-17]

The smart room: a 100-Mb/s integrated optical access point transceiver for indoor visible light communication, Ninrat B. Datiri, Ali Mirvakili, Enjin Fu, Valencia M. Joyner, Tufts Univ. (USA) . . . . . [8282-18]

Hybrid positioning with lighting LEDs and Zigbee multihop wireless network, Y. U. Lee, S. Baang, J. Park, Hallym Univ. (Korea, Republic of); Z. Zhou, M. Kavehrad, The Pennsylvania State Univ. (USA) . . . . . [8282-19]

Conference 8283

Tuesday-Thursday 24-26 January 2012 • Proceedings of SPIE Vol. 8283

Optical Metro Networks and Short-Haul Systems IV

Conference Chairs: **Werner Weiershausen,** Deutsche Telekom AG (Germany); **Benjamin Dingel,** Nasfine Photonics, Inc. (USA); **Achyut Dutta,** Banpil Photonics, Inc. (USA); **Atul K. Srivastava,** OneTerabit (USA)

Program Committee: **Ronald Freund,** Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); **Akimasa Kaneko,** NEL America, Inc. (USA); **Franko Küppers,** College of Optical Sciences, The Univ. of Arizona (USA); **Ralph Leppla,** Deutsche Telekom AG (Germany); **Ernst-Dieter Schmidt,** Nokia Siemens Networks (Germany); **Sascha Vorbeck,** Deutsche Telekom AG (Germany); **Winston I. Way,** Vello Systems (USA)

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

Optical Communications Plenary Session

Tues. 10:30 am to 12:10 pm

Session Chairs: **Benjamin B. Dingel,** Nasfine Photonics, Inc. (USA); **Guifang Li,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Space-division multiplexed transmission over few-mode- and coupled-core fiber based on coherent MIMO digital signal processing *(Invited Paper)*, Roland Ryf, Alcatel-Lucent Bell Labs. (USA). . . . . [8284-01]

112-Gb/s PM-QPSK transmission systems with reach lengths enabled by optical fibers with ultra-low loss and very large effective area *(Invited Paper)*, John D. Downie, Corning Incorporated (USA) . . . . [8284-02]

Optical coherent technologies in next generation access networks *(Invited Paper)*, Katsumi Iwatsuki, NTT Network Innovation Labs. (Japan) . . . . . [8282-01]

Optics-bloodstream for future data networks *(Invited Paper)*, Cedric F. Lam, Google Inc. (USA) . . . . . [8283-01]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION OF INTEREST . . . . . Tues. 1:30 to 3:15 pm

Advanced Signal Processing

Joint Session between Conferences 8282 and 8284

Session Chairs: **Katsutoshi Tsukamoto,** Osaka Univ. (Japan); **Dieter Stefan Jäger,** Univ. Duisburg-Essen (Germany)

Optical signal processing for wireless transmission *(Invited Paper)*, Tetsuya Kawanishi, National Institute of Information and Communications Technology (Japan). . . . . [8282-02]

Adjustable transfer function optical filter for microwave applications, Nicholas Madamopoulos, Jia Kuang, The City College of New York (USA) . . . . . [8282-03]

Multi-input injection locking in single mode Fabry-Perot laser diodes and its application in optical signal processing, Bikash Nakarmi, Mohammad Rakib-Uddin, Yong Hyub Won, KAIST (Korea, Republic of) . . . . . [8284-03]

Super receiver design for super-channel coherent optical systems, Cheng Liu, Jie Pan, Thomas F. Detwiler, Andrew J. Stark, Yu-Ting Hsueh, Gee-Kung Chang, Stephen E. Ralph, Georgia Institute of Technology (USA) . . . . . [8284-04]

Uncooled MIMO WDM system using advanced receiver signal processing techniques, S. H. Lee, Richard V. Penty, Ian H. White, Univ. of Cambridge (United Kingdom); David G. Cunningham, Avago Technologies Ltd. (United Kingdom) . . . . . [8284-05]

SESSION 1 . . . . . Tues. 3:40 to 5:40 pm

Coding and Modulation Format

Joint Session with Conference 8284

Session Chairs: **Atul K. Srivastava,** OneTerabit (USA); **John C. Cartledge,** Queen's Univ. (Canada)

Advanced modulation formats for high-capacity transmission system at 100 G and beyond *(Invited Paper)*, Jianjun Yu, ZTEK Corp., Inc. (USA) [8283-02]

Energy-efficient hybrid coded modulations enabling terabit optical ethernet *(Invited Paper)*, Ivan B. Djordjevic, The Univ. of Arizona (USA). . . . . [8283-03]

Efficient multiplexing and demultiplexing of orbital angular momentum beams, Kevin M. Birnbaum, Baris I. Erkmen, Jet Propulsion Lab. (USA); Nisar Ahmed, Irfan M. Fazal, Jian Wang, Jeng-Yuan Yang, Yan Yang, Bishara Shamee, Alan E. Willner, The Univ. of Southern California (USA); Samuel J. Dolinar, Jr., Jet Propulsion Lab. (USA) . . . . . [8284-06]

Continuous phase modulation parameter optimization for DWDM systems, Thomas F. Detwiler, Alexander Blanquet, Andrew J. Stark, Georgia Institute of Technology (USA); Bert E. Basch, Verizon Labs., Inc. (USA); Stephen E. Ralph, Georgia Institute of Technology (USA) . . . . . [8284-07]

Wednesday 25 January

SESSION OF INTEREST . . . . . Wed. 8:00 to 10:20 am

High-Capacity Coherent Optical Technologies

Joint Session between Conferences 8282 and 8284

Session Chairs: **Roland Ryf,** Alcatel-Lucent Bell Labs. (USA);
Benjamin B. Dingel, Nasfine Photonics, Inc. (USA)

Optical OFDM based on the fractional Fourier transform *(Invited Paper)*, Gabriella Cincotti, Univ. degli Studi di Roma Tre (Italy) . . . . . [8284-08]

Reconfigurable optical transmitters and receivers *(Invited Paper)*, Wolfgang Freude, Rene Schmogrow, David Hillerkuss, Joachim Meyer, Michael Dreschmann, Karlsruher Institut für Technologie (Germany); Bernd Nebendahl, Agilent Technologies Deutschland GmbH (Germany); Michael Huebner, Jürgen Becker, Christian Koos, Juerg Leuthold, Karlsruher Institut für Technologie (Germany) . . . . . [8284-09]

Coherent OCDMA communication systems *(Invited Paper)*, Xu Wang, Heriot-Watt Univ. (United Kingdom) . . . . . [8282-04]

Performance of 32-Gbaud PDM-QPSK in nonlinear transport regimes with different phase recovery methods, Andrew J. Stark, Yu-Ting Hsueh, Thomas F. Detwiler, Cheng Liu, Georgia Institute of Technology (USA); Mark Filer, Sorin Tibuleac, ADVA Optical Networking North America, Inc. (USA); Gee-Kung Chang, Stephen E. Ralph, Georgia Institute of Technology (USA) . . . . . [8284-10]

Performance of PM-QPSK and PM-16QAM coherent optical fiber communication systems *(Invited Paper)*, John C. Cartledge, Queen's Univ. (Canada) . . . . . [8284-11]

VCSEL-based optical transceiver module operating at 25-Gb/s and using a single CMOS IC, Gil Afriat, Lior Horwitz, Dror Lazar, Assaf Issachar, Alexander Pogrebinsky, Adee Ran, Ehud Shoor, Roi Bar, Rushdy Saba, Intel Israel (74) Ltd. (Israel) . . . . . [8282-05]

SESSION 2 . . . . . Wed. 10:40 am to 12:40 pm

Next-Generation Devices and Components

Joint Session with Conferences 8282 and 8284

Session Chairs: **Guifang Li,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA);
Werner Weiershausen, Deutsche Telekom AG (Germany)

Microring resonator for optical access networks *(Invited Paper)*, Michal F. Lipson, Cornell Univ. (USA) . . . . . [8282-06]

Power balancing effect on the performance of IMPACC modulator under critical coupling (CC), over coupling (OC), and under coupling (UC) conditions at high frequency, Benjamin B. Dingel, Nasfine Photonics, Inc. (USA); Nicholas Madamopoulos, The City College of New York (USA); Andru Prescod, Corning Incorporated (USA) . . . . . [8282-07]

InP-based Mach Zehnder modulators for next generation systems *(Invited Paper)*, Eiichi Yamada, Yasuo Shibata, Hiroyuki Ishii, NTT Photonics Labs. (Japan) . . . . . [8284-12]

SOA-based Mamyshev-type regeneration: towards an all-optical error correction? *(Invited Paper)*, Hacene Chaouch, College of Optical Sciences, The Univ. of Arizona (USA); Franko Küppers, Technische Univ. Darmstadt (Germany) . . . . . [8283-04]

Integrated photonic components for 100G and beyond *(Invited Paper)*, Atul K. Srivastava, OneTerabit (USA) . . . . . [8283-05]

Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

SESSIONS OF INTEREST . . . . . Wed. 1:40 to 3:20 pm

See programs for conferences 8282 and 8284

SESSIONS OF INTEREST . . . . . Wed. 3:40 to 5:25 pm

See programs for conferences 8282 and 8284

POSTERS-WEDNESDAY . . . . . Wed. 6:00 to 8:00 pm

Conference attendees are invited to attend the OPTO poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x27476.xml.

Design of the optical fibers for differential mode delay compensation, Vladimir A. Burdin, Anton V. Bourdine, Povolzhskaya State Academy of Telecommunications and Informatics (Russian Federation); Oleg R. Delmukhametov, Ufa State Aviation Technical Univ. (Russian Federation) . . . . . [8283-17]

Optical link upgrade by dispersion and nonlinearity management technique realized by compensating optical cable coiled around of fiber optic closure, Vladimir A. Burdin, Anton V. Bourdine, Kirill A. Volkov, Povolzhskaya State Academy of Telecommunications and Informatics (Russian Federation) [8283-18]

Thursday 26 January

SESSION 3 . . . . . Thurs. 8:00 to 10:10 am

Metro and Alternative Access Technologies (Visible Light Communication)

Joint Session with Conference 8282

Session Chairs: **Atul K. Srivastava,** OneTerabit (USA);
Raj Jain, Washington Univ. in St. Louis (USA)

An efficient solution for building high-bandwidth active metro and access networks *(Invited Paper)*, Peter Hostalka, Huawei Technologies Co., Ltd. (Germany); L. Pang, A. Shen, Huawei Technologies Co., Ltd. (China) . . [8283-06]

Service driven packet-optical convergence for data-center campus applications and metro applications *(Invited Paper)*, Hans-Juergen Schmidtke, Juniper Networks, Inc. (USA) . . . . . [8283-07]

Visible light communication in dynamic environment using image/high-speed communication hybrid sensor, Keita Maeno, Mehrdad Panahpour Tehrani, Toshiaki Fujii, Hiraku Okada, Masayuki Tanimoto, Takaya Yamazato, Nagoya Univ. (Japan); Tomohiro Yendo, Nagaoka Univ. of Technology (Japan) . . . . . [8282-16]

Energy-efficient lighting and communications, Mohsen Kavehrad, The Pennsylvania State Univ. (USA) . . . . . [8282-17]

The smart room: a 100-Mb/s integrated optical access point transceiver for indoor visible light communication, Ninrat B. Datiri, Ali Mirvakili, Enjin Fu, Valencia M. Joyner, Tufts Univ. (USA) . . . . . [8282-18]

Hybrid positioning with lighting LEDs and Zigbee multihop wireless network, Y. U. Lee, S. Baang, J. Park, Hallym Univ. (Korea, Republic of); Z. Zhou, M. Kavehrad, The Pennsylvania State Univ. (USA) . . . . . [8282-19]

SESSION 4 . . . . . Thurs. 10:30 am to 12:35 pm

Advanced Component Technologies

Joint Session with Conference 8284

Session Chairs: **Achyut Dutta,** Banpil Photonics, Inc. (USA);
Dieter Stefan Jäger, Univ. Duisburg-Essen (Germany)

Next-generation ROADM technologies and architecture *(Invited Paper)*, Peter J. Wigley, Manish Sharma, Oclaro, Inc. (USA). . . . . [8283-08]

Polarization division multiplexed 2×10-Gbps transmissions over 10-km long holey fiber in 1.0-μm waveband photonic transport system, Naokatsu Yamamoto, Atsushi Kanno, Kouichi Akahane, Tetsuya Kawanishi, National Institute of Information and Communications Technology (Japan); Yu Omigawa, Yasuaki Kurata, Hideyuki Sotobayashi, Aoyama Gakuin Univ. (Japan) . [8283-09]

Optimization of broadband detector performance for optical communication: design and simulation, Andrew Lange, Robert Olah, Achyut Dutta, Banpil Photonics, Inc. (USA); Nibir K. Dhar, Defense Advanced Research Projects Agency (USA) . . . . . [8283-10]

Reduction of crosstalk in a colourless multicasting LCOS based wavelength selective switch by the application of wavefront encoding, Brian Robertson, Zichen Zhang, Haining Yang, Maura M. Redmond, Neil Collings, Univ. of Cambridge (United Kingdom); Jinsong Liu, Wuxi OptonTech Ltd. (China); Ruisheng S. Lin, Anna M. Jeziorska-Chapman, John R. Moore, William A. Crossland, Daping P. Chu, Univ. of Cambridge (United Kingdom) . . . . . [8284-27]

Radiation-resistant erbium-doped optical fiber for space applications, Jérémie Thomas, Mikhaël Myara, Philippe Signoret, Univ. Montpellier 2 (France); Alain Pastouret, Ekaterina Burov, David E. Boivin, Olivier Cavani, Draka (France); Michel Sotom, Michel Maignan, Thales Alenia Space (France); Olivier Gilard, Ctr. National d'Études Spatiales (France) . . . . . [8284-28]

Advanced high-speed polarimeter for telecommunications, optical channel monitoring, and fiber sensing, Vitaly Mikhailov, Paul S. Westbrook, OFS Labs. (USA) . . . . . [8284-29]

Lunch/Exhibition Break . . . . . 12:35 to 1:35 pm

SESSION 5 . . . . . Thurs. 1:35 to 4:00 pm

Optical Network

Session Chair: **Werner Weiershausen,**
Deutsche Telekom AG (Germany)

Operation View: the key challenges for the implementation of new functionalities in a new 40G/100G (terabit) network *(Invited Paper)*, Heinz Mayer, Deutsche Telekom AG (Germany) . . . . . [8283-11]

Modern transmission networks: high bandwidth, long ranges, and high flexibility *(Invited Paper)*, Fred Masiak, Andreas Reinking, Vodafone D2 GmbH (Germany) . . . . . [8283-12]

Network architecture in a converged optical + IP network *(Invited Paper)*, Walid Wakim, Harald Zottmann, Cisco Systems, Inc. (USA) . . . . . [8283-13]

On-line routing, wavelength assignment, and spectrum allocation in wavelength convertible flexible optical WDM networks, Ankitkumar N. Patel, Philip N. Ji, NEC Labs. America, Inc. (USA); Jason P. Jue, The Univ. of Texas at Dallas (USA); Ting Wang, NEC Labs. America, Inc. (USA) . . . . . [8283-14]

Optical networks in India *(Invited Paper)*, Ashwin Gumaste, Indian Institute of Technology Bombay (India). . . . . [8283-15]

100G and beyond: optical transmission activities in Brazil *(Invited Paper)*, Júlio César R. F. de Oliveira, Fundacao CpqD (Brazil) . . . . . [8283-16]

Courses of Related Interest

SC188 Laser Beam Propagation for Applications in Laser Communications, Laser Radar, and Active Imaging (Phillips, Andrews) Wednesday, 8:30 am to 5:30 pm

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

Conference 8284

Tuesday-Thursday 24-26 January 2012 • Proceedings of SPIE Vol. 8284

Next-Generation Optical Communication: Components, Sub-Systems, and Systems

Conference Chairs: **Guifang Li,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Dieter Stefan Jäger,** Univ. Duisburg-Essen (Germany)

Program Committee: **Young-Kai Chen,** Alcatel-Lucent Bell Labs. (USA); **Benjamin Dingel,** Nasfine Photonics, Inc. (USA); **Ronald Freund,** Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); **Jin Hong,** Opnext, Inc. (USA); **Sander L. Jansen,** Nokia Siemens Networks (Germany); **Masataka Nakazawa,** Tohoku Univ. (Japan); **Alan C. Nilsson,** Infinera Corp. (USA); **Ioannis Roudas,** Univ. of Patras (Greece); **Akihide Sano,** NTT Network Innovation Labs. (Japan); **Atul K. Srivastava,** OneTerabit (USA); **Fatih Yaman,** NEC Labs. America, Inc. (USA); **Xiang Zhou,** AT&T Labs. Research (USA)

Tuesday 24 January

OPTO Plenary Session

Tues. 8:00 to 10:10 am

Session Chairs: **Klaus P. Streubel,** OSRAM GmbH (Germany); **David L. Andrews,** Univ. of East Anglia Norwich (United Kingdom)

8:00 am: **Welcome and Opening Remarks,** Klaus P. Streubel, OSRAM GmbH (Germany)

8:05 am: **Announcement of the Green Photonics Awards,** Stephen J. Eglash, Precourt Institute for Energy, Stanford Univ. (USA)

8:10 am: **Spinoptics: Spin Degeneracy Removal in Nanostructures,** Erez Hasman, Technion-Israel Institute of Technology (Israel)

8:50 am: **High-Contrast Metastructures for Integrated Optics,** Connie J. Chang-Hasnain, Univ. of California, Berkeley (USA)

9:30 am: **Engaging Spins in Semiconductors for Quantum Information Processing,** David Awschalom, Univ. of California, Santa Barbara (USA)

See p. 20 for details.

Optical Communications Plenary Session

Tues. 10:30 am to 12:10 pm

Session Chairs: **Benjamin B. Dingel,** Nasfine Photonics, Inc. (USA); **Guifang Li,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA)

Space-division multiplexed transmission over few-mode- and coupled-core fiber based on coherent MIMO digital signal processing *(Invited Paper)*, Roland Ryf, Alcatel-Lucent Bell Labs. (USA). . . . . [8284-01]

112-Gb/s PM-QPSK transmission systems with reach lengths enabled by optical fibers with ultra-low loss and very large effective area *(Invited Paper)*, John D. Downie, Corning Incorporated (USA) . . . . [8284-02]

Optical coherent technologies in next generation access networks *(Invited Paper)*, Katsumi Iwatsuki, NTT Network Innovation Labs. (Japan) . . . . . [8282-01]

Optics-bloodstream for future data networks *(Invited Paper)*, Cedric F. Lam, Google Inc. (USA) . . . . . [8283-01]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 1 . . . . . Tues. 1:30 to 3:15 pm

Advanced Signal Processing

Joint Session with Conference 8282

Session Chairs: **Katsutoshi Tsukamoto,** Osaka Univ. (Japan); **Dieter Stefan Jäger,** Univ. Duisburg-Essen (Germany)

Optical signal processing for wireless transmission *(Invited Paper)*, Tetsuya Kawanishi, National Institute of Information and Communications Technology (Japan). . . . . [8282-02]

Adjustable transfer function optical filter for microwave applications, Nicholas Madamopoulos, Jia Kuang, The City College of New York (USA) . . . . . [8282-03]

Multi-input injection locking in single mode Fabry-Perot laser diodes and its application in optical signal processing, Bikash Nakarmi, Mohammad Rakib-Uddin, Yong Hyub Won, KAIST (Korea, Republic of) . . . . . [8284-03]

Super receiver design for super-channel coherent optical systems, Cheng Liu, Jie Pan, Thomas F. Detwiler, Andrew J. Stark, Yu-Ting Hsueh, Gee-Kung Chang, Stephen E. Ralph, Georgia Institute of Technology (USA) . . . . . [8284-04]

Uncooled MIMO WDM system using advanced receiver signal processing techniques, S. H. Lee, Richard V. Penty, Ian H. White, Univ. of Cambridge (United Kingdom); David G. Cunningham, Avago Technologies Ltd. (United Kingdom) . . . . . [8284-05]

SESSION 2 . . . . . Tues. 3:40 to 5:40 pm

Coding and Modulation Format

Joint Session with Conference 8283

Session Chairs: **Atul K. Srivastava,** OneTerabit (USA); **John C. Cartledge,** Queen's Univ. (Canada)

Advanced modulation formats for high-capacity transmission system at 100 G and beyond *(Invited Paper)*, Jianjun Yu, ZTEK Corp., Inc. (USA) [8283-02]

Energy-efficient hybrid coded modulations enabling terabit optical ethernet *(Invited Paper)*, Ivan B. Djordjevic, The Univ. of Arizona (USA). . . . . [8283-03]

Efficient multiplexing and demultiplexing of orbital angular momentum beams, Kevin M. Birnbaum, Baris I. Erkmen, Jet Propulsion Lab. (USA); Nisar Ahmed, Irfan M. Fazal, Jian Wang, Jeng-Yuan Yang, Yan Yang, Bishara Shamee, Alan E. Willner, The Univ. of Southern California (USA); Samuel J. Dolinar, Jr., Jet Propulsion Lab. (USA). . . . . [8284-06]

Continuous phase modulation parameter optimization for DWDM systems, Thomas F. Detwiler, Alexander Blanquet, Andrew J. Stark, Georgia Institute of Technology (USA); Bert E. Basch, Verizon Labs., Inc. (USA); Stephen E. Ralph, Georgia Institute of Technology (USA) . . . . . [8284-07]

Wednesday 25 January

SESSION 3 . . . . . Wed. 8:00 to 10:20 am

High-Capacity Coherent Optical Technologies

Joint Session with Conference 8282

Session Chairs: **Roland Ryf,** Alcatel-Lucent Bell Labs. (USA); **Benjamin B. Dingel,** Nasfine Photonics, Inc. (USA)

Optical OFDM based on the fractional Fourier transform *(Invited Paper)*, Gabriella Cincotti, Univ. degli Studi di Roma Tre (Italy) . . . . . [8284-08]

Reconfigurable optical transmitters and receivers *(Invited Paper)*, Wolfgang Freude, Rene Schmogrow, David Hillerkuss, Joachim Meyer, Michael Dreschmann, Karlsruher Institut für Technologie (Germany); Bernd Nebendahl, Agilent Technologies Deutschland GmbH (Germany); Michael Huebner, Jürgen Becker, Christian Koos, Juerg Leuthold, Karlsruher Institut für Technologie (Germany) . . . . . [8284-09]

Coherent OCDMA communication systems *(Invited Paper)*, Xu Wang, Heriot-Watt Univ. (United Kingdom) . . . . . [8282-04]

Performance of 32-Gbaud PDM-QPSK in nonlinear transport regimes with different phase recovery methods, Andrew J. Stark, Yu-Ting Hsueh, Thomas F. Detwiler, Cheng Liu, Georgia Institute of Technology (USA); Mark Filer, Sorin Tibuleac, ADVA Optical Networking North America, Inc. (USA); Gee-Kung Chang, Stephen E. Ralph, Georgia Institute of Technology (USA) . . . . . [8284-10]

Performance of PM-QPSK and PM-16QAM coherent optical fiber communication systems *(Invited Paper)*, John C. Cartledge, Queen's Univ. (Canada) . . . . . [8284-11]

VCSEL-based optical transceiver module operating at 25-Gb/s and using a single CMOS IC, Gil Afriat, Lior Horwitz, Dror Lazar, Assaf Issachar, Alexander Pogrebinsky, Adee Ran, Ehud Shoor, Roi Bar, Rushdy Saba, Intel Israel (74) Ltd. (Israel) . . . . . [8282-05]

SESSION 4 . . . . . Wed. 10:40 am to 12:40 pm

Next-Generation Devices and Components

Joint Session with Conferences 8282 and 8283

Session Chairs: **Guifang Li,** CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Werner Weiershausen,** Deutsche Telekom AG (Germany)

Microring resonator for optical access networks *(Invited Paper)*, Michal F. Lipson, Cornell Univ. (USA) . . . . . [8282-06]

Power balancing effect on the performance of IMPACC modulator under critical coupling (CC), over coupling (OC), and under coupling (UC) conditions at high frequency, Benjamin B. Dingel, Nasfine Photonics, Inc. (USA); Nicholas Madamopoulos, The City College of New York (USA); Andru Prescod, Corning Incorporated (USA) . . . . . [8282-07]

InP-based Mach Zehnder modulators for next generation systems *(Invited Paper)*, Eiichi Yamada, Yasuo Shibata, Hiroyuki Ishii, NTT Photonics Labs. (Japan) . . . . . [8284-12]

SOA-based Mamyshev-type regeneration: towards an all-optical error correction? *(Invited Paper)*, Hacene Chaouch, College of Optical Sciences, The Univ. of Arizona (USA); Franko Küppers, Technische Univ. Darmstadt (Germany) . . . . . [8283-04]

Integrated photonic components for 100G and beyond *(Invited Paper)*, Atul K. Srivastava, OneTerabit (USA) . . . . . [8283-05]

Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

SESSION 5 . . . . . Wed. 1:40 to 3:10 pm

Space-Division Multiplexed Optical Transmission I

Session Chair: **Kunimasa Saitoh,** Hokkaido Univ. (Japan)

Required properties of few mode fibers for mode division multiplexing transmission *(Invited Paper)*, Hirokazu Kubota, NTT Network Innovation Labs. (Japan) . . . . . [8284-13]

Efficient optical amplification for spatial division multiplexing *(Invited Paper)*, Peter M. Krummrich, Technische Univ. Dortmund (Germany) . . . . . [8284-14]

Multimode fiber amplifier with tunable modal gain using a reconfigurable multimode pump, Neng Bai, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Ezra Ip, Ting Wang, NEC Labs. America, Inc. (USA); Guifang Li, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . . . . [8284-15]

Fabrication and characterization of ion-exchanged glass binary phase plates for mode-division multiplexing, Carlos Montero Orille, Xesus Prieto-Blanco, Vicente Moreno, Univ. de Santiago de Compostela (Spain); Eduardo F. Mateo, NEC Labs. America, Inc. (USA); Jesus Linares Beiras, Univ. de Santiago de Compostela (Spain) . . . . . [8284-16]

SESSION 6 . . . . . Wed. 3:40 to 5:10 pm

Space-Division Multiplexed Optical Transmission II

Session Chair: **Peter M. Krummrich,** Technische Univ. Dortmund (Germany)

Low-crosstalk multi-core fibers for long-haul transmission *(Invited Paper)*, Kunimasa Saitoh, Masanori Koshiba, Hokkaido Univ. (Japan) . . . . . [8284-17]

Supermodes for optical transmission, Cen Xia, Neng Bai, Guifang Li, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA) . . [8284-18]

Measurement of complex mode amplitudes, Bilal A. Alvi, Amber Israr, Sir Syed Univ. of Engineering & Technology (Pakistan) . . . . . [8284-19]

Detailed modeling of integrated IQ-transmitters for 100-G+ applications *(Invited Paper)*, Andre Richter, Cristina Arellano, VPIsystems GmbH (Germany); Sergei Mingaleev, Eugene Sokolov, VPI Development Ctr. (Belarus); Igor Koltchanov, VPIsystems GmbH (Germany) . . . . . [8284-20]

Thursday 26 January

SESSION 7 . . . . . Thurs. 8:00 to 10:15 am

Coherent Optical Transmission: Nonlinear Effects

Session Chair: **Fatih Yaman,** NEC Labs. America, Inc. (USA)

MLSE for linear and nonlinear ISI mitigation in optical coherent detection systems *(Invited Paper)*, Yi Cai, Huawei Technologies Co., Ltd. (USA) . [8284-21]

Stimulated Raman crosstalk in WDM system employing distributed Raman amplifier for DPSK and OOK modulation format, Anamika Singh, Vishnu Priye, Indian School Of Mines (India) . . . . . [8284-22]

Recent advances in digital backward propagation algorithm for coherent transmission systems with higher order modulation formats *(Invited Paper)*, Bernhard Schmauss, Rameez Asif, Chien-Yu Lin, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [8284-23]

Digital nonlinear compensation techniques for high-speed DWDM transmission systems *(Invited Paper)*, Takeshi Hoshida, Fujitsu Labs. (Japan); Liang Dou, Fujitsu Research and Development Center Co., Ltd. (China); Takahito Tanimura, Fujitsu Labs. (Japan); Weizhen Yan, Fujitsu Research and Development Center Co., Ltd. (China); Shoichiro Oda, Fujitsu Labs. (Japan); Lei Li, Fujitsu Research and Development Center Co., Ltd. (China); Hisao Nakashima, Fujitsu Labs. (Japan); Meng Yan, Zhenning Tao, Fujitsu Research and Development Center Co., Ltd. (China); Jens C. Rasmussen, Fujitsu Labs. (Japan) . . . . . [8284-24]

Low-complexity logarithmic step-size based filtered digital backward propagation algorithm for compensating fiber transmission impairments, Muhammad Rameez Asif, Chien-Yu Lin, Michael F. Holtmannspoetter, Bernhard Schmauss, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . [8284-25]

Nonlinear tolerance of 400-Gbit/s DP-RZ-QPSK transmission over 1200km SMF-28 employing digital backward propagation, Muhammad Rameez Asif, Chien-Yu Lin, Muhammad Usman, Bernhard Schmauss, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [8284-26]

Conference 8284

SESSION 8 . . . . . Thurs. 10:30 am to 12:35 pm

Advanced Component Technologies

Joint Session with Conference 8283

Session Chairs: **Achyut Dutta,** Banpil Photonics, Inc. (USA);
Dieter Stefan Jäger, Univ. Duisburg-Essen (Germany)

Next-generation ROADM technologies and architecture *(Invited Paper)*, Peter J. Wigley, Manish Sharma, Oclaro, Inc. (USA). . . . . [8283-08]

Polarization division multiplexed 2×10-Gbps transmissions over 10-km long holey fiber in 1.0-µm waveband photonic transport system, Naokatsu Yamamoto, Atsushi Kanno, Kouichi Akahane, Tetsuya Kawanishi, National Institute of Information and Communications Technology (Japan); Yu Omigawa, Yasuaki Kurata, Hideyuki Sotobayashi, Aoyama Gakuin Univ. (Japan) . [8283-09]

Optimization of broadband detector performance for optical communication: design and simulation, Andrew Lange, Robert Olah, Achyut Dutta, Banpil Photonics, Inc. (USA); Nibir K. Dhar, Defense Advanced Research Projects Agency (USA) . . . . . [8283-10]

Reduction of crosstalk in a colourless multicasting LCOS based wavelength selective switch by the application of wavefront encoding, Brian Robertson, Zichen Zhang, Haining Yang, Maura M. Redmond, Neil Collings, Univ. of Cambridge (United Kingdom); Jinsong Liu, Wuxi OptonTech Ltd. (China); Ruisheng S. Lin, Anna M. Jeziorska-Chapman, John R. Moore, William A. Crossland, Daping P. Chu, Univ. of Cambridge (United Kingdom) . . . . . [8284-27]

Radiation-resistant erbium-doped optical fiber for space applications, Jérémie Thomas, Mikhaël Myara, Philippe Signoret, Univ. Montpellier 2 (France); Alain Pastouret, Ekaterina Burov, David E. Boivin, Olivier Cavani, Draka (France); Michel Sotom, Michel Maignan, Thales Alenia Space (France); Olivier Gilard, Ctr. National d'Études Spatiales (France) . . . . . [8284-28]

Advanced high-speed polarimeter for telecommunications, optical channel monitoring, and fiber sensing, Vitaly Mikhailov, Paul S. Westbrook, OFS Labs. (USA) . . . . . [8284-29]

Courses of Related Interest

SC747 Semiconductor Photonic Device Fundamentals (Linden) Monday, 8:30 am to 5:30 pm

See pages 294-330 for course and workshop details.

GREEN PHOTONICS

Symposium Chair
Stephen J. Eglash
Precourt Institute for Energy, Stanford Univ. (USA)

Be part of the SPIE Green Photonics "Virtual" Conference

Energy, sustainability, and conservation are inherently interdisciplinary. With over 50 papers, the Green Photonics virtual symposium brings together the latest research in a broad range of photonics applications across Photonics West.

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
		GP101 Green Photonics in Solid State Lighting and Displays, p. 280			
	GP102 Green Photonics in Laser-assisted Manufacturing and Micro/Nano Fabrication, p. 281				
	GP103 Green Photonics in Communications, p. 282				
		GP104 Green Photonics in Renewable Energy Generation: Fusion and Photovoltaics, p. 283			

Green Photonics Awards

Awards in each of the four areas will be presented at the OPTO Plenary Session on Tuesday morning, and the LASE Plenary Session on Wednesday morning.

Awards presented at the OPTO Plenary Session:
- Green Photonics Award for Solid State Lighting/Displays
- Green Photonics Award for Optical Communications Research
- Green Photonics Award for Renewable Energy Generation: Fusion and Photovoltaics

Award presented at the LASE Plenary Session:
- Green Photonics Award for Laser-assisted Manufacturing or Micro/Nano Fabrication

Green Photonics in Solid State Lighting and Displays

Monday 23 January

Afternoon

The effect of exciton dimensionality on resonance energy transfer: advances for organic color converters in hybrid inorganic/organic LEDs, Jan Junis Rindermann, Univ. of Southampton (United Kingdom); Galia R. Pozina, Bo Monemar, Lars Hultman, Linköping Univ. (Sweden); Hiroshi Amano, Nagoya Univ. (Japan); Pavlos G. Lagoudakis, Univ. of Southampton (United Kingdom) . . . . . [8255-17]

Tuesday 24 January

Afternoon

Real-space distribution of cavity modes in single ZnO nanowires *(Invited Paper)*, Frank Güell, Univ. de Barcelona (Spain); Alejandro R. Goñi, Consejo Superior de Investigaciones Científicas (Spain); Josep Oriol Ossó, MATGAS (Spain); Luis A. Perez, Eduardo A. Coronado, La Univ. Nacional de Córdoba (Argentina); Joan Ramón Morante, Institut de Recerca en Energia de Catalunya (Spain) . . . . . [8263-53]

Infrared excited Yb: Er: Y_2O_2S phosphors with intense emission for lighting applications, Gangadharan Ajith Kumar, Madhab Pokhrel, Dhiraj K. Sardar, The Univ. of Texas at San Antonio (USA) . . . . . [8278-13]

Wednesday 25 January

Posters

Analysis of nanoparticles in controlling the vertical alignment of nematic liquid crystals, Amit Choudhary, Guoqiang Li, Univ. of Missouri-St. Louis (USA) . . . . . [8279-41]

Thursday 26 January

Morning

Power conversion and luminous efficiency performance of nanophosphor quantum dots on color-conversion LEDs for high-quality general lighting, Talha Erdem, Sedat Nizamoglu, Hilmi Volkan Demir, Bilkent Univ. (Turkey) . . . . . [8278-35]

Afternoon

Simulation of the evolution of spectrum-managed optical pulse propagation in active fibers with programmable gain spectral profile, Tianxin Yang, Zifei Wang, Delin Yang, Dongfang Jia, Mei Sang, Tianjin Univ. (China) . . . . . [8255-62]

Polariton lasers based on GaN microcavities *(Invited Paper)*, Alexey V. Kavokin, Univ. of Southampton (United Kingdom) . . . . . [8262-60]

Green Photonics in Laser-assisted Manufacturing and Micro/Nano Fabrication

Sunday 22 January

Morning

Plasmonic nanocavities for photovoltaics devices and biosensing *(Invited Paper)*, Stéphane S. Collin, Andrea Cattoni, Clément Colin, Inès Massiot, Petru V. Ghenuche, Nathalie Bardou, Dominique Decanini, Anne-Marie Haghiri-Gosnet, Jean-Luc Pelouard, Ctr. National de la Recherche Scientifique (France) . . . . . [8268-07]

Afternoon

Quantum cascade laser enabled polymer waveguide sensor, Sheng Wu, Andrei Deev, California Institute of Technology (USA) . . . . . [8268-12]

Average power scaling of UV excimer lasers drives flat panel display and LIDAR applications, Ralph F. Delmdahl, Rainer Paetzel, Coherent GmbH (Germany) . . . . . [8238A-09]

Monday 23 January

Afternoon

High efficiency kW-class semiconductor laser bars with passive cooling, John G. Bai, Zhigang Chen, nLIGHT Corp. (USA); Paul O. Leisher, Rose-Hulman Institute of Technology (USA); Mark DeFranza, Mike Grimshaw, Mark A. DeVito, Robert J. Martinsen, Jim Haden, nLIGHT Corp. (USA) . . . . . [8241-31]

Guided resonances for light-assisted self assembly and structural-absorption engineering *(Invited Paper)*, Michelle L. Povinelli, Camilo Mejia Prada, Chenxi Lin, Eric Jaquay, Luis J. Martinez Rodriguez, The Univ. of Southern California (USA); Avik Dutt, Indian Institute of Technology Kharagpur (India) . . . . . [8236-36]

Comparative study of the performance of semiconductor laser based coherent Doppler lidars, Peter John L. Rodrigo, Christian Pedersen, Technical Univ. of Denmark (Denmark) . . . . . [8241-37]

Mechanism of selective removal of transparent layers on semiconductors using ultrashort laser pulses, Tino Rublack, Stefan Hartnauer, Markus Muchow, Michael Mergner, Gerhard Seifert, Martin-Luther-Univ. Halle-Wittenberg (Germany) . . . . . [8247-34]

Tuesday 24 January

Afternoon

A coherent laser Doppler wind profiler for active control of wind turbine, Leilei Shinohara, Siegwart Bogatscher, Nico Heussner, Harsha Umesh Babu, Wilhelm Stork, Karlsruher Institut für Technologie (Germany) . . . . . [8235-39]

Tuesday Posters

Theoretical and experimental results for using phosphate glass solar laser in the focus of powerful solar concentrator, Abdukhakim Fazilov, Riskiev Tohtapulat, Abdurahmanov Abdujabbar, Radjapov Lutfulla, Payziev Shermahamat, Institute of Materials Science UAS (Uzbekistan); Joris Lousteau, Daniel Milaneze, Davide Negro, Emanuele Mura, Nadia Boetti, Politecnico di Torino (Italy) . . . . . [8235-58]

Femtosecond laser doping and nanostructuring of silicon for photovoltaics, Benjamin Franta, Meng-Ju Sher, Yu-Ting Lin, Katherine C. Phillips, Eric Mazur, Harvard Univ. (USA) . . . . . [8243-50]

Wednesday 25 January

Morning

Tribological enhancement of surface properties by multi-scale femtosecond laser texturing: relation between laser treatment, topography, and wettability, Pavel Bizi-Bandoki, Stéphane Valette, Stéphane Benayoun, Ecole Centrale de Lyon (France); Eric Audouard, Univ. Jean Monnet Saint-Etienne (France) . . . . . [8243-32]

Afternoon

Long-wavelength VCSELs for sensing applications *(Invited Paper)*, Markus Ortsiefer, Vertilas GmbH (Germany) . . . . . [8276-09]

Thursday 26 January

Morning

Rotary MEMS comb-drive actuator with large deflection for photonic applications, Quamrul Huda, Fahim Amin, Univ. of Alberta (Canada); Yuebin Ning, Graham McKinnon, Norcada Inc. (Canada); Alexandre Lytkine, John Tulip, Wolfgang Jaeger, Univ. of Alberta (Canada) . . . . . [8248-02]

Afternoon

Selective ablation of thin films in latest generation CIGS solar cells with picosecond pulses, Andreas Burn, Martin Muralt, Berner Fachhochschule Technik und Informatik (Switzerland); Reiner Witte, Bruno Frei, Solneva SA (Switzerland); Stephan Bücheler, EMPA (Switzerland); Valerio Romano, Berner Fachhochschule Technik und Informatik (Switzerland) . . . . . [8243-45]

Green Photonics in Communications

Sunday 22 January

Morning

Novel step-tunable wavelength-swept optical system based on a SSB modulator driven by a RF generator for fiber sensing networks, Tianxin Yang, Changren Qiu, Zhaoying Wang, Chunfeng Ge, Mei Sang, Tianjin Univ. (China) . . . . . [8259-01]

Monday 23 January

Afternoon

Broadband perfect light absorber using a multiplexed metal-dielectric structure, Joshua Hendrickson, Air Force Research Lab. (USA); Junpeng Guo, Boyang Zhang, The Univ. of Alabama in Huntsville (USA); Walter Buchwald, Richard Soref, Air Force Research Lab. (USA) . . . . . [8269-12]

Wednesday 25 January

Afternoon

Evaluation of a costless 60-GHz OFDM based indoor wireless over multimode fiber green system employing a photonic integrated smart antenna *(Invited Paper)*, Spiros S. Mikroulis, Technological Education Institute of Athens (Greece); Panos Sotiropoulos, Technological Education Institute of Athens (Greece) and Hellenic Telecommunications Organization SA (Greece); George Agapiou, Hellenic Telecommunications Organization SA (Greece) . . . . . [8282-15]

Energy-efficient VCSELs for "green" data and computer communication, Philip Moser, Technische Univ. Berlin (Germany); James A. Lott, VI Systems GmbH (USA); Philip Wolf, Gunter Larisch, Alexey Payusov, Technische Univ. Berlin (Germany); Nikolay N. Ledentsov, Technische Univ. Berlin (USA); Werner Hofmann, Dieter Bimberg, Technische Univ. Berlin (Germany) . . . . . [8276-18]

Thursday 26 January

Morning

The smart room: a 100-Mb/s integrated optical access point transceiver for indoor visible light communication, Ninrat B. Datiri, Ali Mirvakili, Enjin Fu, Valencia M. Joyner, Tufts Univ. (USA). . . . . [8282-18]

Green Photonics in Renewable Energy Generation: Fusion and Photovoltaics

Monday 23 January

Morning

Increasing upconversion by metal and dielectric nanostructures *(Invited Paper)*, Jan Christoph Goldschmidt, Stefan Fischer, Heiko Steinkemper, Barbara Herter, Benedikt Bläsi, Fraunhofer-Institut für Solare Energiesysteme (Germany); Florian Hallermann, Gero von Plessen, RWTH Aachen (Germany); Karl W. Krämer, Daniel Biner, Univ. Bern (Switzerland); Martin Hermle, Fraunhofer-Institut für Solare Energiesysteme (Germany) . . . . . [8256-01]

Simulations of solar cell enhancement using whispering-gallery modes of dielectric nanospheres *(Invited Paper)*, Jonathan Grandidier, Dennis M. Callahan, Jr., Michael G. Deceglie, Jeremy N. Munday, Harry A. Atwater, California Institute of Technology (USA) . . . . . [8256-02]

Nanocrystalline cellulose for covert optical encryption, Mark P. Andrews, Yuping Zhang, Vamsy P. Chodavarapu, Andrew K. Kirk, McGill Univ. (Canada) . . . . [8258-07]

Improved efficiency for nanopillar array of c-Si photovoltaic by down-conversion and anti-reflection of quantum dots, Chien-chung Lin, Hsin-Chu Chen, H. W. Han, Y. L. Tsai, C. H. Chang, Min-An Tsai, Hao-Chung Kuo, Peichen Yu, National Chiao Tung Univ. (Taiwan) . . . . . [8256-07]

Scattering analysis of the indium-tin-oxide (ITO) nanowhiskers on ITO film substrate for a-Si solar cell, Hsiao-Wei Liu, Chia-Hua Chang, Cheng-Chung Lin, Peichen Yu, National Chiao Tung Univ. (Taiwan) . . . . . [8256-08]

Additional donor modification by oxy groups for strengthening electro-optic response of molecules *(Invited Paper)*, Akira Otomo, Toshiki Yamada, National Institute of Information and Communications Technology (Japan) . . . . . [8258-09]

Afternoon

Minority carrier contacts for high efficiency tandem solar cells, Christiana B. Honsberg, Stephen M. Goodnick, Arizona State Univ. (USA) . . . . . [8256-12]

Photovoltaic properties of silicon quantum dots in dielectric matrices, Philipp Löper, Anke Witzky, Fraunhofer-Institut für Solare Energiesysteme (Germany); Andreas Hartel, Sebastian Gutsch, Daniel Hiller, Albert-Ludwigs-Univ. Freiburg (Germany); Jan Christoph Goldschmidt, Stefan Janz, Stefan W. Glunz, Fraunhofer-Institut für Solare Energiesysteme (Germany); Margit Zacharias, Albert-Ludwigs-Univ. Freiburg (Germany) . . . . . [8256-14]

Achieve more than 5% PbS quantum dot solar cells, Jianbo Gao, National Renewable Energy Lab. (USA); So-Hee Jeong, Korea Institute of Machinery and Materials (Korea, Republic of); Octavi E. Semonin, Joseph M. Luther, National Renewable Energy Lab. (USA); Randy J. Ellingson, The Univ. of Toledo (USA); Arthur J. Nozik, Matthew C. Beard, National Renewable Energy Lab. (USA) . . . . . [8256-15]

Characterization of water-based thiophene polymers for organic photovoltaics, Tze Chien Sum, Michael Kurniawan, Kong Fai Tai, Cheng Hon A. Huan, Nanyang Technological Univ. (Singapore) . . . . . [8258-16]

White organic light-emitting diodes with ultra-thin mixed emitting layer, Taewoo Jeon, Ecole Polytechnique (France); Bernard Geffroy, Ecole Polytechnique (France) and CEA (France); Yvan Bonnassieux, Denis Tondelier, Ecole Polytechnique (France); Eléna Ishow, Univ. de Nantes (France); Sébastien V. Chenais, Sébastien Forget, Univ. Paris 13 (France) and CNRS (France) . . . . . [8258-17]

Tuesday 24 January

Morning

Thin Cu(In,Ga)Se $_2$ photovoltaic microcells: high efficiency with reduced material usage, Myriam Paire, Laurent Lombez, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) and Ctr. National de la Recherche Scientifique (France) and Ecole Nationale Supérieure de Chimie de Paris (France); Nicolas Péré-Laperne, Ctr. National de la Recherche Scientifique (France); Zacharie Jehl, Marie Jubault, Frédérique Donsanti, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) and Ctr. National de la Recherche Scientifique (France) and Ecole Nationale Supérieure de Chimie de Paris (France); Stéphane S. Collin, Alain Dollet, Jean-Luc Pelouard, Ctr. National de la Recherche Scientifique (France); Jean-François Guillemoles, Daniel Lincot, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France) and Ctr. National de la Recherche Scientifique (France) and Ecole Nationale Supérieure de Chimie de Paris (France) . . [8256-18]

Afternoon

Demonstration of a multiband solar cell *(Invited Paper)*, Nair López Martínez, Lawrence Berkeley National Lab. (USA); Lothar A. Reichertz, Lawrence Berkeley National Lab. (USA) and RoseStreet Labs. Energy (USA); Kin Man Yu, Lawrence Berkeley National Lab. (USA); Kenneth Campman, Sumika Electronic Materials, Inc. (USA); Wladek Walukiewicz, Lawrence Berkeley National Lab. (USA) and RoseStreet Labs. Energy (USA) . . . . . [8256-22]

Detailed balance calculations for quantum dot intermediate band solar cells with realistic absorption coefficients, Alexander Mellor, Antonio Luque, Ignacio Tobías, Antonio Martí, Univ. Politécnica de Madrid (Spain) . . . . [8256-24]

Wednesday 25 January

Morning

Modeling carrier relaxation in hot carrier solar cells *(Invited Paper)*, Stephen M. Goodnick, Christiana B. Honsberg, Arizona State Univ. (USA) . . . . . [8256-30]

InGaAs/GaAsP quantum wells for hot carrier solar cells, Louise C. Hirst, Markus Furher, Daniel J. Farrell, Imperial College London (United Kingdom); Arthur Le Bris, Jean-François Guillemoles, Institut de Recherche et Développement sur l'Energie Photovoltaïque (France); Murad J. Y. Tayebjee, Raphael Clady, Timothy W. Schmidt, The Univ. of Sydney (Australia); Masakazu Sugiyama, Yunpeng Wang, The Univ. of Tokyo (Japan); Nicholas J. Ekins-Daukes, Imperial College London (United Kingdom) . . . . . [8256-31]

Multiple exciton generation in PbSe nanorods, Paul D. Cunningham, U.S Naval Research Lab. (USA); Janice E. Boercker, Edward E. Foos, U.S. Naval Research Lab. (USA); Matthew P. Lumb, U.S. Naval Research Lab. (USA) and The George Washington Univ. (USA); Anthony R. Smith, Joseph G. Tischler, Joseph S. Melinger, U.S. Naval Research Lab. (USA) . . . . . [8256-34]

The use of nanostructures for meeting the terawatt photovoltaic challenge, Christiana B. Honsberg, Stephen M. Goodnick, Stuart G. Boweden, Arizona State Univ. (USA) . . . . . [8256-36]

Afternoon

Spectroscopic ellipsometry: metrology for photovoltaics from the nano to the giga *(Invited Paper)*, Sylvain Marsillac, Old Dominion Univ. (USA); Robert W. Collins, Jr., The Univ. of Toledo (USA) . . . . . [8256-37]

Energy conversion efficiency calculation model for direct-bonding planar-waveguide THz emitters based on optical rectification effects in GaAs, Tianxin Yang, Xuehui Niu, Junlong Wang, Mei Sang, Tianjin Univ. (China) . . . . . [8261-12]

A novel method to eliminate the artifacts in external quantum efficiency measurements on multi-junction solar cell, Jing-Jing Li, Shi Liu, Swee H. Lim, Charles R. Allen, Yong-Hang Zhang, Arizona State Univ. (USA) . . . [8256-40]

Minimizing solar cell reflection loss through surface texturing and implementation of 1D and 2D subwavelength dielectric gratings, Wei Wang, Akhil Mehrotra, Andenet Alemu, Alex Freundlich, Univ. of Houston (USA) . . . . . [8256-44]

Wednesday Posters

Energy conversion materials for photovoltaic application, Madhab Pokhrel, Ajith K. Gangadharan, Dhiraj K. Sardar, The Univ. of Texas at San Antonio (USA) . . . . . [8256-59]

Optimum concentration factor analysis using dynamic thermal model for a concentrated photovoltaic system, John T. Avrett, Air Force Institute of Technology (USA) . . . . . [8256-64]

First principle investigation of optoelectronic properties of (S-Ta)-doped TiO $_2$: an approach for solar energy harvesting, Shermin Arab, Roger K. Lake, Univ. of California, Riverside (USA) . . . . . [8256-65]

Numerical analysis of triangular micro-optical array for enhancement of incident power of photovoltaic panels, Rajat Dey, Evgueni V. Bordatchev, Mohammed Tauhiduzzaman, Hugo W. Reshef, National Research Council Canada (Canada) . . . . . [8256-69]

Thursday 26 January

Morning

Intersubband and intrasubband transition in InGaN quantum dot for solar cell application, Kuang-Chung Wang, Yuh-Renn Wu, National Taiwan Univ. (Taiwan) . . . . . [8256-49]

Afternoon

Photonic crystals for improving light absorption in organic solar cells *(Invited Paper)*, Ludovic Escoubas, David Duché, Jean-Jacques Simon, Institut Matériaux Microélectronique Nanosciences de Provence (France); Cécile Gourgon, Céline Masclaux, CEA-LETI (France); Philippe Torchio, Judikael Le Rouzo, Francois Flory, Institut Matériaux Microélectronique Nanosciences de Provence (France) . . . . . [8256-54]

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Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Biomedical Spectroscopy, Microscopy, and Imaging					
	SC1054 **Bio-Interferometry** *(Nolte)* 8:30 am to 12:30 pm, $300 / $355, p. 294	SC981 **Biomedical Fiber Optic Sensors and Applications** *(Mendez, McLaughlin)* 8:30 am to 12:30 pm, $300 / $355, p. 295	SC868 **Optical Design for Biomedical Imaging** *(Liang)* 1:30 to 5:30 pm, $380 / $435, p. 294	SC1051 **Fundamentals of Microscope Design** *(Seward)* 8:30 am to 12:30 pm, $300 / $355, p. 295	
	SC978 **Light Microscopy** *(Tkaczyk)* 1:30 to 5:30 pm, $335 / $390, p. 294		SC1053 **Ultrafast Laser Pulse Shaping and Adaptive Pulse Compression** *(Dantus)* 1:30 to 5:30 pm, $300 / $355, p. 296		
			SC1013 **Choosing the Correct Optical Filter for Your Application** *(Reichel)* 1:30 to 5:30 pm, $300 / $355, p. 296		
Clinical Technologies and Systems					
	SC312 **Principles and Applications of Optical Coherence Tomography** *(Fujimoto)* 1:30 to 5:30 pm, $300 / $355, p. 296	SC981 **Biomedical Fiber Optic Sensors and Applications** *(Mendez, McLaughlin)* 8:30 am to 12:30 pm, $300 / $355, p. 297			
Displays and Holography					
		SC011 **Design of Efficient Illumination Systems** *(Cassarly)* 1:30 to 5:30 pm, $300 / $355, p. 297			

Pricing = Member / Non-member

Course Daily Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Laser Applications					
			SC746 **Introduction to Ultrafast Technology** *(Trebino)* 1:30 to 5:30 pm, $300 / $355, p. 298	SC188 **Laser Beam Propagation for Applications in Laser Communications, Laser Radar, and Active Imaging** *(Phillips, Andrews)* 8:30 am to 5:30 pm, $655 / $765, p. 298	
Laser Micro-/Nanoengineering					
		SC743 **Micromachining with Femtosecond Lasers** *(Nolte, Schaffer)* 1:30 to 5:30 pm, $300 / $355, p. 299		SC689 **Precision Laser Micromachining** *(Schaeffer)* 1:30 to 5:30 pm, $300 / $355, p. 298	

Pricing = Member / Non-member

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Laser Source Engineering					
SC752 **Solid State Laser Technology** *(Hodgson)* 8:30 am to 5:30 pm, $640 / $750, p. 300	SC748 **High-Power Fiber Sources** *(Nilsson)* 8:30 am to 5:30 pm, $525 / $635, p. 300	SC931 **Applied Nonlinear Frequency Conversion** *(Paschotta)* 8:30 am to 5:30 pm, $525 / $635, p. 302	SC977 **Fundamentals of Laser Beam Profile Measurements** *(Rypma)* 8:30 am to 12:30 pm, $300 / $355, p. 302	WS972 **Basic Laser Technology** *(Sukuta)* 8:30 am to 12:30 pm, $300 / $355, p. 303	
	SC818 **Laser Beam Quality** *(Paschotta)* 8:30 am to 12:30 pm, $300 / $355, p. 301	SC974 **Interconnection and Splicing of High-Power Optical Fibers** *(Yablon)* 8:30 am to 12:30 pm, $300 / $355, p. 302	SC746 **Introduction to Ultrafast Technology** *(Trebino)* 1:30 to 5:30 pm, $300 / $355, p. 300	SC860 **Resonator Design for Solid State Lasers** *(Paschotta)* 8:30 am to 5:30 pm, $525 / $635, p. 301	
	SC1020 **Splicing of Specialty Fibers and Glass Processing of Fused Fiber Components for Fiber Lasers** *(Wang)* 8:30 am to 12:30 pm, $300 / $355, p. 303		SC1053 **Ultrafast Laser Pulse Shaping and Adaptive Pulse Compression** *(Dantus)* 1:30 to 5:30 pm, $300 / $355, p. 304		
	SC1012 **Coherent Mid-Infrared Sources and Applications** *(Vodopyanov)* 1:30 to 5:30 pm, $300 / $355, p. 303				
	SC744 **Ultrafast Fiber Lasers** *(Fermann)* 1:30 to 5:30 pm, $300 / $355, p. 299				

Pricing = Member / Non-member

Course Daily Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Metrology & Standards					
	SC212 **Modern Optical Testing** *(Wyant)* 8:30 am to 12:30 pm, $335 / $390, p. 305	SC211 **Practical Interferometry and Fringe Analysis** *(Creath)* 8:30 am to 5:30 pm, $525 / $635, p. 305	SC1011 **Understanding Waviness and Roughness Specifications for Optics** *(Aikens)* 1:30 to 5:30 pm, $300 / $355, p. 306	SC700 **Understanding Scratch and Dig Specifications** *(Aikens)* 8:30 am to 12:30 pm, $370 / $425, p. 305	
		SC1003 **Optical Scatter Metrology for Industry** *(Stover)* 8:30 am to 12:30 pm, $360 / $415, p. 304		SC1017 **Optics Surface Inspection Workshop** *(Aikens)* 1:30 to 5:30 pm, $380 / $435, p. 306	
Micro/Nanofabrication					
		SC454 **Fabrication Technologies for Micro- and Nano-Optics** *(Suleski)* 8:30 am to 12:30 pm, $300 / $355, p. 307		SC532 **Micro- and Nanofluidics - Technology and Applications** *(Gärtner)* 8:30 am to 12:30 pm, $300 / $355, p. 307	
		SC743 **Micromachining with Femtosecond Lasers** *(Nolte, Schaffer)* 1:30 to 5:30 pm, $300 / $355, p. 308		SC689 **Precision Laser Micromachining** *(Schaeffer)* 1:30 to 5:30 pm, $300 / $355, p. 308	
Nano/Biophotonics					
	SC463 **Biophotonics** *(Prasad)* 8:30 am to 5:30 pm, $605 / $715, p. 309		SC1013 **Choosing the Correct Optical Filter for Your Application** *(Reichel)* 1:30 to 5:30 pm, $300 / $355, p. 310	SC727 **Nanoplasmonics** *(Stockman)* 8:30 am to 5:30 pm, $525 / $635, p. 309	

Pricing = Member / Non-member

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Nanotechnologies in Photonics					
	SC608 **Photonic Crystals: A Crash Course, from Bandgaps to Fibers** *(Johnson)* 1:30 to 5:30 pm, $345 / $400, p. 310				
Nonlinear Optics					
	SC1060 NEW **Fundamentals of Nonlinear Optics** *(Powers)* 8:30 am to 12:30 pm, $300 / $355, p. 310	SC931 **Applied Nonlinear Frequency Conversion** *(Paschotta)* 8:30 am to 5:30 pm, $525 / $635, p. 311			
	SC1020 **Splicing of Specialty Fibers and Glass Processing of Fused Fiber Components for Fiber Lasers** *(Wang)* 8:30 am to 12:30 pm, $300 / $355, p. 312	SC974 **Interconnection and Splicing of High-Power Optical Fibers** *(Yablon)* 8:30 am to 12:30 pm, $300 / $355, p. 311			
	SC1012 **Coherent Mid-Infrared Sources and Applications** *(Vodopyanov)* 1:30 to 5:30 pm, $300 / $355, p. 311				
Optical Communications: Devices to Systems					
				SC188 **Laser Beam Propagation for Applications in Laser Communications, Laser Radar, and Active Imaging** *(Phillips, Andrews)* 8:30 am to 5:30 pm, $655 / $765, p. 312	

Pricing = Member / Non-member

Course Daily Schedule

Optics and Optical Engineering

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
	SC1060 NEW **Fundamentals of Nonlinear Optics** *(Powers)* 8:30 am to 12:30 pm, $300 / $355, p. 316	SC156 **Basic Optics for Engineers** *(Ducharme)* 8:30 am to 5:30 pm, $565 / $675, p. 315	SC1013 **Choosing the Correct Optical Filter for Your Application** *(Reichel)* 1:30 to 5:30 pm, $300 / $355, p. 320	SC1055 NEW **Applied Diffractive Optics** *(Soskind)* 8:30 am to 12:30 pm, $335 / $390, p. 317	
	SC935 **Introduction to Lens Design** *(Bentley)* 8:30 am to 5:30 pm, $525 / $635, p. 315	SC690 **Optical System Design: Layout Principles and Practice** *(Greivenkamp)* 8:30 am to 5:30 pm, $635 / $745, p. 314	SC206 **Polarized Light: A Practical Hands-on Introduction** *(Fisher)* 8:30 am to 5:30 pm, $525 / $635, p. 317	SC1061 NEW **Designing Optical Systems with Manufacturable Aspheres** *(Bentley)* 8:30 am to 12:30 pm, $300 / $355, p. 315	
		SC321 **Thin Film Optical Coatings** *(Macleod)* 8:30 am to 5:30 pm, $525 / $635, p. 318	SC003 **Practical Optical System Design** *(Youngworth)* 8:30 am to 5:30 pm, $610 / $720, p. 314	SC1039 NEW **Evaluating Aspheres for Manufacturability** *(Forbes, Murphy, Dumas)* 1:30 to 5:30 pm, $300 / $355, p. 316	
		SC011 **Design of Efficient Illumination Systems** *(Cassarly)* 1:30 to 5:30 pm, $300 / $355, p. 318	SC017 **Principles of Fourier Optics and Diffraction** *(Gaskill)* 8:30 am to 5:30 pm, $630 / $740, p. 317	SC1052 NEW **Optical Systems Engineering: A Practical Approach** *(Kasunic)* 8:30 am to 5:30 pm, $525 / $635, p. 313	
			SC915 NEW **Radiometry Revealed** *(Shaw)* 8:30 am to 12:30 pm, $300 / $355, p. 313	SC700 **Understanding Scratch and Dig Specifications** *(Aikens)* 8:30 am to 12:30 pm, $370 / $425, p. 319	
			SC1011 **Understanding Waviness and Roughness Specifications for Optics** *(Aikens)* 1:30 to 5:30 pm, $300 / $355, p. 319	SC1017 **Optics Surface Inspection Workshop** *(Aikens)* 1:30 to 5:30 pm, $380 / $435, p. 319	
				WS972 **Basic Laser Technology** *(Sukuta)* 8:30 am to 12:30 pm, $300 / $355, p. 320	

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Optoelectronic Materials and Devices					
	SC1060 NEW **Fundamentals of Nonlinear Optics** *(Powers)* 8:30 am to 12:30 pm, $300 / $355, p. 322	SC931 **Applied Nonlinear Frequency Conversion** *(Paschotta)* 8:30 am to 5:30 pm, $525 / $635, p. 322	SC817 **Silicon Photonics** *(Michel, Saini)* 8:30 am to 12:30 pm, $300 / $355, p. 321		
	SC547 **Terahertz Wave Technology and Applications** *(Zhang)* 1:30 to 5:30 pm, $300 / $355, p. 321	SC747 **Semiconductor Photonic Device Fundamentals** *(Linden)* 8:30 am to 5:30 pm, $525 / $635, p. 321			
Optomechanics					
			SC010 **Introduction to Optical Alignment Techniques** *(Ruda)* 8:30 am to 5:30 pm, $1000 / $1255, p. 323		
			SC781 **Optomechanical Analysis** *(Hatheway)* 8:30 am to 5:30 pm, $525 / $635, p. 323		
			SC015 **Structural Adhesives for Optical Bonding** *(Daly)* 8:30 am to 12:30 pm, $300 / $355, p. 323		
Photonic Integration					
		SC747 **Semiconductor Photonic Device Fundamentals** *(Linden)* 8:30 am to 5:30 pm, $525 / $635, p. 324	SC817 **Silicon Photonics** *(Michel, Saini)* 8:30 am to 12:30 pm, $300 / $355, p. 324		

Pricing = Member / Non-member

Course Daily Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Semiconductor Lasers and LEDs					
	SC1020 **Splicing of Specialty Fibers and Glass Processing of Fused Fiber Components for Fiber Lasers** *(Wang)* 8:30 am to 12:30 pm, $300 / $355, p. 326	SC974 **Interconnection and Splicing of High-Power Optical Fibers** *(Yablon)* 8:30 am to 12:30 pm, $300 / $355, p. 325	SC977 **Fundamentals of Laser Beam Profile Measurements** *(Rypma)* 8:30 am to 12:30 pm, $300 / $355, p. 326		
	SC1012 **Coherent Mid-Infrared Sources and Applications** *(Vodopyanov)* 1:30 to 5:30 pm, $300 / $355, p. 326	SC052 **Light-Emitting Diodes** *(Schubert)* 8:30 am to 12:30 pm, $370 / $425, p. 325			
		SC747 **Semiconductor Photonic Device Fundamentals** *(Linden)* 8:30 am to 5:30 pm, $525 / $635, p. 325			
		SC011 **Design of Efficient Illumination Systems** *(Cassarly)* 1:30 to 5:30 pm, $300 / $355, p. 324			
Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering					
	SC029 **Tissue Optics** *(Jacques)* 1:30 to 5:30 pm, $300 / $355, p. 327				

Pricing = Member / Non-member

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Industry Workshops - Business & Intellectual Property					
			WS1057 **Magnifying Your IP IQ: Topics for the Savvy Intellectual Property Manager** *(Gallagher, Yamato, Jankowski, Bayles)* 8:30 am to 12:30 pm, $300 / $355, p. 327		
			WS1056 **Commercialization of Photonics Technology** (Krohn) 1:30 to 5:30 pm, $300 / $355, p. 327		
			WS1058 **Critical Skills for Compelling Research Proposals** (Diehl) 1:30 to 5:30 pm, $100 / $150, p. 328		
Industry Workshops - Fundamental Optics					
		WS609 **Basic Optics for Non-Optics Personnel** *(Harding)* 1:30 to 4:00 pm, $100 / $150, p. 328		WS972 **Basic Laser Technology** *(Sukuta)* 8:30 am to 12:30 pm, $300 / $355, p. 329	
Professional Development Workshops					
		WS1059 **Resumes to Interviews: Strategies for a Successful Job Search** *(Krinsky)* 1:30 to 5:30 pm, $75 / $125, p. 329	WS1058 **Critical Skills for Compelling Research Proposals** *(Diehl)* 1:30 to 5:30 pm, $100 / $150, p. 329	WS667 **The Craft of Scientific Presentations: A Workshop on Technical Presentations** *(Alley)* 8:30 am to 12:30 pm, $75 / $125, p. 330	
				WS668 **The Craft of Scientific Writing: A Workshop on Technical Writing** *(Alley)* 1:30 to 5:30 pm, $75 / $125, p. 330	

Biomedical Spectroscopy, Microscopy, and Imaging

Optical Design for Biomedical Imaging

SC868

Course level: Intermediate
CEU .35 $380 Member / $435 Non-member USD
Tuesday 1:30 to 5:30 pm

This course provides attendees with a basic working knowledge of optical design for biomedical imaging. The course will begin with the fundamentals of biomedical optics, followed by the light sources, detectors, and other optical components for biomedical imaging. It will briefly discuss illumination and imaging system design, and then focus on optical systems and techniques for different imaging modalities. Design examples, such as fluorescence imaging and OCT imaging, will be presented

LEARNING OUTCOMES

This course will enable you to:
- learn the fundamentals of biomedical optics
- specify and select lenses, light sources, detectors and other optical components
- describe the optical system requirements for biomedical imaging
- become familiar with various optical systems for biomedical imaging
- design and model illumination and imaging systems for biomedical applications

INTENDED AUDIENCE

This material is intended for anyone who is interested in understanding and developing optical systems for biomedical applications. Basic knowledge of optical fundamentals is expected.

INSTRUCTOR

Rongguang (Ron) Liang is an associate professor at College of Optical Sciences, University of Arizona. Prior to that, he was a Senior Principal Research Scientist at Carestream Health Inc and a Principal Research Scientist at Eastman Kodak Company. He has been working on optical design for 15 years, in the fields of biomedical imaging, digital imaging, display, and 3D imaging. He is a Topical Editor of Applied Optics.

COURSE PRICE INCLUDES the text *Optical Design for Biomedical Imaging* (SPIE Press, 2010) by Rongguang Liang.

Bio-Interferometry

SC1054

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Sunday 8:30 am to 12:30 pm

This course explains the basic principles of optical interferometry applied to biological problems and systems. Interference is at the core of many types of optical detection and is a powerful probe of cellular and tissue structure such as for interference microscopy and optical coherence tomography. Interference is also the root cause of speckle and other imaging artifacts that limit range and resolution. Furthermore, the inherent sensitivity of interferometry enables ultrasensitive detection of molecules in biological samples for medical diagnostics using biosensors. In this course, emphasis is placed on the physics of light scattering, with a focus on coherence detection techniques that allow information to be selectively detected out of incoherent and heterogeneous backgrounds.

Bio-Interferometry is divided into four parts. The first part covers fundamental principles of partial coherence and interferometry. The next three parts move up successive size scales: biosensors and molecular interferometry (nano-scale), cellular interferometry and microscopy (micron-scale), and ending with tissue interferometry and holography (millimeter scale). The course clearly presents the physics, with easy derivations of the appropriate equations, while emphasizing "rules of thumb" that can be applied by experimental researchers to give semi-quantitative predictions.

LEARNING OUTCOMES

This course will enable you to:
- quantify the partial coherence of common light sources, including lasers, superluminescent diodes (SLDs), light emitting diodes (LEDs) and spectrally-filtered incandescent sources
- relate partial coherence to optical system performance and resolution, and to identify all the major classes of interferometers
- explain how the coherent properties of light change during propagation through biological tissues
- explain the origin of speckle in biological imaging, to determine and use the statistical properties of speckle, and to mitigate speckle for high-resolution imaging
- identify all the major classes of interferometric label-free biosensors, including Young's, Mach-Zender, Resonant Cavity, and Waveguide sensors, and to calculate the molecular responsivity and sensitivity of interferometric biosensors
- estimate and optimize phase contrast in interference and holographic microscopes
- explain the principles of coherence gating and imaging
- calculate the resolution and range of optical coherence tomography (OCT) and its variants, such as time-domain, spectral-domain, swept-source, full-field and holographic OCT
- describe the principles of lens-free holographic imaging of cells and tissues

INTENDED AUDIENCE

Scientists, engineers, technicians or managers who want to learn how to apply optical interferometry to measure or image biological molecules, cells or tissues. Undergraduate training in optical engineering or science is assumed.

INSTRUCTOR

David Nolte is a professor of physics at Purdue University. He has spent two decades in the field of coherent optics, with a focus on holography, interferometry and their applications to biology and medicine. David is a Fellow of the Optical Society of America and a Fellow of the American Physical Society. He was a Research Fellow of the Alfred P. Sloan Foundation, and a Presidential Young Investigator of the National Science Foundation. In 2005 he received the Herbert Newby McCoy Award, which is the highest scientific honor awarded by Purdue University. He is a popular lecturer, received the Best Teaching Award for undergraduate teaching in physics, has given over a hundred invited talks and seminars, and has been interviewed on public radio and by science magazines on the topics of his scientific research.

The course is based on the book "*Optical Interferometry for Biology and Medicine*", by David D. Nolte (Springer, 2011). A discount on the book will be made available by Springer to attendees of the Photonics West Course.

Light Microscopy

SC978

Course level: Introductory
CEU .35 $335 Member / $390 Non-member USD
Sunday 1:30 to 5:30 pm

This course provides attendees with a working knowledge of the principles of light microscopy. After reviewing the main principles of imaging, diffraction, interference and polarization used in microscopy, it discusses the most widely used microscope configurations and applications. The major system components will be covered: light sources, illumination layouts, microscope optics and image detection electronics. An overview of techniques will be given, including brightfield and darkfield imaging, phase and amplitude contrast, DIC, polarization and fluorescence microscopy. Scanning techniques like confocal and multiphoton imaging are also introduced. New technology trends like super-

resolution techniques (4Pi Microscopy, STED, STORM and Structured Illumination) will be summarized.

LEARNING OUTCOMES

This course will enable you to:
- describe microscopy set-ups
- learn how to configure a microscopy system
- determine primary system parameters like lateral, axial and temporal resolution, detection levels and others
- identify a microscopy imaging modality for your specific application
- become familiar with current trends in light microscopy

INTENDED AUDIENCE

This material is intended for anyone who needs to learn the principles of microscopy and variety of microscopy methods. Those who either assemble their own microscopy systems or who work with microscopy applications will find this course valuable.

INSTRUCTOR

Tomasz Tkaczyk is a Professor of Bioengineering at Rice University, where he specializes in systems engineering for miniature, cost effective and multi modal microscopy for biomedical applications. He is also interested in new microscopy techniques like hyperspectral real time imaging and sub-diffraction resolution imaging. He first gained his experience working throughout several years at the College of Optical Sciences, University of Arizona and continuous his research at Rice through numerous implementations at Texas Medical Center.

COURSE PRICE INCLUDES the text *Field Guide to Microscopy* (SPIE Press, 2009) by Tomasz S. Tkaczyk.

Fundamentals of Microscope Design

SC1051

NEW

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Wednesday 8:30 am to 12:30 pm

This course will cover the optical engineering principles necessary to understand the working principles of microscopes and to develop a design suited to your own application. The basic components common to any microscope are defined. Seidel and chromatic aberrations which determine image quality are reviewed. The composition of the glass elements are related to chromatic aberrations.

The contrast sensitivity function of human vision as it relates to microscopy is described. The effects of numerical aperture (NA) are described in terms of diffraction and lateral coherence. The numerous definitions of Nelson, Critical, and Kohler illumination are resolved by reference to the original designs of the 1890s. Edge sharpening by the use of critical illumination is described.

LEARNING OUTCOMES

This course will enable you to:
- identify the basic components of a microscope
- define a paraxial thick-lens model of an objective
- comprehend Seidel and chromatic aberrations
- select glass types for minimum lateral color
- sharpen human vision with proper design of the exit pupil
- comprehend the lateral inhibition of human vision
- define a practical NA in the presence of spherical aberration
- define a point spread function in relation to the objective NA
- define depth of focus with a Gaussian beam
- comprehend the effects of the illumination NA
- optimize the design of a microscope for your specific needs

INTENDED AUDIENCE

Instrument designers seeking optimum performance of a microscope.

INSTRUCTOR

George Seward is a consultant in optical design through L-A-Omega, Inc. His book, Optical Design of Microscopes (SPIE Press, 2010) provides a more rigorous treatment of the subject beyond this introductory seminar.

Biomedical Fiber Optic Sensors and Applications

SC981

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Monday 8:30 am to 12:30 pm

This course provides a broad overview of optical fiber sensing principles and techniques for biological and medical applications. The course is divided into two parts. Part I provides an introduction to fiber optic sensor (FOS) technology. This includes their operating principles, associated components (such as light sources, detectors, couplers, polarizers, etc.), and the specialty fiber types required for biomedical sensing system integration.

In Part II, a review of the major classes of biomedical fiber sensors and techniques is made (based on VIS-UV-IR absorption, scattering, spectroscopy, fluorescence-among others), along with discussions on detection techniques, data analysis and interpretation. In addition, since some types of biomedical FOS rely, directly or indirectly, on visual or spectral imaging, the relevant image processing techniques and associated algorithms will also be discussed.

LEARNING OUTCOMES

This course will enable you to:
- describe the operating principles, characteristics and advantages of fiber optic sensors
- review a wide range of sensor types and the biomedical parameters/features they detect
- learn the required components necessary to make complete biomedical fiber sensing systems
- describe deployment mechanisms for fiber sensors in a biomedical setting
- illustrate specific sensing solutions and their clinical impact through case-study analysis
- identify key image processing techniques available for fiber optic sensor applications
- obtain an overall view of the biological and medical fiber sensing industries and their trends

INTENDED AUDIENCE

Technical managers, scientists, engineers, technicians and research students who wish to learn about biomedical sensors and fiber sensing technology and review their implementation and applications. The course is also suitable to gain an overview of the field and to learn about state-of-the-art of fiber optic-based biomedical and life sciences applications and devices.

INSTRUCTORS

Alexis Mendez is President of MCH Engineering LLC, and has over 20 years of experience in optical fiber technology, sensors and instrumentation. He was the former Group Leader of the Fiber Optic Sensors Lab within ABB Corporate Research (USA), working on the development of new fiber optic sensing systems for electric utility and oil & gas applications. He has written over 45 technical publications, holds 4 US patents and is recipient of an R&D 100 award. He is an SPIE Fellow, editor of the *Specialty Optical Fibers Handbook*, as well as past chair of the International Optical Fiber Sensors Conference (OFS-18). Dr. Mendez holds a PhD. degree in Electrical Engineering from Brown University.

Robert McLaughlin is an Associate Professor at the University of Western Australia, where he leads research in fiber-optic sensors for oncology. He has over 10 years of experience in medical imaging and was previously a Product Manager with Siemens Medical Solutions, responsible for bringing several medical products to market. Prior to this, he was a researcher in medical imaging at the University of Oxford, UK.

Choosing the Correct Optical Filter for Your Application

SC1013

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

This course enables attendees to choose and specify the appropriate optical filter type for different applications. The physical principles of interference (multilayer thin film) and absorption (doped glass) filters are explained. Optical filters are clustered into groups according to their spectral characteristics (e.g. band pass or notch filter). The individual advantages and drawbacks of the different filter types are described across the ultraviolet, visible and infrared spectrum. Anyone who is faced with the question "what is the right filter for my application?" or "how should I specify the filter?" will benefit from this course.

LEARNING OUTCOMES

This course will enable you to:
- describe the physical fundamentals of interference filters (thin film filters)
- explain the physics of absorption filters (doped glass filters)
- classify filters according to their spectral characteristics
- transfer filter spectral curves into color coordinates
- use design calculation tools for interference and absorption filters
- identify advantages and disadvantages of both optical filter types
- demonstrate typical applications of optical filters for analytics, biophotonics, digital image sensors, etc.
- formulate typical filter specifications for on your own application

INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn more about how to use and apply optical filters for different applications. Basic knowledge in optics is assumed.

INSTRUCTOR

Steffen Reichel is currently in charge of product management and business development for optical filters at SCHOTT AG in Mainz/Germany. He has been working on fiber optic telecommunications, wave guided optics, diffractive optics, laser optics, and imaging optics since more than 10 years. Besides his work in the field of optical filters at SCHOTT AG he is associated lecturer for "Microoptics 1 (diffractive optics)" and "Microoptics 2 (wave optics)" at the University of Applied Science Darmstadt, Germany. He earned a Ph.D. in Electrical Engineering in the field of fiber optic telecommunications at the University of Kaiserslautern. Dr. Reichel is a Senior Member of the IEEE Photonics Society.

Ultrafast Laser Pulse Shaping and Adaptive Pulse Compression

SC1053

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

Pulse shapers are being used for a number of applications including (a) pulse compression, (b) pulse characterization, (c) creation of two or more pulse replicas, and (d) control of nonlinear optical processes such as selective two-photon excitation and selective vibrational mode excitation. This course will introduce the most common pulse shaper designs and discuss their operational differences. A brief theoretical description will be presented for those wanting to simulate different pulse shaping scenarios; however, most of the course will be based on experimental implementation and results. The course will emphasize applications of pulse shapers that greatly enhance the capabilities of femtosecond laser sources.

LEARNING OUTCOMES

This course will enable you to:
- design and build a pulse shaper based on a particular set of goals
- compare different pulse shaper designs and determine which one is best suited for a particular application
- simulate the output pulse from a pulse shaper given a particular phase and amplitude modulation
- define key concepts in pulse shaper design such as optical resolution and focal length. Describe the effect caused by introducing a simple phase such as a linear, quadratic or cubic function on a transform-limited pulse
- explain two different approaches to creating pulse replicas that can be independently controlled in the time domain using the pulse shaper
- measure the spectral phase of laser pulses using the pulse shaper itself as the measurement tool, and eliminate phase distortions to compress the output pulses
- summarize the advantages of having an adaptive pulse shaper for controlling the output of ultrafast lasers

INTENDED AUDIENCE

This course is intended for those interested in learning how pulse shapers can greatly enhance the performance and utility of ultrafast (femtosecond) laser sources. Results from more advanced methods will be presented, but the course does not require previous experience with pulse shaping.

INSTRUCTOR

Marcos Dantus received his PhD on the development of Femtochemistry, postdoc on the development of Ultrafast Electron Diffraction under Professor Zewail (Caltech, 1999 Nobel Prize). Presently a University Distinguished Professor of Chemistry and Physics at Michigan State University. Dantus' interests include ultrafast laser pulse theory, development and control, control of nonlinear laser-matter interactions, and biomedical imaging. Dantus has more than 150 publications, 43 invention disclosures and 13 patents. Dantus is presently the President and CEO of BioPhotonic Solutions Inc, the President of the OSA Ann Arbor, MI chapter and serves on the board of advisors for Chemical Physics Letters.

Clinical Technologies and Systems

Principles and Applications of Optical Coherence Tomography

SC312

Course level: Advanced
CEU .35 $300 Member / $355 Non-member USD
Sunday 1:30 to 5:30 pm

Optical coherence tomography (OCT) is a new imaging modality, which is the optical analog of ultrasound. OCT can perform high resolution cross sectional imaging of the internal structure of biological tissues and materials. OCT is promising for biomedical imaging because it functions as a type of optical biopsy, enabling tissue pathology to be imaged in suit and in real time. This technology also has numerous applications in other fields ranging from nondestructive evaluation of materials to optical data storage. This course describes OCT and the integrated disciplines including fiber optics, interferometry, high-speed optical detection, biomedical imaging, in vitro and in vivo studies, and clinical medicine

LEARNING OUTCOMES

This course will enable you to:
- describe the principles of optical coherence tomography (OCT)
- understand a systems viewpoint of OCT technology
- understand OCT detection approaches and factors governing performance
- understand ultrafast laser technology and other low coherence light sources

- describe OCT imaging devices such as microscopes, hand held probes and catheters
- describe functional imaging such as Doppler and spectroscopic OCT
- understand an overview of clinical imaging including clinical ophthalmology, surgical guidance, and detection of neoplasia and guiding biopsy
- gain an overview of materials applications
- discuss transitioning technology from the laboratory to the clinic

INTENDED AUDIENCE

This material is appropriate for scientists, engineers, and clinicians who are performing research in medical imaging.

INSTRUCTOR

James Fujimoto is Professor of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology. His research interests include femtosecond optics and biomedical imaging and his group is responsible for the invention and development of optical coherence tomography. Dr. Fujimoto is a member of the National Academy of Sciences and National Academy of Engineering. He is co-chair of the SPIE BIOS symposium and co-chair of the conference on Optical Coherence Tomography and Coherence Domain Techniques at BIOS. Dr. Fujimoto is a co-founder of LightLabs Imaging, a company developing OCT for intravascular imaging that was recently acquired by St. Jude Medical.

Biomedical Fiber Optic Sensors and Applications

SC981

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Monday 8:30 am to 12:30 pm

This course provides a broad overview of optical fiber sensing principles and techniques for biological and medical applications. The course is divided into two parts. Part I provides an introduction to fiber optic sensor (FOS) technology. This includes their operating principles, associated components (such as light sources, detectors, couplers, polarizers, etc.), and the specialty fiber types required for biomedical sensing system integration.

In Part II, a review of the major classes of biomedical fiber sensors and techniques is made (based on VIS-UV-IR absorption, scattering, spectroscopy, fluorescence-among others), along with discussions on detection techniques, data analysis and interpretation. In addition, since some types of biomedical FOS rely, directly or indirectly, on visual or spectral imaging, the relevant image processing techniques and associated algorithms will also be discussed.

LEARNING OUTCOMES

This course will enable you to:

- describe the operating principles, characteristics and advantages of fiber optic sensors
- review a wide range of sensor types and the biomedical parameters/features they detect
- learn the required components necessary to make complete biomedical fiber sensing systems
- describe deployment mechanisms for fiber sensors in a biomedical setting
- illustrate specific sensing solutions and their clinical impact through case-study analysis
- identify key image processing techniques available for fiber optic sensor applications
- obtain an overall view of the biological and medical fiber sensing industries and their trends

INTENDED AUDIENCE

Technical managers, scientists, engineers, technicians and research students who wish to learn about biomedical sensors and fiber sensing technology and review their implementation and applications. The course is also suitable to gain an overview of the field and to learn about state-of-the-art of fiber optic-based biomedical and life sciences applications and devices.

INSTRUCTORS

Alexis Mendez is President of MCH Engineering LLC, and has over 20 years of experience in optical fiber technology, sensors and instrumentation. He was the former Group Leader of the Fiber Optic Sensors Lab within ABB Corporate Research (USA), working on the development of new fiber optic sensing systems for electric utility and oil & gas applications. He has written over 45 technical publications, holds 4 US patents and is recipient of an R&D 100 award. He is an SPIE Fellow, editor of the *Specialty Optical Fibers Handbook*, as well as past chair of the International Optical Fiber Sensors Conference (OFS-18). Dr. Mendez holds a PhD. degree in Electrical Engineering from Brown University.

Robert McLaughlin is an Associate Professor at the University of Western Australia, where he leads research in fiber-optic sensors for oncology. He has over 10 years of experience in medical imaging and was previously a Product Manager with Siemens Medical Solutions, responsible for bringing several medical products to market. Prior to this, he was a researcher in medical imaging at the University of Oxford, UK.

Displays and Holography

Design of Efficient Illumination Systems

SC011

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Monday 1:30 to 5:30 pm

Illumination systems are included in fiber illuminators, projectors, and lithography systems. The design of an illumination system requires balancing uniformity, maximizing the collection efficiency from the source, and minimizing the size of the optical package. These choices are examined for systems using lightpipes, lens arrays, faceted optics, tailored edge rays designs, and integrating spheres through a combination of computer simulations, hardware demonstrations and discussions.

LEARNING OUTCOMES

This course will enable you to:

- describe the differences between illuminance, intensity and luminance
- compute the required source luminance given typical illumination system specifications
- compute the change in luminance introduced by an integrating sphere
- distinguish between a Kohler illuminator and an Abbe illuminator
- explain the difference in uniformity performance between a tailored edge ray reflector and a standard conic reflector
- design a lightpipe system to provide uniform illuminance
- design a lens array system to create a uniform illuminance distribution
- design a reflector with facets to create a uniform illuminance distribution

INTENDED AUDIENCE

Individuals who design illumination systems or need to interface with those designers will find this course appropriate. Previous exposure to Optical Fundamentals (Reflection, Refraction, Lenses, Reflectors) is expected.

INSTRUCTOR

William Cassarly is a Senior Scientist with Synopsys (formerly Optical Research Associates). Before joining ORA 14 years ago, Cassarly worked at GE for 13 years, holds 46 patents, and has worked extensively in the areas of illumination system design, sources, photometry, light pipes, and non-imaging optics. Bill was awarded the GE Corporate 'D. R. Mack Advanced Course Supervisor Award' for his efforts in the training of GE Engineers and is an SPIE Fellow.

Laser Applications

Laser Beam Propagation for Applications in Laser Communications, Laser Radar, and Active Imaging

SC188

Course level: Intermediate
CEU .65 $655 Member / $765 Non-member USD
Wednesday 8:30 am to 5:30 pm

This course describes beam wave propagation through optical turbulence. Satellite communication systems, laser radar, remote sensing, and adaptive optics are some of the applications affected by optical turbulence. Tractable analytic equations are provided for calculating Gaussian-beam wave statistical quantities affecting system performance. The mutual coherence function (MCF), mean intensity, degree of coherence, and intensity fluctuations (scintillation) are presented. Videos of actual experiments show how to gather data. Examples are presented using MATHEMATICA software programs. Copies of these programs are available in the text.

LEARNING OUTCOMES

This course will enable you to:
- calculate power budget for laser-based radar and communications systems
- calculate system reliability for laser radar and communication systems
- calculate backscatter effects from targets in monostatic and bistatic laser radar systems
- use MATHEMATICA programs to calculate statistical parameters for laser-based systems

INTENDED AUDIENCE

This course is intended for scientists, supervising and design engineers who are interested in understanding the propagation phenomena, which impose limitations on system performance, and in learning new approaches to improving system design.

INSTRUCTORS

Ronald Phillips is Director of the Florida Space Institute, Professor of Electrical and Computer Engineering, and an associate member of the School of Optics/CREOL at the University of Central Florida. He has worked in optical wave propagation for more than 25 years.

Larry Andrews is Professor of Mathematics and an associate member of School of Optics/CREOL at the University of Central Florida. He has worked in optical wave propagation for more than 20 years.

COURSE PRICE INCLUDES the texts, *Laser Beam Propagation through Random Media* (SPIE Press, 2005) by Ronald Phillips and Larry Andrews and the *Field Guide to Atmospheric Optics* (SPIE Press, 2004) by Larry C. Andrews.

Introduction to Ultrafast Technology

SC746

Expanded course lectures will be available on the instructor's web site.

Course level: Introductory
CEU .35
$300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

Ultrafast Optics-the science, technology, and applications of ultrashort laser pulses-is one of the most exciting and dynamic fields of science. While ultrashort laser pulses seem quite exotic (they're the shortest events ever created!), their applications are many, ranging from the study of ultrafast fundamental events to telecommunications to micromachining to biomedical imaging, to name a few. Interestingly, these lasers are easy to understand, and they are readily available. But their use requires some sophistication. This course is a basic introduction to the nature of these lasers, their use, and some of their applications.

LEARNING OUTCOMES

This course will enable you to:
- understand how ultrafast lasers work
- know how to use ultrashort laser pulses in virtually any application
- know what mirrors to use, how to focus pulses, and how to shape pulses
- know how to keep the pulses short
- know how to meaningfully measure these pulses
- appreciate several important applications of these pulses

INTENDED AUDIENCE

The intended audience is any scientist, engineer or biomedical researcher interested in this exciting field, especially those new to the field.

INSTRUCTOR

Rick Trebino is the Georgia Research Alliance-Eminent Scholar Chair of Ultrafast Optical Physics at the School of Physics at the Georgia Institute of Technology. His research focuses on the use and measurement of ultrashort laser pulses. He is best known for his invention and development of Frequency-Resolved Optical Gating (FROG), the first general method for measuring the intensity and phase evolution of an ultrashort laser pulse, and which is rapidly becoming the standard technique for measuring such pulses. He has also invented techniques for measuring ultraweak ultrashort pulses, ultrafast polarization variation, and ultrafast material relaxation.

Laser Micro-/Nanoengineering

Precision Laser Micromachining

SC689

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Wednesday 1:30 to 5:30 pm

This course is a comprehensive look at laser technology as applied to precision micromachining. A brief background discussion on laser history, technology and definition of important terms will be presented. Then, available laser sources will be compared and contrasted including CO_2, excimer, Nd:YAG, fiber and short pulse lasers. IR and UV material/photon interaction, basic optical components and system integration are also crucial to getting good processing results and these will all be examined in detail. Finally, real applications from the medical, microelectronics, aerospace and other fields will be presented.

This course has been greatly expanded to include detailed discussions on short pulse lasers (ps and fs) and their applications, both present and future. In addition, two market areas have been significantly updated - Aerospace/Defense and renewable energy, particularly Solar. One of the biggest growth markets in the laser future (and historically!), the growth of renewable energy applications will infuse hundreds of millions of dollars into the laser community as new electricity generating capability is brought on line.

LEARNING OUTCOMES

This course will enable you to:
- compare UV, IR and other laser sources to each other and learn where each is best applied
- describe and be familiar with several kinds of micromachining lasers on the market
- describe material/photon interaction and why and how UV lasers for instance are different than IR lasers
- analyze a potential manufacturing application to identify it as a possible candidate for laser processing
- familiarize yourself with 'real world' opportunities for laser micromachining
- identify marketplace growth opportunities

INTENDED AUDIENCE

The course will benefit anyone with an interest in small-scale industrial laser machining and achieving the best edge quality, highest resolution and cost effectiveness. Engineers will benefit from the technical discussions. Project Managers will benefit from cost considerations and risk reduction scenarios.

INSTRUCTOR

Ronald Schaeffer is Chief Executive Officer of PhotoMachining, Inc. He has been involved in laser manufacture and materials processing for over 25 years, working in and starting small companies. He has over 130 publications, has written monthly web and print columns (currently writing a column for MicroManufacturing Magazine) and is on the Editorial Advisory Board of Industrial Laser Solutions. He is also a past member of the Board of Directors of the Laser Institute of America and is affiliated with the New England Board of Higher Education. He has a Ph.D. in Physical Chemistry from Lehigh University and did graduate work at the University of Paris, after which he worked for several major laser companies. He is a US Army veteran of the 172nd Mountain Brigade and the 101st Airborne division. In his spare time he farms, collects antique pocket watches, plays guitar and rides motorcycle.

Micromachining with Femtosecond Lasers

SC743

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Monday 1:30 to 5:30 pm

This course provides attendees with the knowledge necessary to understand and apply femtosecond laser pulses for micromachining tasks in a variety of materials. Emphasis will be placed on developing a fundamental understanding of how femtosecond pulses interact with the sample. From this knowledge, the advantages and limitations of femtosecond lasers for various micromachining tasks can be readily understood. Examples will be given in the micromachining of the surface of metals, semiconductors, and transparent materials, as well as the formation of photonic and microfluidic devices in the bulk of transparent materials.

LEARNING OUTCOMES

This course will enable you to:
- summarize the linear and non-linear interaction mechanisms of femtosecond laser pulses with metals, semiconductors, and transparent materials
- explain mechanisms for material removal and modification, as well as factors affecting precision and degree of collateral damage
- describe unique capabilities afforded by femtosecond pulses for micromachining bulk transparent materials
- determine appropriate femtosecond laser parameters for a micromachining task
- compare various micromachining methods and evaluate the most appropriate for a given job

INTENDED AUDIENCE

This course is aimed at people already doing or interested in starting research on short-pulse laser micromachining, as well as at people who have specific micromachining problems and wish to evaluate the potential of femtosecond lasers for accomplishing their task. Those who do not have a background in some of the unique properties of femtosecond laser pulses would benefit from attending SC541, "An Introduction to Femtosecond Laser Techniques," by Eric Mazur and/or SC746 "Introduction to Ultrafast Technology" by Rick Trebino before attending this course.

INSTRUCTORS

Stefan Nolte is a Professor at the Friedrich-Schiller University in Jena, Germany. His research topics include ultrashort pulse micromachining for industrial and medical applications. He has been actively engaged in research on femtosecond laser micromachining since the field's inception in the mid-1990s.

Christopher Schaffer is an Assistant Professor at Cornell University, where his current research focuses on applications of femtosecond laser ablation in biology. He has been actively engaged in research on femtosecond laser micromachining since the field's inception in the mid-1990s.

COURSE PRICE INCLUDES a detailed reading list of key papers.

Laser Source Engineering

Ultrafast Fiber Lasers

SC744

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Sunday 1:30 to 5:30 pm

Starting from an introduction to fiber lasers, basic properties of fiber amplifiers are reviewed and current state of the art fiber amplifier technology is summarized. The course then describes preferred construction methods for ultrafast fiber lasers and frequency combs and discusses their applications in a variety of optical systems. The course covers mode locked fiber oscillators, phase stabilization techniques, supercontinuum sources, ultrafast fiber amplifiers, frequency converters as well as pulse compressors. Numerous design examples are given, illustrating the recurring physical phenomena governing these systems. The attendee learns about preferred methods for pico- and femtosecond pulse generation in compact fiber systems and basic modeling techniques for pulse evolution, stability, jitter and noise. The course concludes with overviews of applications in materials processing, frequency metrology, spectroscopy and optical sampling.

LEARNING OUTCOMES

This course will enable you to:
- design and build pico-and femtosecond fiber lasers
- model pulse evolution and noise in fiber systems
- describe fiber frequency combs
- gain an overview of applications in material processing
- gain an overview of applications in coherent optical technologies

INTENDED AUDIENCE

This course is intended for researchers, engineers and graduate students who are interested in ultrafast optical technology. It will not only be a 'how to' instruction but will also address the 'why' for those who want to build their own ultrafast fiber laser systems.

INSTRUCTOR

Martin Fermann is Director of Laser Research with IMRA America Inc. He has been involved in fiber and ultrafast laser research for 25 years and is a fellow of the Optical Society of America.

Introduction to Ultrafast Technology

SC746

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

Ultrafast Optics-the science, technology, and applications of ultrashort laser pulses-is one of the most exciting and dynamic fields of science. While ultrashort laser pulses seem quite exotic (they're the shortest events ever created!), their applications are many, ranging from the study of ultrafast fundamental events to telecommunications to micromachining to biomedical imaging, to name a few. Interestingly, these lasers are easy to understand, and they are readily available. But their use requires some sophistication. This course is a basic introduction to the nature of these lasers, their use, and some of their applications.

LEARNING OUTCOMES

This course will enable you to:
- understand how ultrafast lasers work
- know how to use ultrashort laser pulses in virtually any application
- know what mirrors to use, how to focus pulses, and how to shape pulses
- know how to keep the pulses short
- know how to meaningfully measure these pulses
- appreciate several important applications of these pulses

INTENDED AUDIENCE

The intended audience is any scientist, engineer or biomedical researcher interested in this exciting field, especially those new to the field.

INSTRUCTOR

Rick Trebino is the Georgia Research Alliance-Eminent Scholar Chair of Ultrafast Optical Physics at the School of Physics at the Georgia Institute of Technology. His research focuses on the use and measurement of ultrashort laser pulses. He is best known for his invention and development of Frequency-Resolved Optical Gating (FROG), the first general method for measuring the intensity and phase evolution of an ultrashort laser pulse, and which is rapidly becoming the standard technique for measuring such pulses. He has also invented techniques for measuring ultraweak ultrashort pulses, ultrafast polarization variation, and ultrafast material relaxation.

Expanded course lectures will be available on the instructor's web site.

High-Power Fiber Sources

SC748

Course level: Advanced
CEU .65 $525 Member / $635 Non-member USD
Sunday 8:30 am to 5:30 pm

This course describes the principles of high-power fiber lasers and amplifiers, with output powers that can exceed a kilowatt. It reviews current state of the art and research directions of this rapidly advancing field. Fiber technology, pump lasers and input coupling will be addressed. Rare-earth-doped fiber devices including those based on Yb-doped fibers at 1.0 - 1.1 µm and the more complicated Er:Yb codoped fibers at 1.5 - 1.6 µm and Tm-doped fibers at 2 µm will be covered. Devices based on nonlinear scattering phenomena such as stimulated Raman scattering will be considered if time allows. The operating regimes to be treated extend from continuous-wave single-frequency to short pulses. A few key equations will be introduced to find limits and identify critical parameters. For example, pump brightness is a critical parameter for some devices in some regimes but not always. Methods to mitigate limitations in different operating regimes will be discussed. A large core is a critical fiber design feature of high-power fiber lasers, and the potential and limits of this approach will be covered, e.g., as it comes to beam quality.

LEARNING OUTCOMES

This course will enable you to:
- describe the state of the art of high-power fiber lasers and amplifiers
- assess performance limitations and their underlying physical reasons in different operating regimes
- design fiber devices to mitigate detrimental effects and reach required specifications
- describe possibilities, limitations, and implications of current technology regarding core size and rare earth concentration of doped fibers
- get a sense of areas in need of further research

INTENDED AUDIENCE

This course is intended for scientists and engineers involved in the research and development of commercial and military high power fiber systems.

INSTRUCTOR

Johan Nilsson leads the high-power fiber laser group at the Optoelectronics Research Centre (ORC), University of Southampton, England. He received a doctorate in Engineering Science from the Royal Institute of Technology, Stockholm, Sweden, for research on optical amplification, and has worked on optical amplifiers and amplification in lightwave systems, optical communications, and guided-wave lasers, for both Samsung and the ORC. His research has covered system, fabrication, and materials aspects of guided-wave lasers and amplifiers, particularly device aspects of high power fiber lasers and erbium-doped fiber amplifiers. He has published 300+ scientific articles and served on program committees including chairing the 2006 Fiber Laser Technology & Applications conference at Photonics West. In 2009, he guest edited two issues on high power fiber lasers and applications in IEEE J. Sel. Top. Quantum Electron. He is a fellow of the OSA.

Solid State Laser Technology

SC752

Course level: Intermediate
CEU .65 $640 Member / $750 Non-member USD
Saturday 8:30 am to 5:30 pm

This course provides an overview of the design, performance characteristics and the current state of the art of solid state lasers and devices. The course reviews the laser-relevant properties of key solid state materials, and discusses the design principles for flashlamp pumped and diode-pumped solid state lasers in cw, pulsed, Q-switched and modelocked operation. Solid state media emphasized include Nd and Yb-doped crystals but mid-IR materials such as Tm, Ho and Er-doped fluorides and oxides will be addressed as well. The course will cover the fundamental scaling laws for power, energy and beam quality for various geometries of the gain medium (rod, slab, disk, waveguide) and pumping arrangements (side and end-pumped) and provides an overview of the state-of-the art of solid state lasers. This includes a review of the design and performance of fiber lasers/amplifiers and their comparison to bulk solid state lasers. An overview of the state-of the art of optically pumped semiconductor lasers (OPSL) will also be given.

Important technical advances (such as diode pump developments) that allowed the technology to mature into diverse industrial and biomedical OEM devices as well as high power and scientific applications will be highlighted along with some remaining design and performance challenges. Topics also include nonlinear frequency conversion techniques, such as harmonic generation, Raman scattering and parametric processes, commonly used in solid state lasers to extend operation to alternative spectral regimes. The course includes an overview of currently available solid state laser products and their industrial and scientific applications.

LEARNING OUTCOMES

This course will enable you to:
- describe the significant laser-relevant properties of solid state laser materials
- acquire an up-to-date overview of solid state laser materials, components, resonators and applications

- assess how thermal properties limit power scaling and beam quality in practical laser systems
- acquire the design criteria for solid state lasers in cw and pulsed operation
- learn about the design methodology of Q-switched and modelocked lasers
- compare the properties, advantages and limitations of different high power solid state laser configurations including fiber lasers/ amplifiers
- become familiar with design principles for solid state lasers with second and third harmonic generation
- develop an appreciation of the scope, depth and pace of technical progress of the state-of-the art of solid state lasers in the UV, visible, IR and mid-IR wavelengths range

INTENDED AUDIENCE

This course is intended for graduate students, engineers, scientists, technicians and managers working in solid state laser research or product development.

INSTRUCTOR

Norman Hodgson is Vice President for Technology and Advanced R&D at Coherent. He has more than 25 years experience in solid state laser design, optimization and product development. Previously held positions include Vice President of Engineering at Coherent (2003-2009), Director of Engineering at Spectra-Physics (1998-2003), Inc., Senior Laser Engineer and Program Manager at Carl Zeiss, Inc. (1992-1996) and various university positions. He received his PhD in Physics from Technical University Berlin in 1990. He is co-author of the book "Optical Resonators" (Springer-Verlag 1996) which went into a second edition as "Laser Resonators and Beam Propagation" (Springer- Verlag 2005). Dr. Hodgson has authored over 80 publications and conference presentations and is co-inventor on more than 15 issued and pending patents.

Laser Beam Quality

SC818

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Sunday 8:30 am to 12:30 pm

This course will address all aspects of laser beam quality. Topics to be covered are: a short introduction to Gaussian beams, definitions and importance of beam quality, measurement techniques, typical beam quality issues related to various kinds of lasers (primarily solid state lasers and semiconductor lasers), a brief overview of techniques to optimize the beam quality particularly of diode-pumped solid state lasers, and the working principles of common beam shapers and mode cleaners.

LEARNING OUTCOMES

This course will enable you to:

- describe the essentials of common beam quality definitions (e.g. M2 factor and beam parameter product)
- select an appropriate beam quality measurement technique for a given type of laser
- perform correct M2 measurements based on ISO 11146, and list some common mistakes
- compare different types of lasers in terms of their potential for high beam quality
- explain the most common causes for beam quality deterioration in solid state lasers and identify options to reduce their impact
- judge the potential of beam shapers and mode cleaners to improve beam quality

INTENDED AUDIENCE

This material is intended for engineers and researchers dealing with solid state and semiconductor lasers. They should already have some basic knowledge of optics and lasers, but do not need to be experts in optical modeling or laser design. It would be useful, although not strictly required, to acquire some basic knowledge of Gaussian beams before the course - e.g., by studying the web page http://www.rp-photonics.com/gaussian_beams.html.

INSTRUCTOR

Ruediger Paschotta is an expert in laser physics and laser technology, who previously was a researcher and is now working in his company RP Photonics Consulting GmbH, providing technical consultancy primarily for companies building or using lasers. Details are available on the web page http://www.rp-photonics.com/paschotta.html.

Resonator Design for Solid State Lasers

SC860

Course level: Intermediate
CEU .65 $525 Member / $635 Non-member USD
Wednesday 8:30 am to 5:30 pm

This course gives a comprehensive introduction into the design of resonators for solid state bulk lasers. After a short introduction to Gaussian beams, the essential properties of optical resonators and their modes (including fundamental and higher-order modes) are discussed, as well as influences such as thermal lensing, misalignment, and aberrations. Fundamental limitations and design optimization procedures are first explained in a general manner and then applied to concrete resonator types, including short linear cavities, unidirectional ring lasers, microchip lasers, Z-shaped resonators, large-mode high power laser resonators, and various issues in the context of Q-switched and mode-locked lasers.

LEARNING OUTCOMES

This course will enable you to:

- explain essential properties of optical resonators and their modes
- understand various implications of resonator properties on the performance of solid state lasers
- describe some typical design trade-offs in the context of laser resonators
- describe some typical types of resonator designs
- design laser resonators in cases of moderate complexity, if sufficiently powerful software is available

INTENDED AUDIENCE

This material is intended for engineers and researchers dealing with solid state bulk lasers. They should already be basically familiar with optics and lasers, but do not need to be experts in optical modeling or laser design. It would be useful, although not strictly required, to acquire some basic knowledge of Gaussian beams before the course- e.g., by studying the web page http://www.rp-photonics.com/gaussian_beams.html.

INSTRUCTOR

Ruediger Paschotta is an expert in laser physics and laser technology, who previously was a researcher and is now working in his company RP Photonics Consulting GmbH, providing technical consultancy primarily for companies building or using lasers. Details are available on the web page http://www.rp-photonics.com/paschotta.html.

Applied Nonlinear Frequency Conversion

SC931

Course level: Intermediate
CEU .65 $525 Member / $635 Non-member USD
Monday 8:30 am to 5:30 pm

This course provides detailed knowledge on the operation and design of nonlinear frequency conversion devices. The emphasis is on frequency conversion in $\chi(2)$ nonlinear crystals, such as frequency doubling, sum and difference frequency generation and parametric oscillation. In addition, Raman amplifiers and lasers (including bulk and fiber-based devices) are treated, and briefly also Brillouin fiber lasers. The course gives an overview of nonlinear crystal materials and addresses the details of phase matching, showing how a certain phase-matching configuration may be chosen based on given device requirements. For various cases, it is shown how to estimate the achievable conversion efficiency. The conversion of short and ultrashort optical pulses is also discussed. Some case studies demonstrate the influence of various practical issues.

LEARNING OUTCOMES

This course will enable you to:
- explain the principles of operation of various nonlinear conversion devices, including resonant frequency doublers and parametric amplifiers
- select a suitable nonlinear material for use in conversion device
- estimate the conversion efficiency of such devices
- identify special considerations for the conversion of short pulses
- describe some typical design trade-offs
- design at least some simpler devices, (e.g. resonant continuous-wave frequency doublers) for your own applications

INTENDED AUDIENCE

This course is intended for laser engineers and researchers being interested in nonlinear frequency conversion devices. They should already have some basic knowledge of laser beams and ideally also of elementary nonlinear optics.

INSTRUCTOR

Ruediger Paschotta is an expert in laser physics, nonlinear optics and fiber technology, who previously was a researcher and is now working in his company RP Photonics Consulting GmbH, providing technical consultancy primarily for companies building or using lasers and related devices. Details are available on the web page http://www.rp-photonics.com/paschotta.html.

Interconnection and Splicing of High-Power Optical Fibers

SC974

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Monday 8:30 am to 12:30 pm

High-power optical fibers are displacing traditional bulk optical elements in applications such as laser sources, optical amplifiers, and beam delivery systems. However, their high signal or pump powers, large spot sizes or mode areas, and large fiber diameters pose interconnection difficulties including signal loss, mode conversion, polarization crosstalk, reflections, localized heating, end facet damage, and even catastrophic device failure. Various technologies have been developed to address these difficulties including mode field matching technologies, high-power fiber terminations, modal content measurements, and large-diameter fiber cleavers and fusion splicers. This course provides attendees with both conceptual and practical knowledge concerning high-power optical fiber interconnection.

LEARNING OUTCOMES

This course will enable you to:
- improve the quality and reliability of your high-power optical fiber assemblies
- avoid destruction of fibers and lasers due to bad interconnections
- compare competing interconnection technologies
- select equipment for high-power optical fiber interconnection
- evaluate and apply mode matching technologies for high-power interconnection
- estimate splice/interconnection optical properties using numerical computation tools
- test and measure high-power optical fiber splice/interconnection quality

INTENDED AUDIENCE

This material is intended for designers and builders of high-power optical fiber lasers, amplifiers, and beam delivery systems. This course builds upon a basic knowledge of optical waveguide theory.

INSTRUCTOR

Andrew Yablon is president and founder of Interfiber Analysis, LLC where he consults widely on fiber interconnection and fusion splicing. He is the author of *Optical Fiber Fusion Splicing* (Springer, 2005) and has 14 years experience with fusion splicing and fiber interconnection during his career at Bell Laboratories, OFS Laboratories, and Vytran Corporation.

Fundamentals of Laser Beam Profile Measurements

SC977

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 8:30 am to 12:30 pm

This course explains the basic principles and measurement methods used to characterize laser beam size, shape, position, divergence and energy density distribution (beam profile). The goal of this course is to provide insight into the different techniques used for laser beam profile measurements, and which approaches are best suited for specific laser types or applications. Important considerations for optical beam sampling techniques and sources of measurement error will be discussed. Applicable ISO standards and definitions will also be reviewed.

LEARNING OUTCOMES

This course will enable you to:
- summarize the various laser beam profile definitions and measurements
- differentiate between Qualitative and Quantitative beam profile measurement results
- determine the optimum measurement method needed to address a laser application
- distinguish the difference between Near Field and Far Field laser measurements
- employ correct optical beam sampling techniques for beam profile measurements
- describe and control critical sources of error in beam profile measurements
- identify and reference the ISO standards applicable to beam profile measurements
- compare and evaluate various commercially available laser beam profiling instruments

INTENDED AUDIENCE

This course is intended for technicians, scientists, engineers and managers who wish to gain a better understanding of laser beam profile measurements and how they are made. They should have some basic working knowledge of optics and lasers.

INSTRUCTOR

Roger Rypma has over 30 years of experience in laser measurement applications. He has B.S. and M.S. degrees in Physics, and has worked in the laser industry for Boeing, Big Sky Laser Technologies (co-founder), Coherent, Concise Dynamics (Consultant) and JDS Uniphase. He is also a member of the ISO TC 172, SC9 subcommittee responsible for development of international standards for laser measurement.

Basic Laser Technology

WS972

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Wednesday 8:30 am to 12:30 pm

If you are uncomfortable working with lasers as "black boxes" and would like to have a basic understanding of their inner workings, this introductory course will be of benefit to you. The workshop will cover the basic principles common to the operation of any laser/laser system. Next, we will discuss laser components and their functionality. Components covered will include laser pumps/energy sources, mirrors, active media, nonlinear crystals, and Q-switches. The properties of laser beams will be described in terms of some of their common performance specifications such as longitudinal modes and monochromaticity, transverse electromagnetic (TEM) modes and focusability, continuous wave (CW) power, peak power and power stability. Laser slope and wall-plug efficiencies will also be discussed.

LEARNING OUTCOMES

This course will enable you to:
- describe the overall inner workings of any laser
- describe the functionality of the key laser components
- know the difference between how acousto- and electro-optic Q-switches work
- explain how each key component in a laser may contribute to laser performance
- intelligently engage your clients or customers using proper laser terminology
- build stronger relationships with clients and customers by demonstrating product knowledge
- obtain the technical knowledge and confidence to enhance your job performance and rise above the competition, inside and outside your company

INTENDED AUDIENCE

Managers, engineers, technicians, assemblers, sales/marketing, customer service, and other support staff. This workshop will help cultivate a common/standardized understanding of lasers across the company.

INSTRUCTOR

Sydney Sukuta is currently a Laser Technology professor at San Jose City College. He also has industry experience working for the some the world's leading laser manufacturers in Silicon Valley where he saw first-hand the issues they encounter on a daily basis. In response, Dr. Sukuta developed prescriptive short courses to help absolve most of these issues.

Coherent Mid-Infrared Sources and Applications

SC1012

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Sunday 1:30 to 5:30 pm

This course explains why the mid-IR spectral range is so important for molecular spectroscopy, standoff sensing, and trace molecular detection. We will regard different approaches for generating coherent light in the mid-IR including solid state lasers, fiber lasers, semiconductor (including quantum cascade) lasers, and laser sources based on nonlinear optical methods. The course will discuss several applications of mid-IR coherent light: spectral recognition of molecules, trace gas sensing, standoff detection, and frequency comb Fourier transform spectroscopy.

LEARNING OUTCOMES

This course will enable you to:
- define the "molecular fingerprint" region
- identify existing direct laser sources of mid-IR coherent radiation, including solid state lasers, fiber lasers, semiconductor heterojunction and quantum cascade lasers
- identify laser sources based on nonlinear optical methods, including difference Frequency generators and optical parametric oscillators and generators
- describe the principles of trace gas sensing and standoff detection
- explain mid-IR frequency combs and how they can be used for advanced spectroscopic detection

INTENDED AUDIENCE

Students, academics, researchers and engineers in various disciplines who require a broad introduction to the subject and would like to learn more about the state-of-the-art and upcoming trends in mid-infrared coherent source development and applications. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Konstantin Vodopyanov is a world expert in mid-IR solid state lasers, nonlinear optics and laser spectroscopy. He has both industrial and academic experience, has > 300 technical publications and he is a co-author, with I.T. Sorokina, of the book Solid-State Mid-Infrared Laser Sources (Springer, 2003). He is a member of program committees for several major laser conferences including CLEO (most recent, General Chair in 2010) and Photonics West (LA106 Conference Chair). Currently he teaches and does scientific research at Stanford University and his research interests include mid-IR and terahertz-wave generation using micro-and nano-structured materials, nano-IR spectroscopy, generation of mid-infrared frequency combs and their applications. Dr. Vodopyanov has delivered numerous invited talks and tutorials at scientific meetings on the subject of mid-IR technology.

Splicing of Specialty Fibers and Glass Processing of Fused Fiber Components for Fiber Lasers

SC1020

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Sunday 8:30 am to 12:30 pm

This course provides attendees with fundamentals of specialty fiber splicing and glass fusion processing with a focus on high power fiber laser applications. It describes fiber waveguide and coupling optics associated with the process and discusses practical fusion splicing methods to achieve high performance optical coupling between dissimilar specialty fibers and also fabrication techniques for producing high performance fused components, such as fiber combiners and couplers. In addition, the course describes several practical fiber amplifier, laser, and sensing application examples and also compares different fusion hardware.

LEARNING OUTCOMES

This course will enable you to:
- become familiar with fiber fusion fundamental, specialty fiber basics, and waveguide coupling optics between dissimilar fibers
- gain in-depth knowledge of fiber splicing process and practical techniques
- learn fusion processing for fabricating fused components such as fiber combiners and couplers
- apply fiber fusion technologies for your applications
- learn state-of-the-art fiber splicing and fusion processing tools and hardware

INTENDED AUDIENCE

This material is intended for anyone who needs to handle and splicing specialty fibers and wants to learn fiber fusion process for fabricating high performance fiber devices. This course is valuable for those who want to further improve their fiber system performance.

INSTRUCTOR

Baishi Wang is Director of Technology at Vytran. He received his Ph.D from State University of New York at Stony Brook. He has over 10 years of experience in specialty fibers and fused component fabrication and fiber fusion. His research area includes doped and un-doped specialty fibers, fiber fused component technology, fiber fusion process and instrumentation, fiber amplifier and lasers, waveguide theory and modeling, and fiber test and measurements. Prior to joining Vytran, he was a technical staff member in the Specialty Fiber Division at Lucent Technologies and OFS. He has published over 20 papers in referred conferences and journals and has given several invited talks. He is a member of SPIE and OSA.

Ultrafast Laser Pulse Shaping and Adaptive Pulse Compression

SC1053

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

Pulse shapers are being used for a number of applications including (a) pulse compression, (b) pulse characterization, (c) creation of two or more pulse replicas, and (d) control of nonlinear optical processes such as selective two-photon excitation and selective vibrational mode excitation. This course will introduce the most common pulse shaper designs and discuss their operational differences. A brief theoretical description will be presented for those wanting to simulate different pulse shaping scenarios; however, most of the course will be based on experimental implementation and results. The course will emphasize applications of pulse shapers that greatly enhance the capabilities of femtosecond laser sources.

LEARNING OUTCOMES

This course will enable you to:

- design and build a pulse shaper based on a particular set of goals
- compare different pulse shaper designs and determine which one is best suited for a particular application
- simulate the output pulse from a pulse shaper given a particular phase and amplitude modulation
- define key concepts in pulse shaper design such as optical resolution and focal length. Describe the effect caused by introducing a simple phase such as a linear, quadratic or cubic function on a transform-limited pulse
- explain two different approaches to creating pulse replicas that can be independently controlled in the time domain using the pulse shaper
- measure the spectral phase of laser pulses using the pulse shaper itself as the measurement tool, and eliminate phase distortions to compress the output pulses
- summarize the advantages of having an adaptive pulse shaper for controlling the output of ultrafast lasers

INTENDED AUDIENCE

This course is intended for those interested in learning how pulse shapers can greatly enhance the performance and utility of ultrafast (femtosecond) laser sources. Results from more advanced methods will be presented, but the course does not require previous experience with pulse shaping.

INSTRUCTOR

Marcos Dantus received his PhD on the development of Femtochemistry, postdoc on the development of Ultrafast Electron Diffraction under Professor Zewail (Caltech, 1999 Nobel Prize). Presently a University Distinguished Professor of Chemistry and Physics at Michigan State University. Dantus' interests include ultrafast laser pulse theory, development and control, control of nonlinear laser-matter interactions, and biomedical imaging. Dantus has more than 150 publications, 43 invention disclosures and 13 patents. Dantus is presently the President and CEO of BioPhotonic Solutions Inc, the President of the OSA Ann Arbor, MI chapter and serves on the board of advisors for Chemical Physics Letters.

Metrology & Standards

Optical Scatter Metrology for Industry

SC1003

Course level: Intermediate
CEU .35 $360 Member / $415 Non-member USD
Monday 8:30 am to 12:30 pm

Optical scatter, originally used almost exclusively to characterize the stray light generated by optically smooth surfaces, is now being used as a sensitive, economical way to monitor the surface texture requirements in a variety of industries. For example, the photo-voltaic industry uses specific types of texture on surfaces to increase absorption and system efficiency. Texture is often an important requirement for the metal producing industry and it changes with roll wear. The appearance of every day appliances (from door hinges to computer cases) varies dramatically with texture. The quality of flat panel displays depends on the scatter characteristics of the screen and components behind it. SEMI and ASTM are responding to the new applications with "scatter standards" to help communication between manufacturers, vendors and customers.

The low signal (hard to measure) optical applications were solved first because the math was easy. Rougher surface scatter relationships are more complicated, but the signals are much larger - making instrumentation easier. The course starts with the optical applications and then explores the transition to rougher industry surfaces. Between a good optical mirror and a concrete sidewalk there are thousands of industry surfaces that can be monitored with scatter metrology. There are two key points for these "in-between" surfaces: (1) If the texture changes - the scatter changes and (2) these changes (and product function) cannot be adequately monitored by a single variable - such as RMS Roughness, Haze or Gloss. The course emphasizes quantifying, measuring and understanding scatter. The modeling of scatter is mentioned, but is not emphasized here.

LEARNING OUTCOMES

This course will enable you to:

- quantify and analyze scatter in terms of BRDF, TIS, Haze and DSC units
- explain the instrumentation for obtaining scatter data and evaluate system calibration
- describe and overcome the various difficulties in comparing roughness statistics found from profilometers and scatterometers for both one- and two- dimensional samples
- convert scatter to roughness statistics when possible and understand when it is not possible
- evaluate the use of scatter measurement for specific applications such as: stray system radiation, surface micro-roughness, particulate sizing, background sensor noise
- explain the use of polystyrene latex sphere depositions as an optical scattering standard
- review scattering standards for the semiconductor and photo-voltaic industries

INTENDED AUDIENCE

Engineers, scientists, and managers who need to understand and apply the basic concepts of scatter metrology to laboratory research and industrial process control. Some knowledge of calculus is helpful, but the course does not require that the student follow mathematical derivations. The instructor has worked with Thomas Germer (SC492 instructor) to avoid overlap between the two courses.

INSTRUCTOR

John Stover is President of The Scatter Works, Inc., a Tucson firm concentrating on scatter based metrology standards, consulting, and measurement as they apply to diverse industries. He has researched light scatter related problems for over 30 years and led teams of engineers who developed state-of-the-art scatterometers, verified theoretical relationship between surface roughness and scatter and characterized surface defects to improve wafer metrology. He has been involved

with international standards organizations for over 20 years, is an SPIE Fellow, and has been active as an author, conference chairman, and editor, and has over one hundred publications.

COURSE PRICE INCLUDES the text *Optical Scattering: Measurement and Analysis, 2nd Edition* (SPIE Press, 1995) by John Stover.

Modern Optical Testing

SC212

Course level: Intermediate
CEU .35 $335 Member / $390 Non-member USD
Sunday 8:30 am to 12:30 pm

This course describes the basic interferometry techniques used in the evaluation of optical components and optical systems. It discusses interferogram interpretation, computer analysis, and phase-shifting interferometry, as well as various commonly used wavefront-measuring interferometers. The instructor describes specialized techniques such as testing windows and prisms in transmission, 90-degree prisms and corner cubes, measuring index inhomogeneity, and radius of curvature. Testing cylindrical and aspheric surfaces, determining the absolute shape of flats and spheres, and the use of infrared interferometers for testing ground surfaces are also discussed. The course also covers state-of-the-art direct phase measurement interferometers.

LEARNING OUTCOMES

This course will enable you to:
- better specify optical components and systems
- produce higher-quality optical systems
- determine if an optics supplier can actually supply the optics you are ordering
- evaluate optical system performance
- explain basic interferometry and interferometers for optical testing
- analyze interferograms
- test flat and spherical surfaces
- test ground and aspheric surfaces
- make absolute measurements and discuss state-of-the-art direct phase - measurement interferometers.

INTENDED AUDIENCE

Engineers and technical managers who are involved with the construction, analysis or use of optical systems will find this material useful.

INSTRUCTOR

James Wyant is Dean of the College of Optical Sciences and Professor of Optical Sciences at the University of Arizona. He was a founder of the WYKO Corporation and served as its president from 1984 to 1997. Dr. Wyant was the 1986 President of SPIE.

COURSE PRICE INCLUDES the text *Field Guide to Interferometric Optical Testing* (SPIE Press, 2006) by Eric P. Goodwin and James C. Wyant.

Practical Interferometry and Fringe Analysis

SC211

Course level: Intermediate
CEU .65 $525 Member / $635 Non-member USD
Monday 8:30 am to 5:30 pm

You've no doubt heard of interferometric testing and all the wonderful things it can do to solve your measurement problems. You may have attended an introduction to interferometry or been shopping for an instrument. But how do you get started? How do you determine which type of interferometer will solve your problem? Do you make your own or buy a commercial instrument? Once you've got an instrument how can you be sure you aligned it correctly and are getting the best data you can for your measurement problem?

This intermediate-level course offers an overview of the fundamentals of interferometric testing and the analysis of interferometric fringe patterns applicable to many different areas of interferometry, optical testing, nondestructive testing, and metrology. It is geared towards technically minded types who have had some exposure to the basics of interferometry and want to find out more about the practical nuts and bolts of using interferometry as a tool. We will begin with an overview of the basic fundamentals of interferometry including formation of interference fringes for different types of sources, fringe visibility and how fringes relate to basic properties of the object being tested. We then will cover common interferometer types and phase modulation techniques, essentials for creating, detecting and digitizing fringes, alignment and environmental considerations and calibration.

Throughout this course real-world problems will be used as examples. The second half of the class will focus on these same questions from the aspect of fringe analysis techniques. We will outline the basic techniques and then brainstorm how you determine whether you got good data and how you would begin if you were analyzing your own raw fringe data. During this discussion common pitfalls and sources of errors will be pointed out to help streamline your process of getting up and running to take your own measurements. Attendees are encouraged to bring along their real-world problems and offer them as starting points for our discussion.

LEARNING OUTCOMES

This course will enable you to:
- understand the basic components of monochromatic, narrowband and white light interferometers
- ensure that you are choosing the right type of interferometer for your application
- list the necessary steps to set up an interferometer and take a measurement
- differentiate the pros and cons of various measurement and analysis techniques
- evaluate the tradeoffs between techniques
- outline simple tests to determine if you are getting good measurements
- help you decide which technique is best for a particular application

INTENDED AUDIENCE

This course is for engineers working with optical interferometry, optical testing, surface metrology, experimental mechanics, nondestructive testing, and Moire grating techniques. It will be assumed that attendees have a basic knowledge of geometrical optics and interferometry.

INSTRUCTOR

Katherine Creath is an internationally recognized expert in optical testing, metrology and system design working as a Consultant, a Senior Research Scientist for 4D Technology Corp, and as a Research Professor of Optical Sciences and Medicine at the University of Arizona. She has more than 25 years of experience in interferometry and optical testing and is a Fellow of SPIE and OSA.

Understanding Scratch and Dig Specifications

SC700

Course level: Introductory
CEU .35 $370 Member / $425 Non-member USD
Wednesday 8:30 am to 12:30 pm

Surface imperfection specifications (i.e. Scratch-Dig) are among the most misunderstood, misinterpreted, and ambiguous of all optics component specifications. This course provides attendees with an understanding of the source of ambiguity in surface imperfection specifications, and provides the context needed to properly specify surface imperfections using a variety of specification standards, and to evaluate a given optic to a particular level of surface imperfection specification. The course will focus on the differences and application of the Mil-PRF-13830, ISO 10110-7, and BSR/OP1.002. Many practical and useful specification examples are included throughout, as well as a hands-on demonstration on visual comparison evaluation techniques. The course is followed by SC1017 Optics Surface Inspection Workshop, which provides hands-on experience conducting inspections us-

ing the specification information provided in this course.

LEARNING OUTCOMES

This course will enable you to:
- describe the various surface imperfection specifications that exist today
- compose a meaningful surface imperfection specification for cosmetic imperfections using ISO, ANSI, or Mil standards
- identify the different illumination methods and comparison standards for evaluation
- demonstrate a surface imperfection visual inspection
- understand the options available for controlling surface imperfections in a vendor/supplier relationship

INTENDED AUDIENCE

This material is intended for anyone who needs specify, quote, or evaluate optics for surface imperfections. Those who either design their own optics or who are responsible for optics quality control will find this course valuable.

INSTRUCTOR

David Aikens a.k.a "the scratch guy", is among the foremost experts on surface imperfection standards and inspection. Dave is President and founder of Savvy Optics Corp., is the head of the American delegation to ISO TC 172 SC1, and is currently the Executive Director of the Optics and Electro-Optics Standards Council, OEOSC.

COURSE PRICE INCLUDES a copy of the latest ANSI approved surface imperfections specification standard.

Optics Surface Inspection Workshop

SC1017

Course level: Introductory
CEU .35 $380 Member / $435 Non-member USD
Wednesday 1:30 to 5:30 pm

Understanding the correct way to inspect optical surfaces is one the most important skills anyone working with or around optics can have, including technicians, material handlers, engineers, managers, and buyers. While understanding the specifications is the first step, learning how to actually perform the inspection is just as important. This hands-on workshop will allow attendees to learn the "Best Practice" for cleaning and inspecting optical surfaces. The course has many demonstrations and labs and gives attendees practice handling and inspecting optics to develop a high level of proficiency.

This course was designed to bring photonics personnel up to an immediate working knowledge on the correct methods to conduct a surface inspection in accordance with MIL, ANSI, and ISO standards. It is designed to complement SC700 Understanding Scratch and Dig Specifications and provide hands-on experience applying the specification and inspection parameters covered in that course.

LEARNING OUTCOMES

This course will enable you to:
- perform a visual review of the surface
- create a surface map
- safely clean the surface using air only, and the drag method
- assess when magnification or high-intensity light is allowed or required
- conduct a visual inspection according to MIL-PRF-13830B
- conduct a visual inspection according to ANSI OP1.002
- conduct a visual inspection according to ISO 10110-7 and ISO 14997 standards
- acquire and apply the accumulation rules
- review the tools available for microscope-based inspection to ANSI and ISO standards
- evaluate a surface and determine if a surface passes or fails

INTENDED AUDIENCE

This course is designed for all optical practitioners who need to handle and evaluate optics or optical assemblies. Other suggested attendees include mechanical engineers, purchasing agents, quality assurance personnel and other persons working with or around optical components. SC700 Understanding Scratch and Dig Specifications is a prerequisite for the course.

INSTRUCTOR

David Aikens a.k.a "the scratch guy", is among the foremost experts on surface imperfection standards and inspection. Dave is President and founder of Savvy Optics Corp., is the head of the American delegation to ISO TC 172 SC1, and is currently the Executive Director of the Optics and Electro-Optics Standards Council, OEOSC.

COURSE PRICE INCLUDES a plastic scratch/dig paddle, and a set of cleaning and handling tools for small optics.

Understanding Waviness and Roughness Specifications for Optics

SC1011

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

This course was designed to bring photonics personnel up to an immediate working knowledge on surface texture specifications and the impact surface roughness and waviness can have on an optical system. The surface texture of a polished optical surface is an important, if misunderstood, surface property. Surface roughness causes scatter and system transmission loss, while waviness and mid-spatial frequency ripple can cause loss of resolution, image quality, veiling glare, beam modulation and a host of other issues.

Until recently, surface texture could be safely described by a single number, RMS roughness, following MIL-STD-10A, since most polished optical surfaces were manufactured using the same slurry-pitch process that had existed for decades. In the past 30 years, however, new manufacturing technologies have evolved using molding, diamond turning, synthetic lap polishing and deterministic figuring which have dramatically altered the surface finish of optics. In order to control the resultant surface texture errors, new specifications like gradients, correlation values, PSDs and MSF ripple specifications have been introduced. Most users do not completely understand these new notations however, and the meaning of even a simple RMS roughness specification has become obscure, or even meaningless.

The course begins with the origins and evolution of surface texture specifications in optics, and defines the terms and parameters used to control surface texture in the modern optical manufacturing world. The potential performance impact of surface texture errors will be covered, and some specific case studies will be used to show the impact of various amplitudes of these errors on precision optical instrument performance. The national and international standards are introduced, and the derivation of meaningful specification for texture and waviness for common applications is discussed. Finally, the identification, measurement and reduction of these manufacturing errors is treated.

LEARNING OUTCOMES

This course will enable you to:
- describe the surface texture of a polished optical surface
- identify the sources of surface texture errors in modern manufacturing processes
- explain the meaning of the most common surface texture and ripple specifications
- compose a meaningful surface texture specification using MIL, ASME and ISO standards
- assess the impact of mid-spatial frequency ripple and roughness on system performance
- identify these surface errors in measurement data
- quantify the requirements for surface texture using a variety of notations

INTENDED AUDIENCE

This course is intended for optical design, manufacturing and quality control and assurance engineers and managers. Some understanding of algebra is beneficial.

INSTRUCTOR

David Aikens has been writing on the subject of surface texture and ripple for more than 20 years and is one of the foremost experts on optics mid-spatial frequency ripple today. Dave is President and founder of Savvy Optics Corp., is the head of the American delegation to ISO TC 172 SC1, and is currently the Executive Director of the Optics and Electro-Optics Standards Council, OEOSC.

Micro/Nanofabrication

Fabrication Technologies for Micro- and Nano-Optics

SC454

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Monday 8:30 am to 12:30 pm

Applications of micro and nano-scale optics are widespread in essentially every industry that uses light in some way. A short list of sample application areas includes communications, solar power, biomedical sensors, laser-assisted manufacturing, and a wide range of consumer electronics. Understanding both the possibilities and limitations for manufacturing micro- and nano-optics is useful to anyone interested in these areas. To this end, this course provides an introduction to fabrication technologies for micro- and nano-optics, ranging from refractive microlenses to diffractive optics to sub-wavelength optical nanostructures.

After a short overview of key applications and theoretical background for these devices, the principles of photolithography are introduced. With this backdrop, a wide variety of lithographic and non-lithographic fabrication methods for micro- and nano-optics are discussed in detail, followed by a survey of testing methods. Relative advantages and disadvantages of different techniques are discussed in terms of both technical capabilities and scalability for manufacturing. Issues and trends in micro- and nano-optics fabrication are also considered, focusing on both technical challenges and manufacturing infrastructure.

LEARNING OUTCOMES

This course will enable you to:

- describe example applications and key 'rules of thumb' for micro- and nano-optics
- explain basic principles of photolithography and how they apply to the fabrication of micro- and nano-optics
- identify and explain multiple techniques for micro- and nano-optics fabrication
- compare the advantages and disadvantages of different manufacturing methods
- describe and compare performance and metrological testing methods for micro- and nano-optics
- evaluate fabrication trends and supporting process technologies for volume manufacturing

INTENDED AUDIENCE

Engineers, scientists, and managers who are interested in the design, manufacture, or application of micro/nano-optics, or systems that integrate these devices. A background in basic optics is helpful but not assumed.

INSTRUCTOR

Thomas Suleski has been actively involved in research and development of micro- and nano-optics since 1991 at Georgia Tech, Digital Optics Corporation, and since 2003, as a member of the faculty at the University of North Carolina at Charlotte. He holds 11 patents and more than 100 technical publications on the design, fabrication, and testing of micro- and nano-optical components and systems. Dr. Suleski is a Fellow of SPIE, the International Society for Optical Engineering, and currently serves as Senior Editor for JM3, the Journal of Micro/Nanolithography, MEMS and MOEMS.

Micro- and Nanofluidics - Technology and Applications

SC532

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Wednesday 8:30 am to 12:30 pm

This course will provide a broad overview on all aspects of micro- and nanofluidic technology starting with the history over one decade of microfluidics and describing the various fabrication technologies for miniaturized devices in polymers, glass, silicon and metals. A main focus is the application of microfluidic components in biotechnology (e.g. separation techniques, PCR, Lab-on-a-Chip etc.) and chemistry (e.g. micro reactors, micro mixers etc.) and a special microfluidic tool box suited for these applications. Commercialization strategies and business models of microfluidic companies will be covered as well as the hot topics of "killer applications", and the need for standardization. The aspect of becoming even smaller and the challenges and limitations of nanofluidics will have a special focus.

The course will conclude with hands-on tests using microfluidic devices, including a water and milk analysis with chip based capillary electrophoresis.

LEARNING OUTCOMES

This course will enable you to:

- describe the basic physical and chemical principles of microfluidics
- identify the interesting microfluidic components for their most challenging applications in chemistry and life sciences
- learn how to realize microfluidic components in different materials such as polymers, glass, silicon, metal, or ceramics
- categorize existing microfluidic components – a microfluidic tool box for applications in chemistry and life sciences
- learn the business model of microfluidic companies
- gain a perspective on the history of microfluidics from its beginning in the late 80's to the present
- obtain an overview of the rising field of nanofluidics

INTENDED AUDIENCE

This course will be of value for researchers from industry and academia, business developers, general managers with a need to learn about novel technologies, potential investors in microtechnology / microfluidics and anyone who is interested in the realization, application or commercialization of microfluidic components.

INSTRUCTOR

Claudia Gärtner obtained her PhD in biochemistry from the University of Dusseldorf. In 1999 she assumed directorship at the Application Center for Microtechnology (AMT), Jena, Germany, where she installed a micro component technological infrastructure and established a microfluidics research program. She helped found the biotechnology start-up "x-zyme" (2001) and the microfluidic company "microfluidic ChipShop" (2002). In 2002 she was nominated for the German Founders Prize and received the Thuringian award for the best business concept for microfluidic ChipShop. For microfluidic ChipShop she acquired the polymer microfabrication company Mildendo in 2003. In 2006 Dr. Gaertner was named CEO of both microfluidic ChipShop and Mildendo. Dr. Gaertner is a member of the industry platform for micro process engineering of the DECHEMA, and the European Network of Excellence for Multifunctional Microsystems (NEXUS). Her primary research area is the realization of lab-on-a-chip systems for life science applications.

Precision Laser Micromachining

SC689

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Wednesday 1:30 to 5:30 pm

This course is a comprehensive look at laser technology as applied to precision micromachining. A brief background discussion on laser history, technology and definition of important terms will be presented. Then, available laser sources will be compared and contrasted including CO_2, excimer, Nd:YAG, fiber and short pulse lasers. IR and UV material/photon interaction, basic optical components and system integration are also crucial to getting good processing results and these will all be examined in detail. Finally, real applications from the medical, microelectronics, aerospace and other fields will be presented.

This course has been greatly expanded to include detailed discussions on short pulse lasers (ps and fs) and their applications, both present and future. In addition, two market areas have been significantly updated - Aerospace/Defense and renewable energy, particularly Solar. One of the biggest growth markets in the laser future (and historically!), the growth of renewable energy applications will infuse hundreds of millions of dollars into the laser community as new electricity generating capability is brought on line.

LEARNING OUTCOMES

This course will enable you to:
- compare UV, IR and other laser sources to each other and learn where each is best applied
- describe and be familiar with several kinds of micromachining lasers on the market
- describe material/photon interaction and why and how UV lasers for instance are different than IR lasers
- analyze a potential manufacturing application to identify it as a possible candidate for laser processing
- familiarize yourself with 'real world' opportunities for laser micromachining
- identify marketplace growth opportunities

INTENDED AUDIENCE

The course will benefit anyone with an interest in small-scale industrial laser machining and achieving the best edge quality, highest resolution and cost effectiveness. Engineers will benefit from the technical discussions. Project Managers will benefit from cost considerations and risk reduction scenarios.

INSTRUCTOR

Ronald Schaeffer is Chief Executive Officer of PhotoMachining, Inc. He has been involved in laser manufacture and materials processing for over 25 years, working in and starting small companies. He has over 130 publications, has written monthly web and print columns (currently writing a column for MicroManufacturing Magazine) and is on the Editorial Advisory Board of Industrial Laser Solutions. He is also a past member of the Board of Directors of the Laser Institute of America and is affiliated with the New England Board of Higher Education. He has a Ph.D. in Physical Chemistry from Lehigh University and did graduate work at the University of Paris, after which he worked for several major laser companies. He is a US Army veteran of the 172nd Mountain Brigade and the 101st Airborne division. In his spare time he farms, collects antique pocket watches, plays guitar and rides motorcycle.

Micromachining with Femtosecond Lasers

SC743

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Monday 1:30 to 5:30 pm

This course provides attendees with the knowledge necessary to understand and apply femtosecond laser pulses for micromachining tasks in a variety of materials. Emphasis will be placed on developing a fundamental understanding of how femtosecond pulses interact with the sample. From this knowledge, the advantages and limitations of femtosecond lasers for various micromachining tasks can be readily understood. Examples will be given in the micromachining of the surface of metals, semiconductors, and transparent materials, as well as the formation of photonic and microfluidic devices in the bulk of transparent materials.

LEARNING OUTCOMES

This course will enable you to:
- summarize the linear and non-linear interaction mechanisms of femtosecond laser pulses with metals, semiconductors, and transparent materials
- explain mechanisms for material removal and modification, as well as factors affecting precision and degree of collateral damage
- describe unique capabilities afforded by femtosecond pulses for micromachining bulk transparent materials
- determine appropriate femtosecond laser parameters for a micromachining task
- compare various micromachining methods and evaluate the most appropriate for a given job

INTENDED AUDIENCE

This course is aimed at people already doing or interested in starting research on short-pulse laser micromachining, as well as at people who have specific micromachining problems and wish to evaluate the potential of femtosecond lasers for accomplishing their task. Those who do not have a background in some of the unique properties of femtosecond laser pulses would benefit from attending SC541, "An Introduction to Femtosecond Laser Techniques," by Eric Mazur and/or SC746 "Introduction to Ultrafast Technology" by Rick Trebino before attending this course.

INSTRUCTORS

Stefan Nolte is a Professor at the Friedrich-Schiller University in Jena, Germany. His research topics include ultrashort pulse micromachining for industrial and medical applications. He has been actively engaged in research on femtosecond laser micromachining since the field's inception in the mid-1990s.

Christopher Schaffer is an Assistant Professor at Cornell University, where his current research focuses on applications of femtosecond laser ablation in biology. He has been actively engaged in research on femtosecond laser micromachining since the field's inception in the mid-1990s.

COURSE PRICE INCLUDES a detailed reading list of key papers.

Nano/Biophotonics

Biophotonics

SC463

Course level: Advanced
CEU .65 $605 Member / $715 Non-member USD
Sunday 8:30 am to 5:30 pm

Science and technology breakthroughs in the 21st Century are more likely to occur at the interfaces of disciplines. Biophotonics is defined as the interface of photonics or lightwave technology and the biological sciences. It is a new frontier, offering tremendous prospects for optical diagnostics as well as for light activated therapy, surgery, biosensing and restoration of biological functions. The course will include the following topics: photobiology (interaction of light with cells, interaction of light with tissues, nonlinear optical processes with intense laser beams, photo-induced effects in biological systems), bioimaging (various imaging techniques, fluorescent markers, cellular imaging, imaging of soft and hard tissues, in vivo imaging, dynamic imaging), optical diagnostics (biosensors, fluorescence immunoassay, flow cytometry), optical tweezers and scissors (laser trapping and dissection for biological manipulation, single molecule biophysics studies, DNA-protein interactions), light activated therapy (photodynamic therapy, low level light therapy), nanotechnology (application of nanoprobes, nems), and tissue engineering (use of short pulse lasers for tissue welding, tissue contouring; tissue regeneration).

LEARNING OUTCOMES

This course will enable you to:
- learn how to apply lasers and optics to biomedical and clinical research
- learn about bioimaging at cellular and tissue levels
- learn about photodynamic cancer therapy and its status
- be updated on development of new fluorescence tags
- learn about multiphoton microscopy and spectroscopy
- familiarize with applications of short pulse lasers
- learn about applications of flow cytometry
- learn about optical based biosensors

INTENDED AUDIENCE

Anyone who needs to learn how to utilize lasers and optics in biomedical research. The course is intended for a multidisciplinary audience including biomedical researchers, cell physiologists, pharmacologists, MDs, DDSs, cancer therapists, chemists, optical physicists, optical engineers and bioengineers.

INSTRUCTOR

Paras Prasad is Photonics Science Professor and Director of the Photonics Research Laboratory at the State Univ. of New York at Buffalo.

COURSE PRICE INCLUDES the text *Introduction to Biophotonics* (Wiley, 2003) by Paras Prasad.

Nanoplasmonics

SC727

Course level: Intermediate
CEU .65 $525 Member / $635 Non-member USD
Wednesday 8:30 am to 5:30 pm

Nanooptics deals with optical phenomena and spectroscopy on the nanoscale, i.e., in the regions of space whose size is much smaller than the light wavelength. While electromagnetic waves cannot be localized in the regions with sizes significantly less than half wavelength, nanooptics is based on electric fields oscillating at optical frequency. From the positions of the interaction with matter and spectroscopy, such local optical fields mostly produce the same type of responses as electromagnetic waves. Elementary excitations that are carriers of energy and coherence in nanooptics are surface plasmons (SPs). These local fields cause a wealth of gigantically enhanced optical phenomena of which the surface enhanced Raman scattering (SERS) is the most studied and widely known.

This one-day course will encompass the fundamental properties and applications of the surface plasmonics at the nanoscale. It will include coherent effects associated with phase memory of the SPs, in particular, coherent control of nanooptical phenomena. Nonlinear processes such as generation of harmonics and two-photon excitation by nanoscale fields will also be covered. Ultrafast (femtosecond and attosecond) phenomena are within the scope of this course. We will also include quantum phenomena associated with properties of surface plasmons as quantum quasiparticles such as quantum generation and fluctuations. Along with fundamental properties of SPs, we will consider many applications of nanoplasmonics, in particular, detection of ultrasmall amounts of chemical and biological compounds, scanning near-field optical microscopes or SNOMs, and nanolithography.

LEARNING OUTCOMES

This course will enable you to:
- Surface plasmon polaritons (SPPs) as electromagnetic waves at metal-dielectric interfaces
- Fast and slow SPPs in nanolayers as waves of different symmetry
- SPPs in cylindrical nanoplasmonic waveguides
- Nanooptical applications of SPPs: transfer of optical energy on nanoscale
- SPPs in adiabatically changing nanoplasmonic waveguides and nanofocusing
- Quasielectrostatic approximation for nanosystems
- Surface plasmons (SPs) as eigenmodes of nanosystem
- SPs in nanospheres and nanoshells; nanosphere plasmonic sensors
- Localization and delocalization of SPs on the nanoscale
- Linear optical responses on the nanoscale and local optical fields
- Optical responses of nanosphere aggregates; efficient nanolens
- Interference effects in SNOMs and the phases of local fields
- SP enhancement of fluorescence
- Giant enhancement of Raman scattering in nanoplasmonic systems
- Enhanced second and third harmonic generation in nanostructured systems
- Ultrafast nanoplasmonic optical responses
- Coherent control of optical responses on nanoscale: linear and nonlinear effects
- Two-photon excitation of nanosystems and its coherent control
- Quantization of SPs
- Quantum generation of SPs in nanosystem
- Many body effects in nanooptics: spatial dispersion and Landau damping
- Excitation quenching at metal surfaces
- Nanoimaging by Pendry's Perfect Lens; the role of many body effects

INTENDED AUDIENCE

This course is intended for engineers, physicists, chemists, and biologists interested in fundamentals and applications of nanooptics.

INSTRUCTOR

Mark Stockman received his PhD and DSc degrees from institutes of the Russian Academy of Sciences. Currently he is Professor of Physics at Georgia State University, Atlanta, GA, USA. He also served as a Distinguished Professor at Ecole Normale Supérieure de Cachan (France) and as a Guest Professor at University of Stuttgart (Germany), Max Plank Institute for Quantum Optics (Garching, Germany), and Ludwig Maximilian University (Munich, Germany). A major direction of his research is theoretical nanoplasmonics, especially theory of ultrafast and nonlinear nanoscale optical phenomena. He is a co-inventor of SPASER (nanoplasmonic laser). He is an author of 150 major research papers and presented many invited and keynote talks at major international conferences. He taught short courses on nanoplasmonics and related topics at major international meetings and scientific institutions in US, Canada, Europe, Asia, and Australia.

Choosing the Correct Optical Filter for Your Application

SC1013

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

This course enables attendees to choose and specify the appropriate optical filter type for different applications. The physical principles of interference (multilayer thin film) and absorption (doped glass) filters are explained. Optical filters are clustered into groups according to their spectral characteristics (e.g. band pass or notch filter). The individual advantages and drawbacks of the different filter types are described across the ultraviolet, visible and infrared spectrum. Anyone who is faced with the question "what is the right filter for my application?" or "how should I specify the filter?" will benefit from this course.

LEARNING OUTCOMES

This course will enable you to:
- describe the physical fundamentals of interference filters (thin film filters)
- explain the physics of absorption filters (doped glass filters)
- classify filters according to their spectral characteristics
- transfer filter spectral curves into color coordinates
- use design calculation tools for interference and absorption filters
- identify advantages and disadvantages of both optical filter types
- demonstrate typical applications of optical filters for analytics, biophotonics, digital image sensors, etc.
- formulate typical filter specifications for on your own application

INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn more about how to use and apply optical filters for different applications. Basic knowledge in optics is assumed.

INSTRUCTOR

Steffen Reichel is currently in charge of product management and business development for optical filters at SCHOTT AG in Mainz/Germany. He has been working on fiber optic telecommunications, wave guided optics, diffractive optics, laser optics, and imaging optics since more than 10 years. Besides his work in the field of optical filters at SCHOTT AG he is associated lecturer for "Microoptics 1 (diffractive optics)" and "Microoptics 2 (wave optics)" at the University of Applied Science Darmstadt, Germany. He earned a Ph.D. in Electrical Engineering in the field of fiber optic telecommunications at the University of Kaiserslautern. Dr. Reichel is a Senior Member of the IEEE Photonics Society.

Nanotechnologies in Photonics

Photonic Crystals: A Crash Course, from Bandgaps to Fibers

SC608

Course level: Intermediate
CEU .35 $345 Member / $400 Non-member USD
Sunday 1:30 to 5:30 pm

This half-day course will survey basic principles and developments in the field of photonic crystals, nano-structured optical materials that achieve new levels of control over optical phenomena. This leverage over photons is primarily achieved by the photonic band gap: a range of wavelengths in which light cannot propagate within a suitably designed crystal, forming a sort of optical insulator.

The course will begin with an introduction to the fundamentals of wave propagation in periodic systems, Bloch's theorem and band diagrams, and from there moves on to the origin of the photonic band gap and its realization in practical structures. After that we will cover a number of topics and applications important for understanding the field and its future.

Topics will include: the introduction of intentional defects to create waveguides, cavities, and ideal integrated optical devices in a crystal; exploitation of exotic dispersions for negative-refraction, super-prisms, and super-lensing; the combination of photonic band gaps and conventional index guiding to form easily fabricated hybrid systems (photonic-crystal slabs); the origin and control of losses in hybrid systems; photonic band gap and microstructured optical fibers; and computational approaches to understanding these systems (from brute-force simulation to semi-analytical techniques).

LEARNING OUTCOMES

This course will enable you to:
- learn the fundamental concepts necessary for understanding photonic crystals
- gain familiarity with the unusual phenomena and devices that have been enabled by photonic bandgaps, and the directions taken to achieve them in practice
- understand the principles and perspectives by which future applications in nano-structured photonics may be developed and described

INTENDED AUDIENCE

This course is designed for engineers and scientists who wish to understand how photonic crystals work and its potential applications to quantum optical devices and optoelectronics. It is aimed at those who have an understanding of elementary electromagnetism and some familiarity with the applications and governing principles of optical devices.

INSTRUCTOR

Steven Johnson received his Ph.D. in 2001 from the Dept. of Physics at MIT, where he also earned undergraduate degrees in computer science and mathematics. He is currently an assistant professor of applied mathematics at the Massachusetts Institute of Technology, and also consults for OmniGuide Communications Inc. on hollow bandgap fibers. Several free software packages he has written have seen widespread use in computational electromagnetism and other fields, including the MPB package to solve for photonic eigenmodes and the FFTW fast Fourier transform library (for which he received the 1999 J. H. Wilkinson Prize for Numerical Software, along with M. Frigo). In 2002, Kluwer published his Ph. D. thesis as a book *Photonic Crystals: The Road from Theory to Practice*. His recent work has ranged from the development of new semi-analytical and numerical methods for electromagnetism in high-index-contrast periodic systems to the design of integrated optical devices.

COURSE PRICE INCLUDES the text *Photonic Crystals: Molding the Flow of Light (Second Edition)* (Princeton University Press, 2008) by John D. Joannopoulos, Steven G. Johnson, Joshua N. Winn & Robert D. Meade.

Nonlinear Optics

Fundamentals of Nonlinear Optics

SC1060

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Sunday 8:30 am to 12:30 pm

This course provides an introduction to important nonlinear optical effects and devices such as second harmonic generation, difference frequency generation, optical parametric amplification, Raman amplification, and Brillouin scattering. The course also covers linear optical properties of crystals critical to determining the performance of nonlinear devices. The course gives, in simplified terms, a common framework to describe nonlinear phenomena. This framework allows for explaining critical aspects of nonlinear devices such as phase matching and gain, which in turn allow for an understanding of performance tolerances.

LEARNING OUTCOMES

This course will enable you to:
- identify and describe second order nonlinear effects: second harmonic generation, difference-frequency generation, sum-frequency generation, the electro-optic effect, and optical parametric oscillation
- describe the classical origin of nonlinear effects
- be able to determine extraordinary and ordinary waves in a crystal
- learn about birefringent phase matching and quasi-phase matching
- assess nonlinear device tolerances to temperature, beam divergence, and frequency shifts
- explain the operation of a Raman amplifier
- describe Brillouin scattering in fiber based devices and learn how to mitigate these effects

INTENDED AUDIENCE

This introductory course is intended for engineers, scientists, and program managers interested in learning the fundamental ideas and concepts of nonlinear optics with an emphasis on practical applications.

INSTRUCTOR

Peter Powers is the Bro. Leonard Mann Chair in the Natural Sciences and Professor at the University of Dayton. He teaches a broad range of courses including nonlinear optics. He is author of the textbook Fundamentals of Nonlinear Optics (CRC Press, 2011).

Applied Nonlinear Frequency Conversion

SC931

Course level: Intermediate
CEU .65 $525 Member / $635 Non-member USD
Monday 8:30 am to 5:30 pm

This course provides detailed knowledge on the operation and design of nonlinear frequency conversion devices. The emphasis is on frequency conversion in $\chi(2)$ nonlinear crystals, such as frequency doubling, sum and difference frequency generation and parametric oscillation. In addition, Raman amplifiers and lasers (including bulk and fiber-based devices) are treated, and briefly also Brillouin fiber lasers. The course gives an overview of nonlinear crystal materials and addresses the details of phase matching, showing how a certain phase-matching configuration may be chosen based on given device requirements. For various cases, it is shown how to estimate the achievable conversion efficiency. The conversion of short and ultrashort optical pulses is also discussed. Some case studies demonstrate the influence of various practical issues.

LEARNING OUTCOMES

This course will enable you to:
- explain the principles of operation of various nonlinear conversion devices, including resonant frequency doublers and parametric amplifiers
- select a suitable nonlinear material for use in conversion device
- estimate the conversion efficiency of such devices
- identify special considerations for the conversion of short pulses
- describe some typical design trade-offs
- design at least some simpler devices, (e.g. resonant continuous-wave frequency doublers) for your own applications

INTENDED AUDIENCE

This course is intended for laser engineers and researchers being interested in nonlinear frequency conversion devices. They should already have some basic knowledge of laser beams and ideally also of elementary nonlinear optics.

INSTRUCTOR

Ruediger Paschotta is an expert in laser physics, nonlinear optics and fiber technology, who previously was a researcher and is now working in his company RP Photonics Consulting GmbH, providing technical consultancy primarily for companies building or using lasers and related devices. Details are available on the web page http://www.rp-photonics.com/paschotta.html.

Interconnection and Splicing of High-Power Optical Fibers

SC974

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Monday 8:30 am to 12:30 pm

High-power optical fibers are displacing traditional bulk optical elements in applications such as laser sources, optical amplifiers, and beam delivery systems. However, their high signal or pump powers, large spot sizes or mode areas, and large fiber diameters pose interconnection difficulties including signal loss, mode conversion, polarization crosstalk, reflections, localized heating, end facet damage, and even catastrophic device failure. Various technologies have been developed to address these difficulties including mode field matching technologies, high-power fiber terminations, modal content measurements, and large-diameter fiber cleavers and fusion splicers. This course provides attendees with both conceptual and practical knowledge concerning high-power optical fiber interconnection.

LEARNING OUTCOMES

This course will enable you to:
- improve the quality and reliability of your high-power optical fiber assemblies
- avoid destruction of fibers and lasers due to bad interconnections
- compare competing interconnection technologies
- select equipment for high-power optical fiber interconnection
- evaluate and apply mode matching technologies for high-power interconnection
- estimate splice/interconnection optical properties using numerical computation tools
- test and measure high-power optical fiber splice/interconnection quality

INTENDED AUDIENCE

This material is intended for designers and builders of high-power optical fiber lasers, amplifiers, and beam delivery systems. This course builds upon a basic knowledge of optical waveguide theory.

INSTRUCTOR

Andrew Yablon is president and founder of Interfiber Analysis, LLC where he consults widely on fiber interconnection and fusion splicing. He is the author of *Optical Fiber Fusion Splicing* (Springer, 2005) and has 14 years experience with fusion splicing and fiber interconnection during his career at Bell Laboratories, OFS Laboratories, and Vytran Corporation.

Coherent Mid-Infrared Sources and Applications

SC1012

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Sunday 1:30 to 5:30 pm

This course explains why the mid-IR spectral range is so important for molecular spectroscopy, standoff sensing, and trace molecular detection. We will regard different approaches for generating coherent light in the mid-IR including solid state lasers, fiber lasers, semiconductor (including quantum cascade) lasers, and laser sources based on nonlinear optical methods. The course will discuss several applications of mid-IR coherent light: spectral recognition of molecules, trace gas sensing, standoff detection, and frequency comb Fourier transform spectroscopy.

LEARNING OUTCOMES

This course will enable you to:
- define the “molecular fingerprint” region

- identify existing direct laser sources of mid-IR coherent radiation, including solid state lasers, fiber lasers, semiconductor heterojunction and quantum cascade lasers
- identify laser sources based on nonlinear optical methods, including difference Frequency generators and optical parametric oscillators and generators
- describe the principles of trace gas sensing and standoff detection
- explain mid-IR frequency combs and how they can be used for advanced spectroscopic detection

INTENDED AUDIENCE

Students, academics, researchers and engineers in various disciplines who require a broad introduction to the subject and would like to learn more about the state-of-the-art and upcoming trends in mid-infrared coherent source development and applications. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Konstantin Vodopyanov is a world expert in mid-IR solid state lasers, nonlinear optics and laser spectroscopy. He has both industrial and academic experience, has > 300 technical publications and he is a co-author, with I.T. Sorokina, of the book Solid-State Mid-Infrared Laser Sources (Springer, 2003). He is a member of program committees for several major laser conferences including CLEO (most recent, General Chair in 2010) and Photonics West (LA106 Conference Chair). Currently he teaches and does scientific research at Stanford University and his research interests include mid-IR and terahertz-wave generation using micro-and nano-structured materials, nano-IR spectroscopy, generation of mid-infrared frequency combs and their applications. Dr. Vodopyanov has delivered numerous invited talks and tutorials at scientific meetings on the subject of mid-IR technology.

Splicing of Specialty Fibers and Glass Processing of Fused Fiber Components for Fiber Lasers

SC1020

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Sunday 8:30 am to 12:30 pm

This course provides attendees with fundamentals of specialty fiber splicing and glass fusion processing with a focus on high power fiber laser applications. It describes fiber waveguide and coupling optics associated with the process and discusses practical fusion splicing methods to achieve high performance optical coupling between dissimilar specialty fibers and also fabrication techniques for producing high performance fused components, such as fiber combiners and couplers. In addition, the course describes several practical fiber amplifier, laser, and sensing application examples and also compares different fusion hardware.

LEARNING OUTCOMES

This course will enable you to:
- become familiar with fiber fusion fundamental, specialty fiber basics, and waveguide coupling optics between dissimilar fibers
- gain in-depth knowledge of fiber splicing process and practical techniques
- learn fusion processing for fabricating fused components such as fiber combiners and couplers
- apply fiber fusion technologies for your applications
- learn state-of-the-art fiber splicing and fusion processing tools and hardware

INTENDED AUDIENCE

This material is intended for anyone who needs to handle and splicing specialty fibers and wants to learn fiber fusion process for fabricating high performance fiber devices. This course is valuable for those who want to further improve their fiber system performance.

INSTRUCTOR

Baishi Wang is Director of Technology at Vytran. He received his Ph.D from State University of New York at Stony Brook. He has over 10 years of experience in specialty fibers and fused component fabrication and fiber fusion. His research area includes doped and un-doped specialty fibers, fiber fused component technology, fiber fusion process and instrumentation, fiber amplifier and lasers, waveguide theory and modeling, and fiber test and measurements. Prior to joining Vytran, he was a technical staff member in the Specialty Fiber Division at Lucent Technologies and OFS. He has published over 20 papers in referred conferences and journals and has given several invited talks. He is a member of SPIE and OSA.

Optical Communications: Devices to Systems

Laser Beam Propagation for Applications in Laser Communications, Laser Radar, and Active Imaging

SC188

Course level: Intermediate
CEU .65 $655 Member / $765 Non-member USD
Wednesday 8:30 am to 5:30 pm

This course describes beam wave propagation through optical turbulence. Satellite communication systems, laser radar, remote sensing, and adaptive optics are some of the applications affected by optical turbulence. Tractable analytic equations are provided for calculating Gaussian-beam wave statistical quantities affecting system performance. The mutual coherence function (MCF), mean intensity, degree of coherence, and intensity fluctuations (scintillation) are presented. Videos of actual experiments show how to gather data. Examples are presented using MATHEMATICA software programs. Copies of these programs are available in the text.

LEARNING OUTCOMES

This course will enable you to:
- calculate power budget for laser-based radar and communications systems
- calculate system reliability for laser radar and communication systems
- calculate backscatter effects from targets in monostatic and bistatic laser radar systems
- use MATHEMATICA programs to calculate statistical parameters for laser-based systems

INTENDED AUDIENCE

This course is intended for scientists, supervising and design engineers who are interested in understanding the propagation phenomena, which impose limitations on system performance, and in learning new approaches to improving system design.

INSTRUCTORS

Ronald Phillips is Director of the Florida Space Institute, Professor of Electrical and Computer Engineering, and an associate member of the School of Optics/CREOL at the University of Central Florida. He has worked in optical wave propagation for more than 25 years.

Larry Andrews is Professor of Mathematics and an associate member of School of Optics/CREOL at the University of Central Florida. He has worked in optical wave propagation for more than 20 years.

COURSE PRICE INCLUDES the texts, *Laser Beam Propagation through Random Media* (SPIE Press, 2005) by Ronald Phillips and Larry Andrews and the *Field Guide to Atmospheric Optics* (SPIE Press, 2004) by Larry C. Andrews.

Optics and Optical Engineering

Optical Systems Engineering: A Practical Approach

SC1052

Course level: Introductory
CEU .65 $525 Member / $635 Non-member USD
Wednesday 8:30 am to 5:30 pm

Optical systems engineering requires an understanding of more than the traditional lens design and system testing aspects of optical engineering. This course brings together the components needed to develop and specify optical systems such as imagers, radiometers, and spectrometers. Using rules-of-thumb and back-of-the-envelope calculations, topics covered will include geometrical optics, aberrations, radiometry, optical sources, detectors, and optomechanics, as well as aspects unique to the systems engineering process.

LEARNING OUTCOMES

This course will enable you to:

- utilize system engineering tools such as optical systems tradeoffs and architecture development; requirements flowdown, allocation, and error budgets; and component specifications.
- calculate geometrical-optics parameters such as image size, image location, FOV, IFOV, GSD, and the effects of stops and pupils
- distinguish the various types of optical aberrations; estimate blur size and blur-to-pixel ratio, and their effects on MTF, GRD, and image quality
- quantify radiometric performance, using the concepts of optical transmission, f/#, etendue, scattering, and stray light
- compare source types and properties; estimate radiometric performance; develop source-selection specifications and tradeoffs such as output power, irradiance, radiance, uniformity, stability, and SWaP
- compare FPA and detector types and properties; predict SNR performance combining optical, source, and detector parameters; develop detector-selection specifications and tradeoffs such as sensitivity, dynamic range, uniformity, operability, and SWaP
- explain optical component specifications; estimate thermal, structural, and dynamic effects on the performance of an optical system; utilize the results of STOP analysis

INTENDED AUDIENCE

Intended for engineers, scientists, technicians, and managers who are developing, specifying, or purchasing optical, electro-optical, and infrared systems. Prerequisites include a familiarity with Snell's law, the lens equation for simple imaging, and the concepts of wavelength and wavefronts.

INSTRUCTOR

Keith Kasunic has more than 20 years experience developing optical, electro-optical, and infrared systems. He holds a Ph.D. in Optical Sciences from the University of Arizona, an MS in Mechanical Engineering from Stanford University, and a BS in Mechanical Engineering from MIT. He has worked for or been a consultant to a number of organizations, including Lockheed Martin, Ball Aerospace, Sandia National Labs, Nortel Networks, and Bookham. He is also an Adjunct Professor and Instructor at Univ. of Central Florida's CREOL - The College of Optics and Photonics, as well as an Affiliate Instructor with Georgia Tech's SENSIAC. This course is based on his textbook Optical Systems Engineering, published by McGraw-Hill in 2011.

Radiometry Revealed

SC915

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 8:30 am to 12:30 pm

This course explains basic principles and applications of radiometry and photometry. A primary goal of the course is to reveal the logic, systematic order, and methodology behind what sometimes appears to be a confusing branch of optical science and engineering. Examples are taken from the ultraviolet through the long-wave infrared portions of the electromagnetic spectrum. Anyone who wants to answer questions such as, "how many watts or photons do I have?" or "how much optical energy or radiation do I need?" will benefit from taking this course.

LEARNING OUTCOMES

This course will enable you to:

- describe the fundamental units and quantities used to quantify electromagnetic radiation at wavelengths from the ultraviolet through the visible and infrared
- use, understand, and convert between radiometric and photometric quantities
- apply radiometry to typical applications, such as calibrating an imaging system, determining human-perceived brightness of a display, or calculating electricity produced by a solar cell
- calculate areas and solid angles to determine the energy, energy density, or brightness in an optical system
- explain the role of rays, stops, and pupils in defining the field of view and light-gathering capability of an optical system
- determine the throughput of an optical system and use it in radiometric calculations
- quantify the radiant energy in optical images from point and extended sources
- transfer radiant energy into and throughout optical systems
- identify radiometric standards and calibration methods
- be familiar with radiometers and photometers

INTENDED AUDIENCE

Scientists, engineers, technicians, or technical managers who wish to learn more about how to quantify radiant energy in optical systems and measurements. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Joseph Shaw is Director of the Optical Technology Center and Professor of Electrical Engineering and Physics at Montana State University in Bozeman, Montana. He previously worked at the NOAA research labs in Boulder, Colorado. He is a widely recognized expert in the development, calibration, and analysis of optical systems used in environmental and military sensing. Recognition for his work in this field includes NOAA research awards, a Presidential Early Career Award for Scientists and Engineers, and the World Meteorological Organization's Vaisala Prize. He earned a Ph.D. in Optical Sciences at the University of Arizona and is a Fellow of both the OSA and SPIE.

Optical System Design: Layout Principles and Practice

SC690

Course level: Introductory
CEU .65 $635 Member / $745 Non-member USD
Monday 8:30 am to 5:30 pm

This course provides the background and principles necessary to understand how optical imaging systems function, and teaches the simple methods and techniques with which you can lay out a system which will satisfy the performance requirements of your application.

Optical system imagery can readily be calculated using the Gaussian cardinal points or by paraxial ray tracing. These principles are extended to the layout and analysis of multi-component systems. This course includes topics such as imaging with thin lenses and systems of thin lenses, stops and pupils, and afocal systems. Numerous examples of optical systems are described.

This course provides simple methods of arriving at, and understanding, the first-order layout of an optical system by a process which determines the required components and their locations. This process will produce an image of the right size and in the right location. A special emphasis is placed on the practical aspects of the design of optical systems.

LEARNING OUTCOMES

This course will enable you to:

- specify the requirements of an optical system for your application including magnification, object-to-image distance, and focal length
- diagram ray paths and do simple ray tracing
- describe the performance limits imposed on optical systems by diffraction and the human eye
- predict the imaging characteristics of multi-component systems
- determine the required element diameters
- apply the layout principles to a variety of optical instruments including telescopes, microscopes, magnifiers, field and relay lenses, zoom lenses, and afocal systems
- adapt a known configuration to suit your application
- describe the process of the design and layout of an optical system

INTENDED AUDIENCE

This course is intended for engineers, scientists, managers, technicians and students who need to use or design optical systems and want to understand the principles of image formation by optical systems. No previous knowledge of optics is assumed in the material development, and only basic math is used (algebra, geometry and trigonometry). By the end of the course, these techniques will allow the design and analysis of relatively sophisticated optical systems.

INSTRUCTOR

John Greivenkamp is a professor at the College of Optical Sciences of The University of Arizona where he teaches geometrical optics and optical system design to undergraduate and graduate students. John is the editor of the *SPIE Field Guides* and is the author of the *Field Guide to Geometrical Optics* (SPIE Press, 2004).

COURSE PRICE INCLUDES the texts *Modern Optical Engineering, 4th edition* (SPIE Press, 2008) by Warren J. Smith and the *Field Guide to Geometrical Optics* (SPIE Press, 2004) by John E. Greivenkamp.

SPECIAL NOTE: This course is a continuation of Warren Smith's long-standing SPIE course SC001, Optical System Design: Layout Principles and Practice and incorporates many of the same approaches and material used for that course.

Practical Optical System Design

SC003

Course level: Intermediate
CEU .65 $610 Member / $720 Non-member USD
Tuesday 8:30 am to 5:30 pm

This course will provide attendees with a basic working knowledge of optical design and associated engineering. The information in this course will help novice and experienced designers, as well as people who interact with optical designers and engineers, sufficiently understand these problems and solutions to minimize cost and risk. The course includes background information for optical design and an array of pragmatic considerations such as optical system specification, analysis of optical systems, material selection, use of catalog systems and components, ultraviolet through infrared system considerations, environmental factors and solutions, Gaussian beam optics, and production considerations such as optical testing and alignment. The course includes many practical and useful examples emphasizing rigorous optical design and engineering with an emphasis on designing for manufacture. Even if you have never used an optical design program before, you will become fluent with how to estimate, assess, execute, and manage the design of optical systems for many varied applications.

This course is a continuation of the long-running Practical Optical Systems Design course established and taught by Robert E. Fischer.

LEARNING OUTCOMES

This course will enable you to:

- develop a complete optical system design specification
- review fundamental physics and engineering related to optical design
- assess and analyze optical systems using computer-aided methods
- properly take into account system considerations such as environmental factors
- design for manufacture, alignment, and testing
- describe all aspects of optical design and associated engineering

INTENDED AUDIENCE

This course is intended for anyone who needs to learn how to design optical systems. It will be of value to those who either design their own optics or those who work directly or indirectly with optical designers, as you will now understand what is really going on and how to ask the right questions of your designers.

INSTRUCTOR

Richard Youngworth Ph.D. is the Director of Optical Engineering at Light Capture, Inc., an optical and optomechanical design firm providing consulting, innovation incubation, and product development services. His industrial experience spans diverse topics including optical metrology, design, manufacturing, and analysis. In particular, Dr. Youngworth has spent significant time working on optical systems in the challenging transition from ideal design to successful volume manufacturing. He is widely considered an expert, due to his research, lectures, publications, and industrial work on the design, producibility, and tolerance analysis of optical components and systems. He has a B.S. in electrical engineering from the University of Colorado at Boulder and earned his Ph.D. in optics at the University of Rochester by researching tolerance analysis of optical systems.

COURSE PRICE INCLUDES the text *Optical System Design, 2nd Edition* (SPIE Press, 2008) by Robert E. Fischer, Biljana Tadic-Galeb, and Paul R. Yoder, Jr.

Introduction to Lens Design

SC935

Course level: Introductory
CEU .65 $525 Member / $635 Non-member USD
Sunday 8:30 am to 5:30 pm

Have you ever needed to specify, design, or analyze a lens system and wondered how to do it or where to start? Would you like a better understanding of the terminology used by lens designers? Are you interested in learning techniques to better utilize your optical design software? Have you always wanted to know what the difference is between spherical aberration and coma or where those crazy optical tolerances come from? If your answer to any of these questions is yes, this course is for you!

This full day course begins with a review of basic optics, including paraxial optics, system layout, and lens performance criteria. A discussion of how different system specifications influence the choice of design form, achievable performance, and cost will be presented. Third-order aberration theory, stop shift theory, and induced aberrations are examined in detail. Factors that affect aberrations and the principles of aberration correction are discussed. Demonstrations of computer aided lens design are given accompanied by a discussion of optimization theory, variables and constraints, and local vs. global optimization. Techniques for improving an optical design are illustrated with easy-to-understand examples. The optical fabrication and tolerancing process is explored including an example comparison between a simple copier lens and a complex lithography lens (used to print computer circuit boards) to help explain why some optical designs require precision mechanics and precision assembly and some do not.

LEARNING OUTCOMES

This course will enable you to:
- specify and evaluate a lens system
- describe the source and correction of aberrations
- interpret ray-intercept plots
- classify the limits imposed by aberration theory
- determine how to improve a design
- use optical design software to its best advantage
- design toleranced, easily manufacturable lenses

INTENDED AUDIENCE

This course is intended for engineers, scientists, managers, technicians, and students whose main job function is not lens design, but are occasionally called upon to specify, design, analyze, or review an optical system and would like to have a better understanding of the subject. No previous knowledge of geometrical optics, optical design, and computer optimization is assumed.

INSTRUCTOR

Julie Bentley is an Associate Professor at The Institute of Optics, University of Rochester and has been teaching undergraduate and graduate level courses in geometrical optics, optical design, and product design for more than 15 years. She received her B.S., M.S., and PhD in Optics from the The Institute of Optics, University of Rochester. After graduating she spent two years at Hughes Aircraft Co. in California designing optical systems for the defense industry and then twelve years at Corning Tropel Corporation in Fairport, New York designing and manufacturing precision optical assemblies such as microlithographic inspection systems. She has experience designing a wide variety of optical systems from the UV to the IR, refractive and reflective configurations, for both the commercial and military markets.

Basic Optics for Engineers

SC156

This course is also available in online format

Course level: Introductory
CEU .65 $565 Member / $675 Non-member USD
Monday 8:30 am to 5:30 pm

This course introduces each of the following basic areas of optics, from an engineering point of view: geometrical optics, image quality, flux transfer, sources, detectors, and lasers. Basic calculations and concepts are emphasized.

LEARNING OUTCOMES

This course will enable you to:
- compute the following image properties: size, location, fidelity, brightness
- estimate diffraction-limited imaging performance
- explain optical diagrams
- describe the factors that affect flux transfer efficiency, and their quantitative description
- compute the spectral distribution of a source
- describe the difference between photon and thermal detectors
- calculate the signal to noise performance of a sensor (D* and noise equivalent power)
- differentiate between sensitivity and responsivity
- explain the main factors of laser beams: monochromaticity, collimation, and propagation

INTENDED AUDIENCE

This class is intended for engineers, technicians, and managers who need to understand and apply basic optics concepts in their work. The basics in each of the areas are covered, and are intended for those with little or no prior background in optics, or for those who need a fundamental refresher course.

INSTRUCTOR

Alfred Ducharme is a professor of optics and electrical engineering in the College of Engineering and Computer Science at the University of Central Florida. He received a B.S. in Electrical Engineering from the University of Massachusetts - Lowell, and both a M.S. and Ph.D. in Electrical Engineering from the University of Central Florida - School of Optics (CREOL). Dr. Ducharme is the Program Coordinator for the 4-year undergraduate program in Photonics (BSEET-Photonics) offered by the Engineering Technology Department.

COURSE PRICE INCLUDES the text *Basic Electro-Optics for Electrical Engineers* (SPIE Press, 1998) by Glenn D. Boreman.

Designing Optical Systems with Manufacturable Aspheres

SC1061

NEW

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Wednesday 8:30 am to 12:30 pm

Have you ever wondered if adding an asphere to your optical system will make it better? Are you interested in learning techniques to incorporate manufacturable aspheres into your optical designs? Would you like a better understanding of where to put an asphere (e.g. location or material) or if you should you use more than one asphere in the your design? Have you always wanted to know what's the best way to specify and tolerance an asphere or even how to constrain the asphere during optimization so that it is manufacturable. If your answer to any of these questions is yes, this course is for you!

This course will provide attendees with a broad and useful understanding of how to design with aspheric surfaces and components. Aspheric surfaces in a lens or mirror system can bring significant benefits to the optical performance. This is not without the liabilities of added cost, delivery time, and even producibility. The course will begin with a discussion of how and when to incorporate aspherics into a

variety of lens design forms. We present what aspherics will do for a design, and also what they will not do. We will then focus on understanding the differences between the standard polynomial representation and the new Forbes' polynomials for specifying, optimizing, and tolerancing aspheres. Methods to constrain the aspheric profile during optimization to maintain manufacturability will be introduced. The final part of the course will briefly review methods for manufacturing and testing aspheres.

This course is a continuation of the long-running course SPIE SC552-Aspheric Optics, which was established and taught by Robert E. Fischer.

LEARNING OUTCOMES

This course will enable you to:

- determine if adding an asphere to optical design makes sense
- identify where to add an asphere to a lens or mirror design to improve performance
- interpret an aspheric prescription from an optical component print
- assess the difference between the standard polynomial representation and Forbes' polynomials for both specification and optimization
- optimize an optical design using aspheres and constrain the aspheric profile during optimization to maintain manufacturability
- specify and tolerance an asphere to predict as-built performance
- describe how aspherics are manufactured and tested

INTENDED AUDIENCE

This course is intended for engineers, optical designers, and managers who want an overview of the benefits and challenges associated with designing optical systems with aspheric surfaces. It will be of value to those who either design their own optics or those who work directly or indirectly with optical designers, as you will now understand what is really going on with aspheric surfaces and how to ask the right questions of your designers or fabricators to make them manufacturable.

INSTRUCTOR

Julie Bentley is an Associate Professor at The Institute of Optics, University of Rochester and has been teaching undergraduate and graduate level courses in geometrical optics, optical design, and product design for more than 15 years. She received her B.S., M.S., and PhD in Optics from the The Institute of Optics, University of Rochester. After graduating she spent two years at Hughes Aircraft Co. in California designing optical systems for the defense industry and then twelve years at Corning Tropel Corporation in Fairport, New York designing and manufacturing precision optical assemblies such as microlithographic inspection systems. She has experience designing a wide variety of optical systems from the UV to the IR, refractive and reflective configurations, for both the commercial and military markets.

This course is a continuation of Robert E. Fischer's very successful course on aspheres.

Evaluating Aspheres for Manufacturability

SC1039

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Wednesday 1:30 to 5:30 pm

This course provides an overview of how aspheric surfaces are designed, manufactured, and measured. The primary goal of this course is to teach how to determine whether a particular aspheric surface design will be difficult to make and/or test. This will facilitate cost/performance trade off discussions between designers, fabricators, and metrologists.

We will begin with a discussion of what an asphere is and how they benefit optical designs. Next we will explain various asphere geometry characteristics, especially how to evaluate local curvature plots. We will also review flaws of the standard polynomial representation, and how the Forbes polynomials can simplify asphere analysis. Then we will discuss how various specifications (such as figure error and local slope) can influence the difficulty of manufacturing an asphere. Optical assembly tolerances, however, are beyond the scope of this course - we will focus on individual elements (lenses / mirrors).

The latter half of the course will focus on the more common technologies used to generate, polish, and/or measure aspheric surfaces (e.g. diamond turning, glass molding, pad polishing, interferometry). We'll give an overview of a few generic manufacturing processes (e.g. generate-polish-measure). Then we'll review the main strengths and weaknesses of each technology in the context of cost-effective asphere manufacturing.

LEARNING OUTCOMES

This course will enable you to:

- answer the question "Can these aspheres be made within my budget?"
- interpret an aspheric prescription from an optical component print
- describe how Forbes polynomials can simplify asphere interpretation
- know how aspheres are manufactured and tested
- evaluate key characteristics of an aspheric surface to determine whether an asphere will be difficult to manufacture and/or test

INTENDED AUDIENCE

This material is intended for engineers, optical designers, and managers who want an overview of the benefits and challenges associated with manufacturing aspheric surfaces for use in optical systems. It will be of benefit for specialists in a particular area (e.g. design, manufacturing, or testing), as it will give a broad overview in all three of those areas with a focus on aspheric surfaces. It is intended to facilitate communication between designers, fabricators, and testers of aspheric surfaces.

INSTRUCTORS

Gregory Forbes is Senior Scientist at QED and has developed the mathematical core of the software that controls QED's machines for optical finishing and metrology. Dr. Forbes has recently published a series of papers discussing better ways to specify aspheric shapes by using tailored orthogonal polynomials, and they will also be discussed in this short course.

Paul Murphy is a Senior Optical Engineer at QED Technologies International, where he has developed advanced products and processes for aspheric optical manufacturing and metrology. He received his Ph.D. in interferometric non-null asphere testing from The Institute of Optics at the University of Rochester.

Paul Dumas is one of the founding members of QED Technologies, where he has developed software and processes for aspheric optical manufacturing, and managed various engineering groups throughout the company's history. He received his B.S. and M.S. in Optics from The Institute of Optics at the University of Rochester.

Fundamentals of Nonlinear Optics

SC1060

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Sunday 8:30 am to 12:30 pm

This course provides an introduction to important nonlinear optical effects and devices such as second harmonic generation, difference frequency generation, optical parametric amplification, Raman amplification, and Brillouin scattering. The course also covers linear optical properties of crystals critical to determining the performance of nonlinear devices. The course gives, in simplified terms, a common framework to describe nonlinear phenomena. This framework allows for explaining critical aspects of nonlinear devices such as phase matching and gain, which in turn allow for an understanding of performance tolerances.

LEARNING OUTCOMES

This course will enable you to:

- identify and describe second order nonlinear effects: second harmonic generation, difference-frequency generation, sum-

frequency generation, the electro-optic effect, and optical parametric oscillation
- describe the classical origin of nonlinear effects
- be able to determine extraordinary and ordinary waves in a crystal
- learn about birefringent phase matching and quasi-phase matching
- assess nonlinear device tolerances to temperature, beam divergence, and frequency shifts
- explain the operation of a Raman amplifier
- describe Brillouin scattering in fiber based devices and learn how to mitigate these effects

INTENDED AUDIENCE

This introductory course is intended for engineers, scientists, and program managers interested in learning the fundamental ideas and concepts of nonlinear optics with an emphasis on practical applications.

INSTRUCTOR

Peter Powers is the Bro. Leonard Mann Chair in the Natural Sciences and Professor at the University of Dayton. He teaches a broad range of courses including nonlinear optics. He is author of the textbook Fundamentals of Nonlinear Optics (CRC Press, 2011).

Applied Diffractive Optics

SC1055

Course level: Intermediate
CEU .35 $335 Member / $390 Non-member USD
Wednesday 8:30 am to 12:30 pm

This course covers the operational principles of diffractive optical components in modern photonic instruments. It also covers terminology in the field of diffractive optics, as well as delivers a comprehensive overview of the main types of diffractive optics components. The instructor provides attendees with an understanding of basic principles of diffraction phenomena, making an emphasis on qualitative understanding of diffraction by the use of field distributions and graphs, and providing the insight into the fundamental relations and the important trends. Attention is paid to the numerous applications and functions performed by diffractive optical components in photonic systems. The main methods for fabricating diffractive components are surveyed.

LEARNING OUTCOMES

This course will enable you to:
- learn the fundamentals of diffraction phenomena
- become familiar with operational principles, important relations, and terminology in the field of diffractive optics
- describe the differences between the main types of diffractive optics components
- acquire knowledge of the various functions performed by diffractive optical components in optical and photonics systems
- become familiar with different simulation and analysis techniques related to diffractive optics design
- assess the key benefits and important trade-offs attributed to the use of diffractive optics in optics and photonics instruments
- learn the main fabrication technologies for diffractive components

INTENDED AUDIENCE

This material is intended for engineers, scientists, college students, and photonics enthusiasts who would like to broaden their knowledge and understanding of diffractive optics fundamentals, and are interested in the practical applications of diffractive optical components. Previous experience with optical systems design is desirable.

INSTRUCTOR

Yakov Soskind is the Principal Systems Engineer with DHPC Technologies in Woodbridge, NJ. He has been involved in optical systems' design and development for over 30 years. Dr. Soskind has been awarded more than 20 domestic and international patents, and has authored and co-authored several publications. His Field Guide to Diffractive Optics was recently published by SPIE Press (2011).

COURSE PRICE INCLUDES the Field Guide to Diffractive Optics, FG21 (SPIE Press, 2011) by Yakov Soskind.

Principles of Fourier Optics and Diffraction

SC017

Course level: Intermediate
CEU .65 $630 Member / $740 Non-member USD
Tuesday 8:30 am to 5:30 pm

This course introduces the application of Fourier theory in diffraction and image formation. The first part of the course provides a review of a number of mathematical topics, including convolution and the Fourier transform. Next, the phenomenon of diffraction is introduced, the effects of lenses on diffraction are discussed, and the propagation of Gaussian beams is treated. Finally, the effects of diffraction on the performance of image-forming systems and other optical devices are discussed.

LEARNING OUTCOMES

This course will enable you to:
- understand convolution and Fourier transform operations
- describe the general effects of diffraction in the Fresnel and Fraunhofer regions
- understand the effects of lenses on diffraction
- predict the Fraunhofer diffraction patterns associated with specific apertures
- describe the propagation of Gaussian beams
- understand the effects of diffraction on image formation and image resolution
- calculate the Point-Spread Functions (PSF) and Optical Transfer Functions (OTF) for various imaging systems

INTENDED AUDIENCE

This course is intended for scientists and engineers who need to understand the diffraction of optical wavefields and the effects of diffraction on the performance of image-forming systems and other optical devices.

INSTRUCTOR

Jack Gaskill is Professor Emeritus of Optical Sciences at the University of Arizona where, for more than 30 years, his teaching activities were devoted primarily to the applications of Fourier theory in optics. He has taught more than 40 off-campus short courses in Fourier optics and related subjects. Gaskill is author of the textbook, *Linear Systems, Fourier Transforms, and Optics* (Wiley, 1978), and is a Past President of SPIE.

COURSE PRICE INCLUDES the text *Linear Systems, Fourier Transforms, and Optics* (Wiley, 1978) by Jack D. Gaskill.

Polarized Light: A Practical Hands-on Introduction

SC206

Course level: Introductory
CEU .65 $525 Member / $635 Non-member USD
Tuesday 8:30 am to 5:30 pm

Covering introductory and intermediate topics in polarized light, simple explanations, and concepts are the emphasis of this hands-on course. There are demonstrations, and each participant receives two linear polarizers, a circular polarizer, a quarter-wave plate and a half-wave plate. Topics include: linear polarizers, mechanical strains, birefringence, orthogonality, circular polarization, matrices, reflective properties, practical applications, optical activity, and Faraday rotation. The goal of the course is that each participant retains a sound grasp of each concept, and the use of mathematics is kept to a minimum. Attendees learn to appreciate a light beam's "polarization degree of freedom," and how to use polarization-modifying elements to convert a beam's state of polarization from one form to another.

LEARNING OUTCOMES

This course will enable you to:
- understand the different states of pure polarization
- understand how to convert one state of polarization to another
- measure a given beam's state of polarization
- know how the different polarization-modifying elements (HWP, QWP, Faraday rotator, etc.) operate
- apply the proper polarization-modifying element to alter the state or polarization of a polarized beam
- learn how polarization changes upon reflection
- understand the difference between optical activity and Faraday rotation
- appreciate the interference of two orthogonally polarized beams
- appreciate the many practical applications associated with the control of the state of polarization
- specify what polarization element will be suitable for a particular function
- develop a fundamental picture of the meaning of circularly polarized light.

INTENDED AUDIENCE

This presentation is aimed at researchers, engineers, technicians, managers and others who wish to develop an intuitive grasp of polarization concepts.

INSTRUCTOR

Robert Fisher is the owner of RA Fisher Associates, LLC, his firm providing technical training in lasers and in optics, private consulting, and expert legal services. He has been active in laser physics and in nonlinear optics for the last 40 years. He has taught graduate courses at the Univ. of California, Davis, and worked at both Lawrence Livermore National Lab. and Los Alamos National Lab. He is an SPIE Fellow and an OSA Fellow, and was a 3-year member of SPIE's Board of Directors. He has served on the CLEO Conference Nonlinear Optics Subcommittee for 5 years, with two of those years as its chair. He has chaired numerous SPIE conferences. He is currently the Program Chair of the CLEO 2010 Conference and the General Chair of the CLEO 2012 Conference.

Design of Efficient Illumination Systems

SC011

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Monday 1:30 to 5:30 pm

Illumination systems are included in fiber illuminators, projectors, and lithography systems. The design of an illumination system requires balancing uniformity, maximizing the collection efficiency from the source, and minimizing the size of the optical package. These choices are examined for systems using lightpipes, lens arrays, faceted optics, tailored edge rays designs, and integrating spheres through a combination of computer simulations, hardware demonstrations and discussions.

LEARNING OUTCOMES

This course will enable you to:
- describe the differences between illuminance, intensity and luminance
- compute the required source luminance given typical illumination system specifications
- compute the change in luminance introduced by an integrating sphere
- distinguish between a Kohler illuminator and an Abbe illuminator
- explain the difference in uniformity performance between a tailored edge ray reflector and a standard conic reflector
- design a lightpipe system to provide uniform illuminance
- design a lens array system to create a uniform illuminance distribution
- design a reflector with facets to create a uniform illuminance distribution

INTENDED AUDIENCE

Individuals who design illumination systems or need to interface with those designers will find this course appropriate. Previous exposure to Optical Fundamentals (Reflection, Refraction, Lenses, Reflectors) is expected.

INSTRUCTOR

William Cassarly is a Senior Scientist with Synopsys (formerly Optical Research Associates). Before joining ORA 14 years ago, Cassarly worked at GE for 13 years, holds 46 patents, and has worked extensively in the areas of illumination system design, sources, photometry, light pipes, and non-imaging optics. Bill was awarded the GE Corporate 'D. R. Mack Advanced Course Supervisor Award' for his efforts in the training of GE Engineers and is an SPIE Fellow.

Thin Film Optical Coatings

SC321

Course level: Intermediate
CEU .65 $525 Member / $635 Non-member USD
Monday 8:30 am to 5:30 pm

Virtually no modern optical system could operate without optical coatings. Much of any optical system consists of a series of coated and shaped surfaces. The shape determines the power of the surface but it is the coating that determines the specular properties, the amount of light transmitted or reflected, the phase change, the emittance, the color, the polarization, the retardation, including even the mechanical properties. Optical coatings consist of assemblies of thin films of materials where interference properties combine with the intrinsic properties of the materials to yield the desired optical performance. They act to reduce the reflectance losses of lenses, increase the reflectance of mirrors, reduce glare and electromagnetic emission from display systems, improve the thermal insulation of buildings, protect eyes from laser radiation, analyze gases, act as anticounterfeiting devices on banknotes, multiplex or demultiplex communication signals, separate or combine color channels in display projectors, and these are just a few of their roles. This course emphasizes understanding and takes students from fundamentals to techniques for design and manufacture.

LEARNING OUTCOMES

This course will enable you to:
- understand the basic principles of optical interference coatings
- perform many rapid design calculations and assessments without needing a computer
- speak knowledgeably about the parameters that characterize optical coatings
- design simple coatings given a suitably equipped computer
- know the advantages and disadvantages of the basic processes for the production of these filters
- understand the influence of errors in monitoring and estimate tolerances in production

INTENDED AUDIENCE

Anyone who is or wishes to become involved in the manufacture or use of optical coatings or who wants to know more about this rapidly growing and important field. The level is appropriate for someone who has completed high school mathematics and/or science.

INSTRUCTOR

H. Angus Macleod is President of Thin Film Center, a software, training and consulting company in optical coatings, and is Professor Emeritus of Optical Sciences at the University of Arizona. He has been deeply involved in optical coatings for over forty years.

Understanding Scratch and Dig Specifications

SC700

Course level: Introductory
CEU .35 $370 Member / $425 Non-member USD
Wednesday 8:30 am to 12:30 pm

Surface imperfection specifications (i.e. Scratch-Dig) are among the most misunderstood, misinterpreted, and ambiguous of all optics component specifications. This course provides attendees with an understanding of the source of ambiguity in surface imperfection specifications, and provides the context needed to properly specify surface imperfections using a variety of specification standards, and to evaluate a given optic to a particular level of surface imperfection specification. The course will focus on the differences and application of the Mil-PRF-13830, ISO 10110-7, and BSR/OP1.002. Many practical and useful specification examples are included throughout, as well as a hands-on demonstration on visual comparison evaluation techniques. The course is followed by SC1017 Optics Surface Inspection Workshop, which provides hands-on experience conducting inspections using the specification information provided in this course.

LEARNING OUTCOMES

This course will enable you to:
- describe the various surface imperfection specifications that exist today
- compose a meaningful surface imperfection specification for cosmetic imperfections using ISO, ANSI, or Mil standards
- identify the different illumination methods and comparison standards for evaluation
- demonstrate a surface imperfection visual inspection
- understand the options available for controlling surface imperfections in a vendor/supplier relationship

INTENDED AUDIENCE

This material is intended for anyone who needs specify, quote, or evaluate optics for surface imperfections. Those who either design their own optics or who are responsible for optics quality control will find this course valuable.

INSTRUCTOR

David Aikens a.k.a "the scratch guy", is among the foremost experts on surface imperfection standards and inspection. Dave is President and founder of Savvy Optics Corp., is the head of the American delegation to ISO TC 172 SC1, and is currently the Executive Director of the Optics and Electro-Optics Standards Council, OEOSC.

COURSE PRICE INCLUDES a copy of the latest ANSI approved surface imperfections specification standard.

Understanding Waviness and Roughness Specifications for Optics

SC1011

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

This course was designed to bring photonics personnel up to an immediate working knowledge on surface texture specifications and the impact surface roughness and waviness can have on an optical system. The surface texture of a polished optical surface is an important, if misunderstood, surface property. Surface roughness causes scatter and system transmission loss, while waviness and mid-spatial frequency ripple can cause loss of resolution, image quality, veiling glare, beam modulation and a host of other issues.

Until recently, surface texture could be safely described by a single number, RMS roughness, following MIL-STD-10A, since most polished optical surfaces were manufactured using the same slurry-pitch process that had existed for decades. In the past 30 years, however, new manufacturing technologies have evolved using molding, diamond turning, synthetic lap polishing and deterministic figuring which have dramatically altered the surface finish of optics. In order to control the resultant surface texture errors, new specifications like gradients, correlation values, PSDs and MSF ripple specifications have been introduced. Most users do not completely understand these new notations however, and the meaning of even a simple RMS roughness specification has become obscure, or even meaningless.

The course begins with the origins and evolution of surface texture specifications in optics, and defines the terms and parameters used to control surface texture in the modern optical manufacturing world. The potential performance impact of surface texture errors will be covered, and some specific case studies will be used to show the impact of various amplitudes of these errors on precision optical instrument performance. The national and international standards are introduced, and the derivation of meaningful specification for texture and waviness for common applications is discussed. Finally, the identification, measurement and reduction of these manufacturing errors is treated.

LEARNING OUTCOMES

This course will enable you to:
- describe the surface texture of a polished optical surface
- identify the sources of surface texture errors in modern manufacturing processes
- explain the meaning of the most common surface texture and ripple specifications
- compose a meaningful surface texture specification using MIL, ASME and ISO standards
- assess the impact of mid-spatial frequency ripple and roughness on system performance
- identify these surface errors in measurement data
- quantify the requirements for surface texture using a variety of notations

INTENDED AUDIENCE

This course is intended for optical design, manufacturing and quality control and assurance engineers and managers. Some understanding of algebra is beneficial.

INSTRUCTOR

David Aikens has been writing on the subject of surface texture and ripple for more than 20 years and is one of the foremost experts on optics mid-spatial frequency ripple today. Dave is President and founder of Savvy Optics Corp., is the head of the American delegation to ISO TC 172 SC1, and is currently the Executive Director of the Optics and Electro-Optics Standards Council, OEOSC.

Optics Surface Inspection Workshop

SC1017

Course level: Introductory
CEU .35 $380 Member / $435 Non-member USD
Wednesday 1:30 to 5:30 pm

Understanding the correct way to inspect optical surfaces is one the most important skills anyone working with or around optics can have, including technicians, material handlers, engineers, managers, and buyers. While understanding the specifications is the first step, learning how to actually perform the inspection is just as important. This hands-on workshop will allow attendees to learn the "Best Practice" for cleaning and inspecting optical surfaces. The course has many demonstrations and labs and gives attendees practice handling and inspecting optics to develop a high level of proficiency.

This course was designed to bring photonics personnel up to an immediate working knowledge on the correct methods to conduct a surface inspection in accordance with MIL, ANSI, and ISO standards. It is designed to complement SC700 Understanding Scratch and Dig Specifications and provide hands-on experience applying the specification and inspection parameters covered in that course.

LEARNING OUTCOMES

This course will enable you to:
- perform a visual review of the surface
- create a surface map
- safely clean the surface using air only, and the drag method
- assess when magnification or high-intensity light is allowed or required
- conduct a visual inspection according to MIL-PRF-13830B
- conduct a visual inspection according to ANSI OP1.002
- conduct a visual inspection according to ISO 10110-7 and ISO 14997 standards
- acquire and apply the accumulation rules
- review the tools available for microscope-based inspection to ANSI and ISO standards
- evaluate a surface and determine if a surface passes or fails

INTENDED AUDIENCE

This course is designed for all optical practitioners who need to handle and evaluate optics or optical assemblies. Other suggested attendees include mechanical engineers, purchasing agents, quality assurance personnel and other persons working with or around optical components. SC700 Understanding Scratch and Dig Specifications is a prerequisite for the course.

INSTRUCTOR

David Aikens a.k.a "the scratch guy", is among the foremost experts on surface imperfection standards and inspection. Dave is President and founder of Savvy Optics Corp., is the head of the American delegation to ISO TC 172 SC1, and is currently the Executive Director of the Optics and Electro-Optics Standards Council, OEOSC.

COURSE PRICE INCLUDES a plastic scratch/dig paddle, and a set of cleaning and handling tools for small optics.

Choosing the Correct Optical Filter for Your Application

SC1013

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

This course enables attendees to choose and specify the appropriate optical filter type for different applications. The physical principles of interference (multilayer thin film) and absorption (doped glass) filters are explained. Optical filters are clustered into groups according to their spectral characteristics (e.g. band pass or notch filter). The individual advantages and drawbacks of the different filter types are described across the ultraviolet, visible and infrared spectrum. Anyone who is faced with the question "what is the right filter for my application?" or "how should I specify the filter?" will benefit from this course.

LEARNING OUTCOMES

This course will enable you to:
- describe the physical fundamentals of interference filters (thin film filters)
- explain the physics of absorption filters (doped glass filters)
- classify filters according to their spectral characteristics
- transfer filter spectral curves into color coordinates
- use design calculation tools for interference and absorption filters
- identify advantages and disadvantages of both optical filter types
- demonstrate typical applications of optical filters for analytics, biophotonics, digital image sensors, etc.
- formulate typical filter specifications for on your own application

INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn more about how to use and apply optical filters for different applications. Basic knowledge in optics is assumed.

INSTRUCTOR

Steffen Reichel is currently in charge of product management and business development for optical filters at SCHOTT AG in Mainz/Germany. He has been working on fiber optic telecommunications, wave guided optics, diffractive optics, laser optics, and imaging optics since more than 10 years. Besides his work in the field of optical filters at SCHOTT AG he is associated lecturer for "Microoptics 1 (diffractive optics)" and "Microoptics 2 (wave optics)" at the University of Applied Science Darmstadt, Germany. He earned a Ph.D. in Electrical Engineering in the field of fiber optic telecommunications at the University of Kaiserslautern. Dr. Reichel is a Senior Member of the IEEE Photonics Society.

Basic Laser Technology

WS972

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Wednesday 8:30 am to 12:30 pm

If you are uncomfortable working with lasers as "black boxes" and would like to have a basic understanding of their inner workings, this introductory course will be of benefit to you. The workshop will cover the basic principles common to the operation of any laser/laser system. Next, we will discuss laser components and their functionality. Components covered will include laser pumps/energy sources, mirrors, active media, nonlinear crystals, and Q-switches. The properties of laser beams will be described in terms of some of their common performance specifications such as longitudinal modes and monochromaticity, transverse electromagnetic (TEM) modes and focusability, continuous wave (CW) power, peak power and power stability. Laser slope and wall-plug efficiencies will also be discussed.

LEARNING OUTCOMES

This course will enable you to:
- describe the overall inner workings of any laser
- describe the functionality of the key laser components
- know the difference between how acousto- and electro-optic Q-switches work
- explain how each key component in a laser may contribute to laser performance
- intelligently engage your clients or customers using proper laser terminology
- build stronger relationships with clients and customers by demonstrating product knowledge
- obtain the technical knowledge and confidence to enhance your job performance and rise above the competition, inside and outside your company

INTENDED AUDIENCE

Managers, engineers, technicians, assemblers, sales/marketing, customer service, and other support staff. This workshop will help cultivate a common/standardized understanding of lasers across the company.

INSTRUCTOR

Sydney Sukuta is currently a Laser Technology professor at San Jose City College. He also has industry experience working for the some the world's leading laser manufacturers in Silicon Valley where he saw first-hand the issues they encounter on a daily basis. In response, Dr. Sukuta developed prescriptive short courses to help absolve most of these issues.

Optoelectronic Materials and Devices

Terahertz Wave Technology and Applications

SC547

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Sunday 1:30 to 5:30 pm

A pulsed terahertz (THz) wave with a frequency range from 0.1 THz to 10 THz is called a "T-ray." T-rays occupy a large portion of the electromagnetic spectrum between the infrared and microwave bands. However, compared to the relatively well-developed science and technology in the microwave, optical, and x-ray frequencies for defense and commercial applications, basic research, new initiatives and advanced technology developments in the THz band are very limited and remain unexplored. However, just as one can use visible light to create a photograph, radio waves to transmit music and speech, microwave radiation (MRI) or X-rays to reveal broken bones, T-ray can be used to create images or communicate information. This course will provide the fundamentals of free-space THz optoelectronics. We will cover the basic concepts of generation, detection, propagation, and applications of the T-rays, and how the up-to-date research results apply to industry. The free-space T-ray optoelectronic detection system, which uses photoconductive antennas or electro-optic crystals, provides diffraction-limited spatial resolution, femtosecond temporal resolution, DC-THz spectral bandwidth and mV/cm field sensitivity. Examples of homeland security and defense related projects will be highlighted.

LEARNING OUTCOMES

This course will enable you to:
- identify the proper optical sources of a THz beam, including femtosecond lasers and cw lasers
- distinguish and select the correct THz emitters, including photoconductive antennae, surface field screening and optical rectification
- appraise two dominant THz detectors: a photoconductive dipole antenna and an electro-optic sensor
- describe a THz system and optimize its performance in spatial and temporal resolutions, bandwidth and dynamic range
- construct a THz imaging setup and discuss the recent developments in 2D imaging and real-time & single-short measurement
- highlight recent advances of THz research and development from the academic and industrial sectors
- summarize state-of-the-art THz applications and predict new opportunities and applications

INTENDED AUDIENCE

This course is designed for researchers in academia and industry, who are interested in the mid-infrared and far-infrared pulsed THz radiation.

INSTRUCTOR

Xi-Cheng Zhang is a Professor and the Acting Head of the Department of Physics, Applied Physics, and Astronomy, a Professor of the Department of Electrical, Computer & System Engineering, Erik Jonsson Chair Professor of Science, and Director of the Center for Terahertz Research at Rensselaer Polytechnic Institute. Since 1982 he has been involved in ultrafast optoelectronics, especially the implementation of unique technical approaches for the generation and detection of THz beams with photonic approaches.

Semiconductor Photonic Device Fundamentals

SC747

Course level: Introductory
CEU .65 $525 Member / $635 Non-member USD
Monday 8:30 am to 5:30 pm

This provides a review of the basics of semiconductor materials, with primary emphasis on their optoelectronic properties. The motion of electrons and holes is discussed, and photon absorption and generation mechanisms are presented. The course examines basic device structures such as quantum wells and quantum dots, Bragg reflectors, cascade devices, distributed feedback devices, avalanching, tunneling, and various electro-optic effects. Device operating principles are presented, and an overview of current device applications is given. The participants should walk away with a good understanding of semiconductor optoelectronics covering the entire UV to terahertz spectral region, including devices such as diode and cascade lasers, LEDs, SLEDs, VCSELs, modulators, and photodetectors.

LEARNING OUTCOMES

This course will enable you to:
- identify semiconductor materials from which optoelectronic devices are produced
- explain operating principles of lasers, LEDs, VCSELs, modulators, and detectors
- understand their figures of merit and performance limitations
- explain the fabrication techniques used to manufacture optoelectronic devices
- know what questions to ask device manufacturers
- summarize current device applications

INTENDED AUDIENCE

Aimed at managers, engineers, system designers, R&D personnel, and technicians working on components and sub-assemblies as well as systems. No formal mathematics or physics background is necessary.

INSTRUCTOR

Kurt Linden received a PhD in Electrical Engineering, with primary emphasis on semiconductor optoelectronics. With over 35 years of practical experience in the design, development, manufacture, testing, and application of a broad range of semiconductor optoelectronic devices, he is a pioneer in the development of visible, infrared, and far-infrared devices, and has recently been involved with their incorporation into operational systems. Dr. Linden has taught courses at MIT and Northeastern University, presents annual tutorials on optoelectronics and has served as an expert witness on this subject. He is currently a senior scientist at the Spire Corporation.

Silicon Photonics

SC817

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 8:30 am to 12:30 pm

Silicon Microphotonics is a platform for the large scale integration of CMOS electronics with photonic components. This course will evaluate the most promising silicon optical components and the path to electronic-photonic integration. The subjects will be presented in two parts: 1) Context: a review of optical interconnection and the enabling solutions that arise from integrating optical and electronic devices at a micron-scale, using thin film processing; and 2) Technology: case studies in High Index Contrast design for silicon-based waveguides, filters, photodetectors, modulators, laser devices, and an application-specific opto-electronic circuit. The course objective is an overview of the silicon microphotonic platform drivers and barriers in design or fabrication.

LEARNING OUTCOMES

This course will enable you to:
- identify trends in optical interconnection and the power of electronic-photonic convergence
- explain how the electronic, thermal and mechanical constraints of planar integration promote silicon as the optimal platform for microphotonics
- design application-specific photonic devices that take advantage of unique materials processing and device design solutions
- compute the performance of micron-scale optically passive/active devices
- judge the feasibility and impact of the latest silicon photonic devices

INTENDED AUDIENCE

This material is intended for anyone who needs to learn how to design integrated optical systems on a silicon platform. Those who either design their own photonic devices or who work with engineers and scientists will find this course valuable.

INSTRUCTORS

Jurgen Michel is a Principal Research Scientist at the MIT Microphotonics Center. He has conducted research on silicon based photonic devices for more than 10 years.

Sajan Saini is with Princeton University. Previously, he was an assistant professor in the Department of Physics at Queens College following a Postdoctoral Associate position at the MIT Microphotonics Center. He is co-author of the upcoming textbook *Photonic Materials and Devices* (Cambridge Press).

Applied Nonlinear Frequency Conversion

SC931

Course level: Intermediate
CEU .65 $525 Member / $635 Non-member USD
Monday 8:30 am to 5:30 pm

This course provides detailed knowledge on the operation and design of nonlinear frequency conversion devices. The emphasis is on frequency conversion in (2) nonlinear crystals, such as frequency doubling, sum and difference frequency generation and parametric oscillation. In addition, Raman amplifiers and lasers (including bulk and fiber-based devices) are treated, and briefly also Brillouin fiber lasers. The course gives an overview of nonlinear crystal materials and addresses the details of phase matching, showing how a certain phase-matching configuration may be chosen based on given device requirements. For various cases, it is shown how to estimate the achievable conversion efficiency. The conversion of short and ultrashort optical pulses is also discussed. Some case studies demonstrate the influence of various practical issues.

LEARNING OUTCOMES

This course will enable you to:
- explain the principles of operation of various nonlinear conversion devices, including resonant frequency doublers and parametric amplifiers
- select a suitable nonlinear material for use in conversion device
- estimate the conversion efficiency of such devices
- identify special considerations for the conversion of short pulses
- describe some typical design trade-offs
- design at least some simpler devices, (e.g. resonant continuous-wave frequency doublers) for your own applications

INTENDED AUDIENCE

This course is intended for laser engineers and researchers being interested in nonlinear frequency conversion devices. They should already have some basic knowledge of laser beams and ideally also of elementary nonlinear optics.

INSTRUCTOR

Ruediger Paschotta is an expert in laser physics, nonlinear optics and fiber technology, who previously was a researcher and is now working in his company RP Photonics Consulting GmbH, providing technical consultancy primarily for companies building or using lasers and related devices. Details are available on the web page http://www.rp-photonics.com/paschotta.html.

Fundamentals of Nonlinear Optics

SC1060

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Sunday 8:30 am to 12:30 pm

This course provides an introduction to important nonlinear optical effects and devices such as second harmonic generation, difference frequency generation, optical parametric amplification, Raman amplification, and Brillouin scattering. The course also covers linear optical properties of crystals critical to determining the performance of nonlinear devices. The course gives, in simplified terms, a common framework to describe nonlinear phenomena. This framework allows for explaining critical aspects of nonlinear devices such as phase matching and gain, which in turn allow for an understanding of performance tolerances.

LEARNING OUTCOMES

This course will enable you to:
- identify and describe second order nonlinear effects: second harmonic generation, difference-frequency generation, sum-frequency generation, the electro-optic effect, and optical parametric oscillation
- describe the classical origin of nonlinear effects
- be able to determine extraordinary and ordinary waves in a crystal
- learn about birefringent phase matching and quasi-phase matching
- assess nonlinear device tolerances to temperature, beam divergence, and frequency shifts
- explain the operation of a Raman amplifier
- describe Brillouin scattering in fiber based devices and learn how to mitigate these effects

INTENDED AUDIENCE

This introductory course is intended for engineers, scientists, and program managers interested in learning the fundamental ideas and concepts of nonlinear optics with an emphasis on practical applications.

INSTRUCTOR

Peter Powers is the Bro. Leonard Mann Chair in the Natural Sciences and Professor at the University of Dayton. He teaches a broad range of courses including nonlinear optics. He is author of the textbook Fundamentals of Nonlinear Optics (CRC Press, 2011).

Optomechanics

Introduction to Optical Alignment Techniques

SC010

Course level: Introductory
CEU 1.30 $1000 Member / $1255 Non-member USD
Tuesday 8:30 am to 5:30 pm

This course discusses the equipment, techniques, tricks, and skills necessary to align optical systems and devices. You learn to identify errors in an optical system, and how to align lens systems.

LEARNING OUTCOMES

This course will enable you to:
- determine if errors in the optical system are due to misalignment errors or other factors such as fabrication, design, or mounting problems
- recognize and understand the fundamental imaging errors associated with optical systems
- diagnose (qualitatively and quantitively) what is wrong with an optical system by simply observing these fundamental imaging errors
- use the variety of tools available for aligning optical systems, and more importantly, how to "tweak" logically the adjustments on these devices so that the alignment proceeds quickly and efficiently
- align basic lens systems and telescopes
- align more complex optical systems such as those containing off-axis aspheric surfaces, and maintain alignment using automatic mounting techniques

INTENDED AUDIENCE

This course is directed toward engineers and technicians needing basic practical information and techniques to achieve alignment of simple optical systems, as well as seemingly more complicated off-axis aspheric mirrors. To benefit most from this course you will need a basic knowledge of the elementary properties of lenses and optical systems (i.e. focal lengths, f/numbers, magnification, and other imaging properties) and a working knowledge of simple interferometry. Some familiarity with the basic aberrations such as spherical aberration, coma, and astigmatism will be helpful.

INSTRUCTOR

Mitchell Ruda Ph.D., is president of Ruda-Cardinal, Inc., an optical engineering consulting firm, located in Tucson, Arizona. He is a fellow of SPIE.

Structural Adhesives for Optical Bonding

SC015

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Tuesday 8:30 am to 12:30 pm

Optomechanical systems require secure mounting of optical elements. This important aspect of the design can cause a production to stop if sound engineering is not applied. A wide variety of adhesives are discussed with respect to their relevant properties. Design considerations, differing mounting techniques, production concerns, and reliability are reviewed. The instructor gives success and failure case histories.

LEARNING OUTCOMES

This course will enable you to:
- understand and classify adhesives and how they work (epoxy, urethane, silicone, acrylic, RTV, VU-cure, etc.)
- identify properties that affect use
- obtain a users guide to adhesive selection and an adhesive property matrix
- make optic-to-mount considerations
- understand contamination/outgassing
- identify uses of testing; witness sample testing, pull tests, outgassing testing, stress birefringence, optical stability

INTENDED AUDIENCE

This course is for engineers, managers, and technicians, this course provides a foundation for the correct design for successful optical mounting; an understanding of the best options to employ for each application, and the selection and approach conducive to production. A bound course outline is provided including summaries of popular adhesives and their properties. Some adhesive samples are available.

INSTRUCTOR

John Daly has been a consultant for the past 10 years. He has experience in the applications of adhesives to our industry. Daly has more than 20 years of experience in academia, aerospace, medical, commercial, and industrial fields. He has a B.S. in Mechanical Engineering Ph.D. in Applied Physics. His exposure to these areas for applications of laser, electro-optic, and photonic technologies has covered research, development, production, and management.

Optomechanical Analysis

SC781

Course level: Advanced
CEU .65 $525 Member / $635 Non-member USD
Tuesday 8:30 am to 5:30 pm

This course teaches the basic requirements for accurately predicting the influences of thermal, structural and servo system designs on the performance and quality of optical imaging systems. It is based upon the instructor's forty years' experience in designing, analyzing and building complex optical systems, especially for the Federal market place. It incorporates elements from some of his earlier tutorials, "Finite Element Methods in Optics," "Optical Flexures" and "Optomechanics and the Tolerancing of Instruments." The instructor will review the goals of "Integrated Analysis" as promoted by NASA and DoD since the early 90's. Strengths and weakness of various approaches will be discussed. Special optomechanical modeling tools (the Optomechanical Constraint Equations and the Optical Analog) will be presented in some detail. Analytical error functions will be developed and evaluated. Sources of analytical error will be discussed and analyzed. Analytical error budgets will be developed and compared for various approaches to end-to-end analysis of systems. A candidate strategy will be presented for consideration.

The course will be illuminated with both text book-type problems and actual examples of applications from the instructor's experiences. The students will learn the strengths and weakness of the analytical methods in the various disciplines, how to estimate the sources and magnitudes of errors in various approaches to analysis, how to put together an error budget for a proposed analytical effort and how to select the most appropriate methods for end-to-end system analysis.

LEARNING OUTCOMES

This course will enable you to:
- plan and execute multidisciplinary analytical procedures
- know the strengths and weakness of individual analytical routines
- estimate the errors contributed by various steps in the analytical process
- make a complete error budget for end-to-end analysis of optical systems
- evaluate alternative approaches to the system analysis process

INTENDED AUDIENCE

Optics professionals (engineers, scientists, and their managers) who are responsible for planning, designing and building optical instruments.

INSTRUCTOR

Alson Hatheway is a mechanical engineer and president of his own company. He has over forty years experience in designing, analyzing and building new optical and photonic products. He has authored 59 technical papers, presented three different tutorials and holds four patents. He is a fellow of SPIE, a founder of the Optomechanical / Instrument Technical Group and currently its chairman.

Photonic Integration

Semiconductor Photonic Device Fundamentals

SC747

Course level: Introductory
CEU .65 $525 Member / $635 Non-member USD
Monday 8:30 am to 5:30 pm

This provides a review of the basics of semiconductor materials, with primary emphasis on their optoelectronic properties. The motion of electrons and holes is discussed, and photon absorption and generation mechanisms are presented. The course examines basic device structures such as quantum wells and quantum dots, Bragg reflectors, cascade devices, distributed feedback devices, avalanching, tunneling, and various electro-optic effects. Device operating principles are presented, and an overview of current device applications is given. The participants should walk away with a good understanding of semiconductor optoelectronics covering the entire UV to terahertz spectral region, including devices such as diode and cascade lasers, LEDs, SLEDs, VCSELs, modulators, and photodetectors.

LEARNING OUTCOMES

This course will enable you to:
- identify semiconductor materials from which optoelectronic devices are produced
- explain operating principles of lasers, LEDs, VCSELs, modulators, and detectors
- understand their figures of merit and performance limitations
- explain the fabrication techniques used to manufacture optoelectronic devices
- know what questions to ask device manufacturers
- summarize current device applications

INTENDED AUDIENCE

Aimed at managers, engineers, system designers, R&D personnel, and technicians working on components and sub-assemblies as well as systems. No formal mathematics or physics background is necessary.

INSTRUCTOR

Kurt Linden received a PhD in Electrical Engineering, with primary emphasis on semiconductor optoelectronics. With over 35 years of practical experience in the design, development, manufacture, testing, and application of a broad range of semiconductor optoelectronic devices, he is a pioneer in the development of visible, infrared, and far-infrared devices, and has recently been involved with their incorporation into operational systems. Dr. Linden has taught courses at MIT and Northeastern University, presents annual tutorials on optoelectronics and has served as an expert witness on this subject. He is currently a senior scientist at the Spire Corporation.

Silicon Photonics

SC817

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 8:30 am to 12:30 pm

Silicon Microphotonics is a platform for the large scale integration of CMOS electronics with photonic components. This course will evaluate the most promising silicon optical components and the path to electronic-photonic integration. The subjects will be presented in two parts: 1) Context: a review of optical interconnection and the enabling solutions that arise from integrating optical and electronic devices at a micron-scale, using thin film processing; and 2) Technology: case studies in High Index Contrast design for silicon-based waveguides, filters, photodetectors, modulators, laser devices, and an application-specific opto-electronic circuit. The course objective is an overview of the silicon microphotonic platform drivers and barriers in design or fabrication.

LEARNING OUTCOMES

This course will enable you to:
- identify trends in optical interconnection and the power of electronic-photonic convergence
- explain how the electronic, thermal and mechanical constraints of planar integration promote silicon as the optimal platform for microphotonics
- design application-specific photonic devices that take advantage of unique materials processing and device design solutions
- compute the performance of micron-scale optically passive/active devices
- judge the feasibility and impact of the latest silicon photonic devices

INTENDED AUDIENCE

This material is intended for anyone who needs to learn how to design integrated optical systems on a silicon platform. Those who either design their own photonic devices or who work with engineers and scientists will find this course valuable.

INSTRUCTORS

Jurgen Michel is a Principal Research Scientist at the MIT Microphotonics Center. He has conducted research on silicon based photonic devices for more than 10 years.

Sajan Saini is with Princeton University. Previously, he was an assistant professor in the Department of Physics at Queens College following a Postdoctoral Associate position at the MIT Microphotonics Center. He is co-author of the upcoming textbook *Photonic Materials and Devices* (Cambridge Press).

Semiconductor Lasers and LEDs

Design of Efficient Illumination Systems

SC011

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Monday 1:30 to 5:30 pm

Illumination systems are included in fiber illuminators, projectors, and lithography systems. The design of an illumination system requires balancing uniformity, maximizing the collection efficiency from the source, and minimizing the size of the optical package. These choices are examined for systems using lightpipes, lens arrays, faceted optics, tailored edge rays designs, and integrating spheres through a combination of computer simulations, hardware demonstrations and discussions.

LEARNING OUTCOMES

This course will enable you to:
- describe the differences between illuminance, intensity and luminance
- compute the required source luminance given typical illumination system specifications
- compute the change in luminance introduced by an integrating sphere
- distinguish between a Kohler illuminator and an Abbe illuminator
- explain the difference in uniformity performance between a tailored edge ray reflector and a standard conic reflector
- design a lightpipe system to provide uniform illuminance
- design a lens array system to create a uniform illuminance distribution
- design a reflector with facets to create a uniform illuminance distribution

INTENDED AUDIENCE

Individuals who design illumination systems or need to interface with those designers will find this course appropriate. Previous exposure to Optical Fundamentals (Reflection, Refraction, Lenses, Reflectors) is expected.

INSTRUCTOR

William Cassarly is a Senior Scientist with Synopsys (formerly Optical Research Associates). Before joining ORA 14 years ago, Cassarly worked at GE for 13 years, holds 46 patents, and has worked extensively in the areas of illumination system design, sources, photometry, light pipes, and non-imaging optics. Bill was awarded the GE Corporate 'D. R. Mack Advanced Course Supervisor Award' for his efforts in the training of GE Engineers and is an SPIE Fellow.

Light-Emitting Diodes

SC052

Course level: Intermediate
CEU .35 $370 Member / $425 Non-member USD
Monday 8:30 am to 12:30 pm

This course presents the history, operating principles, fabrication processes, and applications of light-emitting diodes (LEDs) with particular emphasis on solid-state lighting applications. The course provides an overview of LED fundamentals, design, and fabrication techniques. Furthermore, the fundamentals of solid-state lighting are discussed, including human factors, efficacy, efficiency, and color rendering properties of novel light sources. Although the course participants do not need to be specialists in optoelectronic device physics, familiarity with semiconductors is expected.

LEARNING OUTCOMES

This course will enable you to:
- explain the operating principles of LEDs
- explain the fundamentals of solid state lighting
- explain quantum efficiency, power efficiency, luminous efficiency, color rendering, and other figures of merit
- design LED structures and drive circuits
- identify present and future areas of applications for LEDs

INTENDED AUDIENCE

This course is intended for scientists, engineers, technicians, and managers working on light-emitting diodes, solid-state lighting, and LED application areas.

INSTRUCTOR

E. Fred Schubert is Wellfleet Senior Constellation Professor of the Future Chips Constellation at Rensselaer Polytechnic Institute (RPI) in Troy, New York. He is Professor of Electrical, Computer, and Systems Engineering. He has taught and published extensively on the subject of optoelectronic materials and devices in particular LEDs. He is the author of *Doping in III-V Semiconductors* (1992), *Delta-Doping of Semiconductors* (1996) and *Light-Emitting Diodes* (2003). He is a fellow of the SPIE, OSA, APS, and IEEE.

COURSE PRICE INCLUDES the text *Light-Emitting Diodes* (Cambridge University Press, 2003) by E. Fred Schubert.

Semiconductor Photonic Device Fundamentals

SC747

Course level: Introductory
CEU .65 $525 Member / $635 Non-member USD
Monday 8:30 am to 5:30 pm

This provides a review of the basics of semiconductor materials, with primary emphasis on their optoelectronic properties. The motion of electrons and holes is discussed, and photon absorption and generation mechanisms are presented. The course examines basic device structures such as quantum wells and quantum dots, Bragg reflectors, cascade devices, distributed feedback devices, avalanching, tunneling, and various electro-optic effects. Device operating principles are presented, and an overview of current device applications is given. The participants should walk away with a good understanding of semiconductor optoelectronics covering the entire UV to terahertz spectral region, including devices such as diode and cascade lasers, LEDs, SLEDs, VCSELs, modulators, and photodetectors.

LEARNING OUTCOMES

This course will enable you to:
- identify semiconductor materials from which optoelectronic devices are produced
- explain operating principles of lasers, LEDs, VCSELs, modulators, and detectors
- understand their figures of merit and performance limitations
- explain the fabrication techniques used to manufacture optoelectronic devices
- know what questions to ask device manufacturers
- summarize current device applications

INTENDED AUDIENCE

Aimed at managers, engineers, system designers, R&D personnel, and technicians working on components and sub-assemblies as well as systems. No formal mathematics or physics background is necessary.

INSTRUCTOR

Kurt Linden received a PhD in Electrical Engineering, with primary emphasis on semiconductor optoelectronics. With over 35 years of practical experience in the design, development, manufacture, testing, and application of a broad range of semiconductor optoelectronic devices, he is a pioneer in the development of visible, infrared, and far-infrared devices, and has recently been involved with their incorporation into operational systems. Dr. Linden has taught courses at MIT and Northeastern University, presents annual tutorials on optoelectronics and has served as an expert witness on this subject. He is currently a senior scientist at the Spire Corporation.

Interconnection and Splicing of High-Power Optical Fibers

SC974

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Monday 8:30 am to 12:30 pm

High-power optical fibers are displacing traditional bulk optical elements in applications such as laser sources, optical amplifiers, and beam delivery systems. However, their high signal or pump powers, large spot sizes or mode areas, and large fiber diameters pose interconnection difficulties including signal loss, mode conversion, polarization crosstalk, reflections, localized heating, end facet damage, and even catastrophic device failure. Various technologies have been developed to address these difficulties including mode field matching technologies, high-power fiber terminations, modal content measurements, and large-diameter fiber cleavers and fusion splicers. This course provides attendees with both conceptual and practical knowledge concerning high-power optical fiber interconnection.

LEARNING OUTCOMES

This course will enable you to:
- improve the quality and reliability of your high-power optical fiber assemblies
- avoid destruction of fibers and lasers due to bad interconnections
- compare competing interconnection technologies
- select equipment for high-power optical fiber interconnection
- evaluate and apply mode matching technologies for high-power interconnection
- estimate splice/interconnection optical properties using numerical computation tools
- test and measure high-power optical fiber splice/interconnection quality

INTENDED AUDIENCE

This material is intended for designers and builders of high-power optical fiber lasers, amplifiers, and beam delivery systems. This course builds upon a basic knowledge of optical waveguide theory.

INSTRUCTOR

Andrew Yablon is president and founder of Interfiber Analysis, LLC where he consults widely on fiber interconnection and fusion splicing. He is the author of *Optical Fiber Fusion Splicing* (Springer, 2005) and has 14 years experience with fusion splicing and fiber interconnection during his career at Bell Laboratories, OFS Laboratories, and Vytran Corporation.

Fundamentals of Laser Beam Profile Measurements

SC977

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 8:30 am to 12:30 pm

This course explains the basic principles and measurement methods used to characterize laser beam size, shape, position, divergence and energy density distribution (beam profile). The goal of this course is to provide insight into the different techniques used for laser beam profile measurements, and which approaches are best suited for specific laser types or applications. Important considerations for optical beam sampling techniques and sources of measurement error will be discussed. Applicable ISO standards and definitions will also be reviewed.

LEARNING OUTCOMES

This course will enable you to:
- summarize the various laser beam profile definitions and measurements
- differentiate between Qualitative and Quantitative beam profile measurement results
- determine the optimum measurement method needed to address a laser application
- distinguish the difference between Near Field and Far Field laser measurements
- employ correct optical beam sampling techniques for beam profile measurements
- describe and control critical sources of error in beam profile measurements
- identify and reference the ISO standards applicable to beam profile measurements
- compare and evaluate various commercially available laser beam profiling instruments

INTENDED AUDIENCE

This course is intended for technicians, scientists, engineers and managers who wish to gain a better understanding of laser beam profile measurements and how they are made. They should have some basic working knowledge of optics and lasers.

INSTRUCTOR

Roger Rypma has over 30 years of experience in laser measurement applications. He has B.S. and M.S. degrees in Physics, and has worked in the laser industry for Boeing, Big Sky Laser Technologies (co-founder), Coherent, Concise Dynamics (Consultant) and JDS Uniphase. He is also a member of the ISO TC 172, SC9 subcommittee responsible for development of international standards for laser measurement.

Coherent Mid-Infrared Sources and Applications

SC1012

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Sunday 1:30 to 5:30 pm

This course explains why the mid-IR spectral range is so important for molecular spectroscopy, standoff sensing, and trace molecular detection. We will regard different approaches for generating coherent light in the mid-IR including solid state lasers, fiber lasers, semiconductor (including quantum cascade) lasers, and laser sources based on nonlinear optical methods. The course will discuss several applications of mid-IR coherent light: spectral recognition of molecules, trace gas sensing, standoff detection, and frequency comb Fourier transform spectroscopy.

LEARNING OUTCOMES

This course will enable you to:
- define the “molecular fingerprint” region
- identify existing direct laser sources of mid-IR coherent radiation, including solid state lasers, fiber lasers, semiconductor heterojunction and quantum cascade lasers
- identify laser sources based on nonlinear optical methods, including difference Frequency generators and optical parametric oscillators and generators
- describe the principles of trace gas sensing and standoff detection
- explain mid-IR frequency combs and how they can be used for advanced spectroscopic detection

INTENDED AUDIENCE

Students, academics, researchers and engineers in various disciplines who require a broad introduction to the subject and would like to learn more about the state-of-the-art and upcoming trends in mid-infrared coherent source development and applications. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Konstantin Vodopyanov is a world expert in mid-IR solid state lasers, nonlinear optics and laser spectroscopy. He has both industrial and academic experience, has > 300 technical publications and he is a co-author, with I.T. Sorokina, of the book Solid-State Mid-Infrared Laser Sources (Springer, 2003). He is a member of program committees for several major laser conferences including CLEO (most recent, General Chair in 2010) and Photonics West (LA106 Conference Chair). Currently he teaches and does scientific research at Stanford University and his research interests include mid-IR and terahertz-wave generation using micro-and nano-structured materials, nano-IR spectroscopy, generation of mid-infrared frequency combs and their applications. Dr. Vodopyanov has delivered numerous invited talks and tutorials at scientific meetings on the subject of mid-IR technology.

Splicing of Specialty Fibers and Glass Processing of Fused Fiber Components for Fiber Lasers

SC1020

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Sunday 8:30 am to 12:30 pm

This course provides attendees with fundamentals of specialty fiber splicing and glass fusion processing with a focus on high power fiber laser applications. It describes fiber waveguide and coupling optics associated with the process and discusses practical fusion splicing methods to achieve high performance optical coupling between dissimilar specialty fibers and also fabrication techniques for producing high performance fused components, such as fiber combiners and couplers. In addition, the course describes several practical fiber amplifier, laser, and sensing application examples and also compares different fusion

hardware.

LEARNING OUTCOMES

This course will enable you to:
- become familiar with fiber fusion fundamental, specialty fiber basics, and waveguide coupling optics between dissimilar fibers
- gain in-depth knowledge of fiber splicing process and practical techniques
- learn fusion processing for fabricating fused components such as fiber combiners and couplers
- apply fiber fusion technologies for your applications
- learn state-of-the-art fiber splicing and fusion processing tools and hardware

INTENDED AUDIENCE

This material is intended for anyone who needs to handle and splicing specialty fibers and wants to learn fiber fusion process for fabricating high performance fiber devices. This course is valuable for those who want to further improve their fiber system performance.

INSTRUCTOR

Baishi Wang is Director of Technology at Vytran. He received his Ph.D from State University of New York at Stony Brook. He has over 10 years of experience in specialty fibers and fused component fabrication and fiber fusion. His research area includes doped and un-doped specialty fibers, fiber fused component technology, fiber fusion process and instrumentation, fiber amplifier and lasers, waveguide theory and modeling, and fiber test and measurements. Prior to joining Vytran, he was a technical staff member in the Specialty Fiber Division at Lucent Technologies and OFS. He has published over 20 papers in referred conferences and journals and has given several invited talks. He is a member of SPIE and OSA.

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Tissue Optics

SC029

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Sunday 1:30 to 5:30 pm

This course outlines the principles of light transport in tissues that underlie design of optical measurement devices and laser dosimetry for medicine. Topics include radiative transport in turbid tissues, the optical properties of tissues, modeling techniques for light transport simulation in tissues, analysis of reflectance and fluorescence spectra measured in turbid tissues by topical and imbedded optical fiber devices, video techniques, and criteria involved in establishing laser dosimetry protocols. Lessons are illustrated using case studies of optical fiber devices, video imaging techniques, and design of therapeutic laser protocols.

LEARNING OUTCOMES

This course will enable you to:
- conduct optical measurements of tissue optical properties
- calculate light distributions in tissues
- design an optical measurement of tissue using optical fibers or video
- justify the dosimetry of therapeutic laser protocols

INTENDED AUDIENCE

This material is intended for biomedical engineers and medical physicists interested in medical applications of ultraviolet, visible, and near infrared wavelengths from both conventional and laser light sources.

INSTRUCTOR

Steven Jacques is Professor of Electrical and Computer Engineering at the Oregon Graduate Institute, a Research Associate Professor of Dermatology at Oregon Health Sciences University, a Senior Scientist at Providence St. Vincent Medical Center, and an Associate at Oregon Center for Optics at the University of Oregon Medical Laser Center.

Industry Workshops

Business & Intellectual Property

Commercialization of Photonics Technology

WS1056

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Tuesday 1:30 to 5:30 pm

The course outlines the approach to move advanced technology into successful commercial products. The elements of commercialization will be defined including: Identification of market opportunities and potential; competitive environment related to both technology and companies; manufacturing encompassing discussion of source, quality, cost, cost reduction, and standards; barriers to entry; value proposition including product differentiation; strategy and funding.
The course price will include an updated edited version of the high technology commercialization course taught at Yale University.

LEARNING OUTCOMES

This course will enable you to:
- identify market opportunities and develop a roadmap for successful commercialization
- provide an outline for commercialization plans now required in many government contracts
- define and justify funding levels and potential sources of funding

INTENDED AUDIENCE

The course is intended for anyone who is involved with technology development as well as business development opportunities in the photonics area.

INSTRUCTOR

David Krohn is Managing Partner of Light Wave Venture LLC. He has been in photonics development and commercialization for over 40 years. He has now assisted over 100 companies and organizations in developing photonic-based opportunities.

Magnifying Your IP IQ: Topics for the Savvy Intellectual Property Manager

WS1057

Course level: Intermediate
CEU .35 $300 Member / $355 Non-member USD
Tuesday 8:30 am to 12:30 pm

This course covers a variety of topics of interest to those with responsibilities for overseeing an intellectual property portfolio. The topics include the key provisions of non-disclosure and licensing agreements, what to know when dealing with venture capitalists and other prospective investors, methods of accelerating the passage of applications through the U.S. Patent and Trademark Office, selection and protection of trademarks, and how to prepare for offensive or defensive patent litigation.

LEARNING OUTCOMES

This course will enable you to:
- identify key provisions in non-disclosure and development agreements with prospective collaborators and distinguish acceptable provisions from unacceptable provisions
- identify key provisions in IP licensing agreements to protect your company's interests
- list steps to take with respect to an IP portfolio before contacting venture capitalists and other prospective investors

- predict which issues involving your IP portfolio are likely to be of importance to a prospective investor
- implement procedures to more efficiently interact with your patent counsel
- classify methods for accelerating the passage of your company's patent applications through the Patent Office
- establish best practices in selecting and protecting product names and trademarks
- prepare properly to effectively assert your patents against competitors
- prepare for possible patent litigation lawsuits filed against you
- communicate with board members, prospective investors, business partners, etc. more precisely and accurately regarding IP issues

INTENDED AUDIENCE

Any individual whose responsibilities include oversight and protection of their company's intellectual property. Basic familiarity with intellectual property management issues is assumed.

INSTRUCTORS

Mark Gallagher is a partner at Knobbe Martens, an intellectual property law firm. Mr. Gallagher specializes in assisting clients in the optical sciences with preparation and prosecution of patents before the U.S. Patent Office. Mr. Gallagher also represents clients through phases of IP due diligence by prospective investors. Mr. Gallagher holds a J.D. degree and a Ph.D. in optical sciences, both from the University of Arizona.

Lori Yamato is also a partner at the Knobbe Martens law firm and specializes in representing clients in intellectual property deals, including preparation and negotiation of license agreements. Ms. Yamato's practice also includes trademark clearance, prosecution and enforcement. Ms. Yamato holds a J.D. degree from the University of Michigan and a B.S. degree in electrical engineering from the University of Southern California.

David Jankowski is a partner at the Knobbe Martens law firm who specializes in patent infringement litigation, representing both plaintiffs and defendants in federal district court and proceedings before the International Trade Commission. Mr. Jankowski holds a J.D. degree from Stanford University and a Ph.D in Astronomy from Cornell University.

Derek Bayles is an associate at the Knobbe Martens law firm and specializes in assisting clients in the optical sciences with preparation and prosecution of patents before the U.S. Patent Office. Mr. Bayles holds a J.D. degree and a B.S. degree in electrical engineering, both from Brigham Young University.

Critical Skills for Compelling Research Proposals

WS1058

Course level: Introductory
CEU .35 $100 Member / $150 Non-member USD
Tuesday 1:30 to 5:30 pm

Research costs money. The good news is that there are thousands of avenues of financial support. The bad news is that hundreds of thousands of proposals are competing for those funds. This class will teach you to craft high-quality proposals that stand out from the masses. We will focus on five fundamental skills that will bolster the substance, structure, and appearance of your proposals. Adhering to these practices will dramatically increase your odds of winning funding for your research.

LEARNING OUTCOMES

This course will enable you to:
- identify funding opportunities that align with your research goals
- develop solid research plans and believable budgets
- communicate your research to a general audience
- write in a clear, concise, and compelling manner
- format your proposal for visual appeal

INTENDED AUDIENCE

This course is intended for all scientists and engineers seeking to improve the quality of their research proposals.

INSTRUCTOR

Damon Diehl is founder and owner of Diehl Research Grant Services. He has a Ph.D. in optical engineering from the University of Rochester Institute of Optics and a B.A. in physics from the University of Chicago. His class is based on fifteen years of academic and industrial research experience.

Fundamental Optics

Basic Optics for Non-Optics Personnel

WS609

This course is also available in online format

Course level: Introductory
CEU .20 $100 Member / $150 Non-member USD
Monday 1:30 to 4:00 pm

This course will provide the technical manager, sales engineering, marketing staff, or other non-optics personnel with a basic understanding of the terms, specifications, and measurements used in optical technology to facilitate effective communication with optics professionals on a functional level. Topics to be covered include basic concepts such as interference, diffraction, polarization and aberrations, definitions relating to color and optical quality, and an overview of the basic measures of optical performance such as MTF and wavefront error. The material will be presented with a minimal amount of math, rather emphasizing working concepts, definitions, rules of thumb, and visual interpretation of specifications. Specific applications will include defining basic imaging needs such as magnification and depth-of-field, understanding MTF curves and interferograms, and interpreting radiometric terms.

LEARNING OUTCOMES

This course will enable you to:
- read and understand optical system descriptions and papers
- ask the right questions about optical component performance
- describe basic optical specifications for lenses, filters, and other components
- select the right off-the-shelf lenses, filters, and beam directing optics
- interpret optical data such as interferogram, MTF and aberration reports

INTENDED AUDIENCE

This course is intended for the non-optical professional who needs to understand basic optics and interface with optics professionals.

INSTRUCTOR

Kevin Harding has been active in the optics industry for over 30 years, and has taught machine vision and optical methods for over 25 years in over 70 workshops and tutorials, including engineering workshops on machine vision, metrology, NDT, and interferometry used by vendors and system houses to train their own engineers. He has been recognized for his leadership in optics and machine vision by the Society of Manufacturing Engineers, Automated Imaging Association, and Engineering Society of Detroit. Kevin is a Fellow of SPIE and was the 2008 President of the Society.

Basic Laser Technology

WS972

Course level: Introductory
CEU .35 $300 Member / $355 Non-member USD
Wednesday 8:30 am to 12:30 pm

If you are uncomfortable working with lasers as "black boxes" and would like to have a basic understanding of their inner workings, this introductory course will be of benefit to you. The workshop will cover the basic principles common to the operation of any laser/laser system. Next, we will discuss laser components and their functionality. Components covered will include laser pumps/energy sources, mirrors, active media, nonlinear crystals, and Q-switches. The properties of laser beams will be described in terms of some of their common performance specifications such as longitudinal modes and monochromaticity, transverse electromagnetic (TEM) modes and focusability, continuous wave (CW) power, peak power and power stability. Laser slope and wall-plug efficiencies will also be discussed.

LEARNING OUTCOMES

This course will enable you to:
- describe the overall inner workings of any laser
- describe the functionality of the key laser components
- know the difference between how acousto- and electro-optic Q-switches work
- explain how each key component in a laser may contribute to laser performance
- intelligently engage your clients or customers using proper laser terminology
- build stronger relationships with clients and customers by demonstrating product knowledge
- obtain the technical knowledge and confidence to enhance your job performance and rise above the competition, inside and outside your company

INTENDED AUDIENCE

Managers, engineers, technicians, assemblers, sales/marketing, customer service, and other support staff. This workshop will help cultivate a common/standardized understanding of lasers across the company.

INSTRUCTOR

Sydney Sukuta is currently a Laser Technology professor at San Jose City College. He also has industry experience working for the some the world's leading laser manufacturers in Silicon Valley where he saw first-hand the issues they encounter on a daily basis. In response, Dr. Sukuta developed prescriptive short courses to help absolve most of these issues.

Professional Development Workshops

Critical Skills for Compelling Research Proposals

WS1058

NEW

Course level: Introductory
CEU .35 $100 Member / $150 Non-member USD
Tuesday 1:30 to 5:30 pm

This course is free to SPIE Student Members, but you must register to attend.

Research costs money. The good news is that there are thousands of avenues of financial support. The bad news is that hundreds of thousands of proposals are competing for those funds. This class will teach you to craft high-quality proposals that stand out from the masses. We will focus on five fundamental skills that will bolster the substance, structure, and appearance of your proposals. Adhering to these practices will dramatically increase your odds of winning funding for your research.

LEARNING OUTCOMES

This course will enable you to:
- identify funding opportunities that align with your research goals
- develop solid research plans and believable budgets
- communicate your research to a general audience
- write in a clear, concise, and compelling manner
- format your proposal for visual appeal

INTENDED AUDIENCE

This course is intended for all scientists and engineers seeking to improve the quality of their research proposals.

INSTRUCTOR

Damon Diehl is founder and owner of Diehl Research Grant Services. He has a Ph.D. in optical engineering from the University of Rochester Institute of Optics and a B.A. in physics from the University of Chicago. His class is based on fifteen years of academic and industrial research experience.

Resumes to Interviews: Strategies for a Successful Job Search

WS1059

NEW

Course level: Introductory
CEU .25 $75 Member / $125 Non-member USD
Monday 1:30 to 5:30 pm

This course is free to SPIE Student Members, but you must register to attend.

This course reviews effective strategies and techniques for a successful job search, including writing your cover letter and resume, as well as interviewing tips. The primary goal of the course is to provide creative and proven techniques for new college graduates and professionals to make sense of their job search, have a plan, successfully get the interview, and ultimately land the job.

Creative and comprehensive job search techniques will be discussed as well as actual resume and interviewing examples and tips. Anyone who is getting ready to enter the work force who wants to answer questions such as, "when and how do I start my job search? ", "what kind of cover letter and resume gets noticed?" or "how do I sell myself in an interview?" will benefit from taking this course.

LEARNING OUTCOMES

This course will enable you to:
- start and create your job search plan
- create an online networking presence
- build and write effective cover letters and resumes that get noticed
- avoid common resume and cover letter mistakes
- interview with confidence

INTENDED AUDIENCE

Graduate students, new graduates, engineers and technicians who wish to learn more about creating a job search plan, writing an effective cover letter and resume that gets you noticed, and techniques for successful interviews.

INSTRUCTOR

Suzanne Krinsky has been in human resources and corporate recruiting for more than 15 years. She has extensive experience with both in-house corporate environments as well as outside agency/consulting environments. Suzanne is currently the Human Resource Director for Daylight Solutions in San Diego, and also a long-time Board member for the Biotech Human Resource Development Coalition (BEDC) and Human Resource Roundtable member.

The Craft of Scientific Writing: A Workshop on Technical Writing

WS668

Course level: Introductory
CEU .35 $75 Member / $125 Non-member USD
Wednesday 1:30 to 5:30 pm

This course provides an overview on writing a scientific paper. The course focuses on the structure, language, and illustration of scientific papers.

LEARNING OUTCOMES

This course will enable you to:
- account for the audience, purpose, and occasion in a scientific paper
- logically structure the introduction, middle, and ending of a scientific paper
- make your language clear, energetic, and fluid
- avoid the most common mechanical errors in scientific writing

INTENDED AUDIENCE

This material is intended for anyone who needs to write about scientific research. Those who either have not yet written a paper or have written several papers will find this course valuable.

INSTRUCTOR

Michael Alley teaches writing and speaking to engineering students at Penn State. Alley has taught this workshop to researchers at the Army Research Laboratory, Lawrence Livermore National Laboratory, United Technologies, the University of Illinois, the University of Oslo, and Virginia Tech.

COURSE PRICE INCLUDES the text *The Craft of Scientific Writing* (Springer, 2003) by Michael Alley. This workshop is free to SPIE Student Members. You must register to attend.

The Craft of Scientific Presentations: A Workshop on Technical Presentations

WS667

Course level: Introductory
CEU .35 $75 Member / $125 Non-member USD
Wednesday 8:30 am to 12:30 pm

This course provides attendees with an overview of what distinguishes the best scientific presentations. The course introduces a new design for presentation slides that is both more memorable and persuasive from what is typically shown at conferences.

LEARNING OUTCOMES

After completing this course, attendees will be able to:
- account for the audience, purpose, and occasion in a presentation
- logically structure the introduction, middle, and ending of a scientific presentation
- create a memorable and persuasive set of presentation slides
- deliver a presentation with more confidence

INTENDED AUDIENCE

This material is intended for anyone who needs to present scientific research. Those who either have not yet presented or have made several presentations will find this course valuable.

INSTRUCTOR

Michael Alley teaches writing and speaking to engineering students at Penn State. Alley has taught this workshop to researchers at the Army Research Laboratory, Lawrence Livermore National Laboratory, United Technologies, the University of Illinois, the University of Oslo, and Virginia Tech.

COURSE PRICE INCLUDES the text *The Craft of Scientific Presentations* (Springer, 2003) by Michael Alley. This workshop is free to SPIE Student Members. You must register to attend.

SPIE Photonics West

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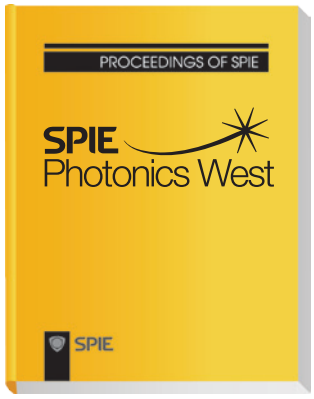

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