Welcome to Majorca, Spain and the 2010 Photonics Society Winter Topical Meetings!

The Topical Meeting Series of the Photonics Society is the premier conference for emerging fields in photonic science, device technologies, and applications. The conferences are held in summer and winter to create the opportunity to learn about exciting new topics and to interact with the research and technology leaders in an intimate environment. A unique aspect of this conference series is that the Photonic Society membership suggest and organize these meetings.

The 3rd annual 2010 Winter Topical Meetings are focussed on “Next Generation Photonic Devices and Applications.” There will be four meetings that will cover a broad area of technology and diverse applications. Over the 3 days of the conference, the following 4 Topical Meetings will be held:

- Photonics for Routing and Interconnects
- Advances in THz Devices and Applications
- Semiconductor Nanolasers
- Advanced Imaging in Bio-Photonics

I would like to personally thank each of the Topical Chairs and the Program Committee Members who have volunteered and invested their time putting together these conferences. I also want to thank the tutorial and invited speakers for giving us their perspectives on the challenges of future optical networks. The combined efforts of the organizers and speakers is why this conference series has achieved its esteemed reputation. Finally I want to express my sincere appreciation to the Photonic Society staff for their professional organization and arrangements for the conference.

"The IEEE/Photonics Society Topicals Series serves as a breeding ground, where experts launch the conferences of tomorrow!"

Have a great time!

Kent D. Choquette
Photonics Society Topical Meetings General Chair
<table>
<thead>
<tr>
<th>Room:</th>
<th>Photonics for Routing and Interconnects(PRI)</th>
<th>Advances in THz Devices and Applications(ADT)</th>
<th>Semiconductor Nanolasers(SNL)</th>
<th>Advanced Imaging in Bio-Photonics(AIBP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zubaran</td>
<td>Prado I</td>
<td>Greco</td>
<td>Prado II</td>
</tr>
</tbody>
</table>

**Monday, 11 January 2010**

**Registration Hours 7:00am-17:00pm Convention Center Lobby**

**KEY NOTE SPEAKER SESSION**
Ken-ichi Sato & Alan Benner
Zubaran
8:30am-10:00am

**10:00am – 10:30am COFFEE BREAK Convention Center Lobby**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30am-12:00pm</td>
<td>Challenges &amp; Optical Interconnects Sources I-Non-linearities</td>
</tr>
<tr>
<td>13:30pm-15:00pm</td>
<td>Circuit Board Optics Sources II THz Laser</td>
</tr>
</tbody>
</table>

**15:00pm – 15:30pm COFFEE BREAK Convention Center Lobby**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:30pm-17:00pm</td>
<td>Panel I: Routers &amp; Servers Detection</td>
</tr>
</tbody>
</table>

**Welcome Reception Hotel Lobby 17:30 pm-19:00pm**

**Tuesday, 12 January 2010**

**Registration Hours 7:30am-17:00pm Convention Center Lobby**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30am – 10:00am</td>
<td>Network Challenges Plenary: Qdot Lasers Tomographic Imaging</td>
</tr>
</tbody>
</table>

**10:00am – 10:30am COFFEE BREAK Convention Center Lobby**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30am-12:00pm</td>
<td>Devices &amp; Subsystems THz Devices Plasmonic Nanolasers 1 High Throughput Imaging</td>
</tr>
<tr>
<td>13:30pm-15:00pm</td>
<td>Devices &amp; Networks Sources III Plasmonic Nanolasers 2 Holographic Imaging</td>
</tr>
</tbody>
</table>

**15:00pm – 15:30pm COFFEE BREAK Convention Center Lobby**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:30pm-17:00pm</td>
<td>Panel 2: Green Networks THz Imaging(Joint with AIBP) Microcavity Lasers THz Imaging(Joint with AIBP)</td>
</tr>
<tr>
<td>19:00pm</td>
<td>Rump Session</td>
</tr>
</tbody>
</table>

**Registration Hours 7:00am-17:00pm Convention Center Lobby**

**KEY NOTE SPEAKER SESSION**
Ken-ichi Sato & Alan Benner
Zubaran
8:30am-10:00am

**10:00am – 10:30am COFFEE BREAK Convention Center Lobby**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30am-12:00pm</td>
<td>Devices &amp; Subsystems THz Devices Plasmonic Nanolasers 1 High Throughput Imaging</td>
</tr>
<tr>
<td>13:30pm-15:00pm</td>
<td>Devices &amp; Networks Sources III Plasmonic Nanolasers 2 Holographic Imaging</td>
</tr>
</tbody>
</table>

**15:00pm – 15:30pm COFFEE BREAK Convention Center Lobby**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:30pm-17:00pm</td>
<td>Panel 2: Green Networks THz Imaging(Joint with AIBP) Microcavity Lasers THz Imaging(Joint with AIBP)</td>
</tr>
<tr>
<td>19:00pm</td>
<td>Rump Session</td>
</tr>
<tr>
<td>Time</td>
<td>Session 1</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>8:30am–10:00am</td>
<td>Data Centers</td>
</tr>
<tr>
<td>10:00am–10:30am</td>
<td>10:00am–10:30am COFFEE BREAK</td>
</tr>
<tr>
<td>10:30am–12:00pm</td>
<td>Novel Devices</td>
</tr>
<tr>
<td>13:30pm–15:00pm</td>
<td>Advanced Photonics</td>
</tr>
<tr>
<td>15:00pm–15:30pm</td>
<td>15:00pm–15:30pm COFFEE BREAK</td>
</tr>
<tr>
<td>15:30pm–17:00pm</td>
<td>Rump Session: Opportunities for Optics</td>
</tr>
</tbody>
</table>
Final Program
Advances in THz Devices and Applications

Monday, 11 January 2010

ALL SESSIONS TO BE HELD IN PRADO I

10.30 - 12.30

Session MA1: SOURCES I: NON-LINEARITIES
Session Chair: Thomas Tongue, Zomega Terahertz Corporation, Troy, NY, USA

MA1.1 10.30 - 11.00 (Invited)

We present technological bricks and concepts under study which could permit build up of future THz remote sensing systems. Critical issues regarding such systems mainly rely on the availability of sensitive and compact detectors together with powerful and versatile sources.

MA1.2 11.00 - 11.30 (Invited)
Modelling the Interaction Between Terahertz Radiation and Semiconductors, S. W. Koch and M. Kira, Philipps University, Marburg, Germany

A systematic theory is presented to explore interaction between terahertz field and semiconductor many-body states. Modeling of related experiments is discussed.

MA1.3 11.30 - 11.45
Developing a Frequency-Agile THz-Wave Generation and Detection System for Real-Time THz-Wave Spectral Imaging, R. Guo, Y. Gong, Institute for Infocomm Research, Singapore, Singapore, H. Minamide and H. Ito, RIKEN, Sendai, Miyagi, Japan

Designing an automatic phase matching device in a surface emitted terahertz-wave (THz) parametric oscillator and a THz-wave detection unit using parametric up-conversion in MgO:LiNbO3, we realized a frequency-agile, monochromatic THz-wave generation and detection system.

MA1.4 11.45 - 12.00
Generation of Tunable Continuous-Wave THz Radiation using a Two Colour External Cavity Diode Laser, D. Blömer, V. Montanaro, S. Berning and W. Elsaesser, Technical University Darmstadt, Darmstadt, Germany

We present results on the generation of tunable continuous-wave THz radiation via photomixing on a PCA using a dual mode external cavity diode laser. The tuning range reaches from 250GHz up to several THz.

MA1.5 12.00 - 12.15
Wave-Mixing Analysis for THz-Signals Generation in dc-Biased Semiconductor Optical Devices at Room Temperature, R. Maldonado-Basilio, S. Latkowski, F. Surre and P. Landais, Dublin City University, Dublin, Ireland

Wave-mixing at 370-GHz in a SOA and FP semiconductor laser is investigated by using a FROG-system. A comparison of the optical time-fluctuations measured at their output stresses the importance of a resonant cavity in THz-signals generation from semiconductor optical devices.

MA1.6 12.15 - 12.30

We present a scheme for dual-wavelength operation of a diode-pumped Cr3+:LiCaAlF6 laser with tunable frequency difference. The maximum spectral separation achieved allows a frequency separation from 0 to 9 THz in the 785 nm region.

12.00 – 13.30     LUNCH BREAK
13.30 - 15.00
Session MA2: SOURCES II: THZ LASERS
Session Chair: Arno Schneider, Swiss Federal Institute of Technology Zurich, Zurich, Switzerland

MA2.1 13.30 - 14.00 (Invited)
Tuning a Terahertz Wire Laser, Q. Hu, Massachusetts Institute of Technology, Cambridge, MA, USA
A wire laser’s transverse dimension is much smaller than the wavelength. Consequently, a large fraction of the mode propagates outside the solid core. A novel tunable laser is demonstrated by manipulating the transverse mode profile.

MA2.2 14.00 - 14.30 (Invited)
Gating of Light- Matter Interaction in Quantum Cascade Lasers with 10 fs Time Resolution, W. Parz, T. Müller, J. Darmo, K. Unterrainer, M. Austerer, G. Strasser, Vienna University of Technology, Vienna, Austria, L. R. Wilson, J. W. Cockburn, A. B. Krysa and J. S. Roberts, University of Sheffield, Sheffield, UK
We present the method of ultrafast time domain spectroscopy as a holistic tool to study the light- matter interaction in a quantum cascade laser in a broad spectral range completely phase resolved. We study temperature degradation and show how to retrieve different loss channels.

MA2.4 14.30 - 15.00 (Invited)
Gain Photonic Crystal Terahertz Quantum-Cascade Lasers, A. Benz, C. Deutsch, G. Fasching, K. Unterrainer, A. M. Andrews, P. Klang, W. Schrenk and G. Strasser, Vienna University of Technology, Vienna, Austria
We present the design and the fabrication of photonic crystal based terahertz quantum- cascade lasers. The emission can be tuned from 2.25 to 2.65 THz by varying the period of the crystal.

15.00 – 15.30  COFFEE BREAK

15.30 - 17.30
Session MA3: DETECTION
Session Chair: Pascal Landais, Dublin City University, Dublin, Ireland

MA3.1 15.30 - 16.00 (Invited)
Progress Toward Handheld THz Spectroscopy and THz Air Photonics, B. Schulkin, T. Tongue, Zomega Terahertz Corporation, Troy, NY, USA, D. Brigada, B. Clough, J. Dai and X.-C. Zhang, Rensselaer Polytechnic Institute, Troy, NY, USA
Development and application of real-time (> 5Hz) first-surface and bulk reflection measurements using the mini-Z THz Time-Domain-Spectrometer (TDS) are presented for standoff detection and identification of organic, pharmaceutical and energetic compounds.

MA3.2 16.00 - 16.30 (Invited)
Terahertz Frequency Metrology based on Frequency Comb Techniques, T. Yasui, Osaka University, Osaka, Japan
A new method for precise frequency measurement of continuous-wave THz wave is proposed by using a THz frequency comb of photocurrent. Precision of the frequency measurement was $2.2 \times 10^{-11}$ within the range of 75-110 GHz.

MA3.3 16.30 - 17.00 (Invited)
Fibre-Laser based THz Spectrometers, R. Holzwarth, Max Planck Institute for Quantum Optics, Garching, Germany
ABSTRACT NOT AVAILABLE

MA3.4 17.00 - 17.15 (Invited)
Real-Time THz Comb Time-Domain Spectroscopy, H. Han, K. Moon, E. Jung, M. Lim, C. Im, Y. Loh, Y. Do, J. Park, Pohang University of Science and Technology, Pohang, Kyungbuk, Korea and I. Park, Ajou University, Suwon, Kyunggi, Korea
A real-time THz comb time-domain spectroscopy was demonstrated to have a maximum time delay and resolution of 10 ns and 100 MHz, respectively. We also demonstrated real-time THz measurements in both time and frequency domains.

MA3.5 17.15 - 17.30 (Invited)
Using the Gouy Phase to Increase the Sensitivity of Electro-Optic Sampling, A. Schneider, Swiss Federal Institute of Technology Zurich, Zurich, Switzerland
The sensitivity of electro-optic sampling of terahertz pulses may be doubled for beams of a finite size, since the terahertz field alters the probe beam diffraction and thus the Gouy phases of both polarisations differently.

17.30 – 19.00  WELCOME RECEPTION
Tuesday, 12 January 2010

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.30 - 12.15</td>
<td>TuA1</td>
<td>THZ DEVICES AND PROPAGATION</td>
<td>Frederic Surer, City University London, London, UK</td>
</tr>
<tr>
<td>10.30 - 11.00</td>
<td>TuA1.1</td>
<td>Active Terahertz Metamaterial Devices, H.-T. Chen, Los Alamos National Laboratory, Los Alamos, NM, USA</td>
<td>The designed controllable resonant metamaterial response enables room temperature high performance terahertz switching and modulation. The results demonstrate that metamaterials are playing an increasingly important role in the development of terahertz technologies.</td>
</tr>
<tr>
<td>11.00 - 11.15</td>
<td>TuA1.2</td>
<td>Broadband Terahertz Modulation based on Reconfigurable Metallic Slits, S. Zarei and M. Jarrahi, University of Michigan, Ann Arbor, MI, USA</td>
<td>We present a terahertz modulation scheme which employs reconfigurable metallic slits to achieve higher modulation depth and higher modulation bandwidth compared to the state-of-the-art.</td>
</tr>
<tr>
<td>11.15 - 11.30</td>
<td>TuA1.3</td>
<td>Terahertz Investigation of Liquid Crystals from the CB Family, N. Vieweg, University of Marburg, Marburg, Germany, R. Wilk, Menlo Systems GmbH, Martinsried, Germany, M. K. Shakfa, University of Marburg, Marburg, Germany, J. M. Kloc, Technical University of Braunsweg, Braunsweg, Germany, M. A. Scheller, C. Jansen, University of Marburg, Marburg, Germany, N. Krumbholz, Technical University of Braunsweg, Braunsweg, Germany, M. Mikulics, Forschungszentrum Jülich GmbH, Juelich, Germany and M. Koch, University of Marburg, Marburg, Germany</td>
<td>We investigate the THz properties of nematic liquid crystals as a function of temperature. In particular we focus on the refractive index the absorption and the birefringence. From the measured data, molecular properties (polarizability and S parameter) are deduced.</td>
</tr>
<tr>
<td>11.30 - 11.45</td>
<td>TuA1.4</td>
<td>Terahertz Surface Plasmon Resonance of Periodic Silicon Micro-Dot Arrays, J. P. Grant, X. Shi, University of Glasgow, Glasgow, Scotland, UK, J. Alton, TeraView Ltd., Cambridge, UK and D. R. S. Cumming, University of Glasgow, Glasgow, Scotland, UK</td>
<td>We have demonstrated the existence of surface plasmon resonances of silicon micro-dot arrays at THz frequencies. The dipole polarization mode associated with the surface plasmon resonance peak may be tuned by modifying the micro-dot radius.</td>
</tr>
<tr>
<td>11.45 - 12.00</td>
<td>TuA1.5</td>
<td>THz Plasmonic Waves Launchers for Metamaterials Studies, T. Akalin, Université de Lille I, Villeneuve d'Ascq, France and W. J. Padilla, Boston College, Chestnut Hill, MA, USA</td>
<td>We present THz plasmonic waves launchers for guided and also for free space waves. These structures are useful for the study of metamaterials in different topologies. We can study planar metamaterials with planar plasmonic waveguides or 3D metamaterials with THz broadband antennas.</td>
</tr>
<tr>
<td>12.00 - 12.15</td>
<td>TuA1.6</td>
<td>Fabrication of Silicon Quarter Wave Plate at Terahertz Frequency, S. C. Saha, Y. Ma, J. P. Grant, A. Khalid and D. R. S. Cumming, University of Glasgow, Glasgow, Scotland, UK</td>
<td>We have developed anisotropically etched artificial dielectric quarter wave plates (QWPs) for use at 1.5 and 2.5 Terahertz. A SU8 anti-reflection coating is used to further improve the transmission coefficient by up to 12%.</td>
</tr>
<tr>
<td>13.30 - 15.00</td>
<td>TuA2</td>
<td>SOURCES III</td>
<td>Martin Koch, Philipps University Marburg, Marburg, Germany</td>
</tr>
<tr>
<td>13.30 - 14.00</td>
<td>TuA2.1</td>
<td>Terahertz Fields Beyond 100 MV/cm - New Radiation for Basic Research, A. Sell, G. Krauss, University of Konstanz, Konstanz, Germany, T. Kampfrath, M. Wolf, Freie Universität Berlin, Berlin, Germany, A. Leitenstorfer and R. Huber, University of Konstanz, Konstanz, Germany</td>
<td>Widely tunable phase-locked THz transients with electric and magnetic fields exceeding 100 MV/cm are generated by a novel table-top laser. These pulses are able to drive non-perturbative optical nonlinearities by electric and magnetic coupling.</td>
</tr>
</tbody>
</table>
TuA2.2  14.00 - 14.30 (Invited)
Improving Photoconductive THz Antennas for 1.5 µm Operation, R. J. B. Dietz, B. Sartorius, H. Roehle, M. Schell, H.-J. Haensel, M. Schlak, J. Boettcher, H. Kuenzel and D. Stanze, Fraunhofer-Institut, Berlin, Germany
Terahertz antennas for 1.5 µm operation are improved by mesa-etching of the InGaAs/InAlAs photoconductive layers. The performance in terms of dark current, signal amplitude and bandwidth has been improved significantly.

TuA2.3  14.30 - 14.45
1.55 µm Photoconductive THz Emitters based on ErAs:In_{0.53}Ga_{0.47}As Superlattices, Z. Zhao, Max Planck Institute for Solid State Research, Stuttgart, Germany
ErAs:In_{0.53}Ga_{0.47}As superlattice THz emitters are fabricated and characterized at an excitation wavelength of 1.55 µm. Photo-current-voltage characteristics, carrier lifetimes and bandwidth of the THz output are discussed as a function of the superlattice period.

TuA2.4  14.45 - 15.00
Generation and Propagation of Sub-Terahertz Pulse Signal using Waveguide Integrated InP/InGaAs Uni-Traveling-Carrier Photodiode, H. Ito, H. Yamamoto, Kitasato University, Sagamihara, Kanagawa, Japan, T. Furuta, NTT Corporation, Atsugi, Kanagawa, Japan, and T. Ishibashi, NTT Electronics Corporation, Kanagawa, Japan
We investigated the waveforms of a pico-second pulse propagating through a waveguide fabricated on an InP substrate to demonstrate the potential of the waveguide integrated UTC-PD as a THz-TDS device operating at 1.55 µm.

15.00 – 15.30  COFFEE BREAK

JOINT ATD/AIBP SESSION TO BE HELD IN PRADO I AND II

15.30 - 17.00
Session TuA3:  THz IMAGING AND ITS APPLICATIONS TO BIO MEDICINE: JOINT AIBP/ATD SESSION
Session Chair:  Aydogan Ozcan, University of California – Los Angeles, Los Angeles, CA, USA
Frederic Surre, City University London, London, UK

TuA3.1  15.30 - 16.00 (Invited)
Intense Terahertz Sources based on Tilted Pulse-Front Excitation and Their Potential Applications in Imaging, Nonlinear THz Spectroscopy and Attosecond Pulse Generation, J. Hebling, J. A. Fülöp, L. Pálfalvi and G. Almási, University of Pécs, Pécs, Hungary
The generation of THz pulses having tens of microjoules energy by tilted pulse-front excitation is reviewed. Possibilities of further up-scaling the THz energy as well as existing and future applications of these pulses are analyzed.

TuA3.2  16.00 - 16.15
We have designed and fabricated a low cost THz band pass filter based on a plastic substrate. The filter shows excellent performance for THz applications. We have also investigated its possible application to biological sensing.

TuA3.3  16.15 - 16.30
High-Sensitivity Terahertz Imaging Technique using Nanoparticle Probes for Medical Applications, J.-H. Son, University of Seoul, Seoul, Korea and S. J. Oh, Yonsei University, Seoul, Korea
We present the principle and in vivo experimental results of high sensitivity terahertz imaging technique which enables the target specific sensing of cancers and the molecular imaging of drug delivery.

TuA3.4  16.30 - 16.45
We developed optical fiber-coupled terahertz (THz) endoscope system. For a feasibility test, the endoscopic system was used to measure reflective THz signals from the side wall of the mouth, tongue, and palm of hand as well as from water for comparison.

TuA3.5  16.45 - 17.00
Improvements in Terahertz Imaging Using Plasmonic Spatial Beam Modulators, M. Jarrahi, University of Michigan, Ann Arbor, MI, USA
In this work, we discuss the improvements in single pixel terahertz imaging systems using plasmonic-based spatial beam modulators. Wave transmission through this new type of THz modulator is due to excitation of surface plasmon waves across an array of subwavelength metallic grids.

END OF PROGRAM
Final Program
Advanced Imaging in Bio-Photonics

Tuesday, 12 January 2010

ALL SESSIONS TO BE HELD IN PRADO II

<table>
<thead>
<tr>
<th>08.30 - 09.50</th>
<th>Session TuB1: TOMOGRAPHIC IMAGING IN BIOPHOTONICS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Session Chair: Rainer Leitgeb, University of Vienna, Vienna, Austria</td>
</tr>
</tbody>
</table>

TuB1.1 08.30 - 09.00 (Invited)
Revolutionizing Biomedical Discovery with Multi-Spectral Optoacoustic Tomography (MSOT), V. Ntziachristos, Technical University of Munich, Munich, Germany
This talk describes current progress with instruments and methods for in-vivo tomography. We show how new tomographic concepts are necessary for accurate and quantitative molecular investigations in tissues and why it could be potentially a valuable tool for accelerated investigations of therapeutic efficacy and outcome.

TuB1.2 09.00 - 09.30 (Invited)
The development of optical coherence tomography (OCT) techniques to the imaging of tumor microvasculature, lymphatic networks, and tissue viability in vivo will be described. The application of the instrument to monitoring anti-cancer therapies and the biological implications will also be presented.

TuB1.3 09.30 - 09.50
Multiple Scattering Detection in Optical Coherence Tomography using Speckle Statistics, A. Curatolo, T. R. Hillman, B. F. Kennedy and D. D. Sampson, University of Western Australia, Crawley, WA, Australia
Angular diversity is a successful speckle reduction technique in optical coherence tomography. We employ the same technique for a different purpose: discriminating between the singly backscattered and multiply scattered signal components.

15.00 – 15.30  COFFEE BREAK

<table>
<thead>
<tr>
<th>10.30 - 11.30</th>
<th>Session TuB2: HIGHTHROUGHPUT IMAGING AND SCREENING IN BIOPHOTONICS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Session Chair: David D. Sampson, University of Western Australia, Crawley, WA, Australia</td>
</tr>
</tbody>
</table>

TuB2.1 10.30 - 11.00 (Invited)
High Throughput Microfluidics and Ultrafast Optics for in vivo Compound/Genetic Discoveries, M. F. Yanik, Massachusetts Institute of Technology, Cambridge, MA, USA
We developed microfluidic and ultrafast optical technologies that enable high-throughput whole-animal neural regeneration studies. These technologies allow automated and rapid manipulation, and non-invasive immobilization of C. elegans for sub-cellular resolution two-photon imaging and femtosecond-laser nanosurgery.

TuB2.2 11.00 - 11.30 (Invited)
Serial Time-Encoded Amplified Microscopy (STEAM) for High-Throughput Detection of Rare Cells, K. Goda, A. Motafakker-Fard, K. K. M. Tsia and B. Jalali, University of California - Los Angeles, Los Angeles, CA, USA
We present an imaging method that maps a 2D image into a serial time-domain waveform and simultaneously amplifies it optically. Continuous real-time images at a record frame rate of 6.1 MHz are captured using an oscilloscope. Its application to high-throughput rare cell detection is discussed.
12.00 – 13.30  LUNCH BREAK

13.30 - 14.40

Session TuB3: HOLOGRAPHIC IMAGING IN BIOPHOTONICS
Session Chair: Rainer Leitgeb, University of Vienna, Vienna, Austria

TuB3.1  13.30 - 14.00  (Invited)
Real-Time Three-Dimensional Microscopy with Volume Holographic Pupils, G. Barbastathis, Y. Luo, S. B. Oh, Massachusetts Institute of Technology, Cambridge, MA, USA and R. Kostuk, University of Arizona, Tucson, AZ, USA
Multiplex volume holographic pupils have been demonstrated in the capacity of imagers with optical slicing and real-time (scanning-free) three-dimensional imaging capability. We overview application to microscopy and describe methods to improve depth resolution and contrast.

TuB3.2  14.00 - 14.20
High Resolution, Wide-Field Microscopic Imaging of Biological Tissue by Coherent Synthesis of Fourier Holograms, T. Gutzler, T. R. Hillman, S. A. Alexandrov and D. D. Sampson, University of Western Australia, Crawley, WA, Australia
We demonstrate superresolved, wide-field, reflectance imaging using synthetic-aperture Fourier holography. By applying a correlation scheme applicable to scattering samples, we show coherent synthesis of large numbers of holograms into reflectance images of, for the first time, tissue sections.

TuB3.3  14.20 - 14.40
Multi-angle Lensless Holography for Depth Resolved High-throughput Imaging of Cells on a Chip, T.-W. Su, S. O. Isikman, W. Bishara and A. Ozcan, University of California - Los Angeles, Los Angeles, CA, USA
A multi-angle lensfree holographic imaging platform capable of resolving the depth location of cells or microparticles on a chip, with an accuracy much greater than that allowed by the detection numerical aperture is presented.

15.00 – 15.30  COFFEE BREAK

JOINT ATD/AIBP SESSION TO BE HELD IN PRADO I AND II

15.30 - 17.00

Session TuA3: THz IMAGING AND ITS APPLICATIONS TO BIOMEDICINE: JOINT AIBP/ATD SESSION
Session Chair: TBD

TuA3.1  15.30 - 16.00  (Invited)
Intense Terahertz Sources based on Tilted Pulse-Front Excitation and Their Potential Applications in Imaging, Nonlinear THz Spectroscopy and Attosecond Pulse Generation, J. Hebling, J. A. Fülöp, L. Pálfalvi and G. Almási, University of Pécs, Pécs, Hungary
The generation of THz pulses having tens of microjoules energy by tilted pulse-front excitation is reviewed. Possibilities of further up-scaling the THz energy as well as existing and future applications of these pulses are analyzed.

TuA3.2  16.00 - 16.15
We have designed and fabricated a low cost THz band pass filter based on a plastic substrate. The filter shows excellent performance for THz applications. We have also investigated its possible application to biological sensing.

TuA3.3  16.15 - 16.30
High-Sensitivity Terahertz Imaging Technique using Nanoparticle Probes for Medical Applications, J.-H. Son and S. J. Oh, Yonsei University, Seoul, Korea
We present the principle and in vivo experimental results of high sensitivity terahertz imaging technique which enables the target specific sensing of cancers and the molecular imaging of drug delivery.

TuA3.4  16.30 - 16.45
We developed optical fiber-coupled terahertz (THz) endoscope system. For a feasibility test, the endoscopic system was used to measure reflective THz signals from the side wall of the mouth, tongue, and palm of hand as well as from water for comparison.
In this work, we discuss the improvements in single pixel terahertz imaging systems using plasmonic-based spatial beam modulators. Wave transmission through this new type of THz modulator is due to excitation of surface plasmon waves across an array of subwavelength metallic grids.

Wednesday, 13 January 2010

08.30 - 09.50
Session WB1: OPTICAL IMAGING IN MEDICINE
Session Chair: David D. Sampson, University of Western Australia, Crawley, WA, Australia

WB1.1 08.30 - 09.00 (Invited)
Evaluation of Diabetic Foot Ulcer Development using Hyperspectral Imaging, D. Yudovsky, A. Nouvong and L. Pilon, University of California - Los Angeles, Los Angeles, CA, USA
This talk discusses the use of hyperspectral imaging for predicting and understanding ulcer formation on diabetic feet. It presents both in vivo experimental measurements and modeling of light transfer through human skin.

WB1.2 09.00 - 09.30 (Invited)
The Islet of Langerhans is a Master Regulator of Glucose Homeostasis, P.-O. Berggren, Karolinska Institute, Stockholm, Sweden
I will discuss some novel aspects of signal-transduction in human β-cells and α-cells and also a systems biology approach where signal-transduction can be investigated in innervated and vascularized pancreatic islets in vivo non-invasively at single cell resolution.

WB1.3 09.30 - 09.50
Surgical Dual-Axis Confocal Microscope for Brain Tumor Resection, J. T. C. Liu, M. J. Mandella, N. O. Loewke, H. Haeberle, H. Ra, W. Piyawattanametha, O. Solgaard, G. S. Kino and C. H. Contag, Stanford University, Stanford, CA, USA
A 1.8-mm diameter gradient-index relay lens has been incorporated into a miniature dual-axis confocal microscope for image-guided surgery. A biaxial MEMS mirror is actuated at resonance along each axis to create a non-repeating Lissajous scan pattern for achieving large fields of view.

10.00 – 10.30
COFFEE BREAK

10.30 - 12.00
Session WB2: EMERGING TECHNIQUES IN BIOMEDICAL IMAGING
Session Chair: Aydogan Ozcan, University of California - Los Angeles, Los Angeles, CA, USA

WB2.1 10.30 - 11.00 (Invited)
Turning Tissues Transparent by Optical Phase Conjugation, M. Cui, E. Mcdowell and C. Yang, California Institute of Technology, Pasadena, CA, USA
I will report on our recent findings of using time-reversed photons to undo the effects of tissue scattering. This phenomenon is surprisingly robust and is observable through 7 mm thick tissues with 532 nm light.

WB2.2 11.00 - 11.30 (Invited)
Fluorescence Interferometry: From Mesoscopic to Nanoscopic Biomedical Imaging, A. Bilenca, Lehigh University, Bethlehem, PA, USA
In this talk, we introduce the concept of fluorescent light interferometry to enable the measurement of phase information through biological matter with nanometer-to-mesoscopic level resolution. Principles of operation and biological applications as well as future research directions will be discussed.

WB2.3 11.30 - 12.00 (Invited)
TBD, A. Dogariu, University of Central Florida, Orlando, FL, USA
ABSTRACT NOT AVAILABLE

12.00 – 13.30
LUNCH BREAK
WB3.1 13.30 - 14.00 (Invited)
Challenges in Multimodal (Fluorescence, Reflectance, Polarisation) Tissue Imaging using Rigid Endoscopes, T. C. Wood, K. R. Koh and D. Elson, Imperial College London, London, UK

A hyperspectral fluorescence and polarisation resolved imaging system incorporating a rigid endoscope has been developed for tissue characterisation. A full Mueller Matrix has been recorded for two rigid endoscopes to allow for correction of the complex polarisation properties.

WB3.2 14.00 - 14.30 (Invited)
From Bench to Bedside with Advanced Confocal Microendoscope, W. Piyawattanametha, M. J. Mandella, H. Ra, J. T. C. Liu, S. Friedland, Stanford University, Stanford, CA, USA, Z. Qiu, University of Michigan, Ann Arbor, MI, USA, G. S. Kino, Stanford University, Stanford, CA, USA, T. D. Wang, University of Michigan, Ann Arbor, CA, USA, C. H. Contag and O. Solgaard, Stanford University, Stanford, CA, USA

We present both 10-mm- and 5-mm-diameter micromachined based DAC microscope/endoscope capable of 3-D in vivo real-time imaging for aiding cancer diagnosis.

WB3.3 14.30 - 14.50

Response to chemotherapy typically takes months to assess. Using fluorescence confocal endomicroscopy, we aim to decrease this time-period and demonstrate this using contrast agents and 5-aminolevulinic acid on cancer cell lines and ex vivo tissue.

END OF PROGRAM
Final Program
Photonics for Routing and Interconnects

**Monday, 11 January 2010**

*ALL SESSIONS TO BE HELD IN ZURBARAN*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session MC1:</th>
<th>Session Chair:</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.30 - 10.00</td>
<td>OPENING/KEYNOTE</td>
<td>Shu Namiki, National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Chair:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>08.30 - 08.40</td>
<td>Opening Remarks</td>
<td></td>
</tr>
<tr>
<td>MC1.1</td>
<td>08.40 - 09.20</td>
<td>Role and Opportunities of Photonics for Future Networks, K.-I. Sato, Nagoya University, Nagoya, Japan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relying solely on IP convergence is not the best approach in creating future bandwidth-abundant video-centric networks. Extending optical path layer technologies will be critical in cost-effectively creating networks.</td>
</tr>
<tr>
<td>MC1.2</td>
<td>09.20 - 10.00</td>
<td>TBD, A. Benner, IBM Research, Yorktown Heights, NY, USA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABSTRACT NOT AVAILABLE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>COFFEE BREAK</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00 - 10.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session MC2:</th>
<th>Session Chair:</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.30 - 12.00</td>
<td>HPC CHALLENGES AND OPTICAL INTERCONNECTS</td>
<td>Ronald P. Luijten, IBM Research, Ruschlikon, Switzerland</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Chair</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MC2.1</td>
<td>10.30 - 11.00</td>
<td>TBD, S. Socolof, New Venture Partners LLC, Murray Hill, NJ, USA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABSTRACT NOT AVAILABLE</td>
</tr>
<tr>
<td>MC2.2</td>
<td>11.00 - 11.30</td>
<td>HPC Challenges/Requirements and Opportunities/ Wishes for Optics, S. Poole, Oak Ridge National Laboratory, Oak Ridge, TN, USA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABSTRACT NOT AVAILABLE</td>
</tr>
<tr>
<td>MC2.3</td>
<td>11.30 - 12.00</td>
<td>Large-Scale Integrated Photonics for Novel High-Performance Computing, R. G. Beausoleil, HP Laboratories, Palo Alto, CA, USA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moore’s Law has created expectations that the performance of information technology will improve exponentially until the end of the next decade. Although the physics of silicon transistors alone might allow these prospects to be realized, the physics of the metal wires that connect these transistors almost certainly will not. Here we describe Si-compatible photonic interconnect components that could precipitate an “optical Moore’s Law” and allow exponential performance gains until the transistors themselves become the bottleneck.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>LUNCH BREAK</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12.00 - 13.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MC3.1  13.30 - 14.00  (Invited)
**Challenges in Mass Production of Electro-Optical Circuit Boards**, F. Betschon, *vario-optics AG, Heiden, Switzerland*
During the last years, research was focused on the production of planar polymer waveguides. This presentation discusses the challenges arising during the next steps of product development: the integration of the fragile optical waveguides into PCB’s.

MC3.2  14.00 - 14.15
A pluggable connector for board-level optical polymer waveguides has been developed by adaptation of standard MPX-Technology to flexible polymer waveguides. Its capability has been demonstrated by realizing an all optical board-backplane-board interconnection system.

MC3.3  14.15 - 14.45  (Invited)
**TBD**, W. Rietveld, *Tyco Electronics, s'Hertogenbosch, The Netherlands*
ABSTRACT NOT AVAILABLE

MC3.4  14.45 - 15.00
**Experimental Demonstration of the Robustness Against Interference of Optical Interconnects on Printed Circuit Boards**, G. Schmid, W. R. Leeb, *Technical University of Vienna, Vienna, Wien, Austria* and G. Langer, *Austria Technologie & Systemtechnik Ag, Leoben, Austria*
Printed circuit boards with two-photon absorption inscribed waveguides have been developed. We show very low crosstalk when transmitting data simultaneously on closely spaced waveguides and high robustness against electromagnetic interference.

15.00 – 15.30  
**COFFEE BREAK**

15.30 - 17.00  
Panel 1:  **ROUTERS & SERVERS**  
Session Chair:  TBD

17.30 – 19.00  
**WELCOME RECEPTION**

**Tuesday, 12 January 2010**

TuC1.1  08.30 - 09.00  (Invited)
**TBD**, D. T. Neilson, *Alcatel-Lucent, Holmdel, NJ, USA*
ABSTRACT NOT AVAILABLE

TuC1.2  09.00 - 09.15
**Electrical Power Consumption of Large Electronic and Optical Switching Fabrics**, S. Aleksic, *Vienna University of Technology, Vienna, Austria*
Four realization options of large switching fabrics are evaluated with respect to total electrical power consumption. The considered options include circuit and packet switches realized using either electronic (CMOS) or optical (SOA, MEMS) technologies.

TuC1.3  09.15 - 09.45  (Invited)
Terabit-Scalable End-to-End Parallel Networking Architecture (TLAN) based on Interactive Virtual Optical Resource Control, O. Kamatani, H. Takahashi, M. Takizawa, A. Tsutsui, O. Ishida, NTT Corporation, Yokosuka, Kanagawa, Japan, V. Vishwanath, Argonne National Laboratory, Argonne, IL, USA, S. Nam, L. Renambot and J. Leigh, University of Illinois at Chicago, Chicago, IL, USA

Terabit/s-scalable end-to-end parallel networking architecture (TLAN) based on virtual optical resource control for a high-end scientific application is outlined. Multi-rail- and Multi-lane-aware networking architecture, the relevant photonic technologies, the requirements of optical devices and interfaces for TLAN optical node deployments are also discussed.

TuC1.4 09.45 - 10.00
Leveraging End-host Parallelism to Achieve Scalable Communication Bandwidth Utilization, H. Takahashi, T. Yamamoto, NTT Corporation, Yokosuka-shi, Kanagawa, Japan, M. Takizawa, NTT Corporation, Yokosuka, Japan, O. Kamatani, NTT Corporation, Yokosuka-shi, Kanagawa-ken, Japan, S. Nam, L. Renambot, J. Leigh, University of Illinois at Chicago, Chicago, USA and V. Vishwanath, Argonne National Laboratory, Argonne, IL, USA

This paper describes experiments to explore the scalability of the MultiRail technology. MultiRail leverages end-host parallel resources to achieve large bandwidth. We confirm that MultiRail scales bandwidth by better utilizing the parallel resources.

10.00 – 10.30
COFFEE BREAK

10.30 - 12.00
Session TuC2: DEVICES AND SUBSYSTEMS
Session Chair: Daniel J. Blumenthal, University of California - Santa Barbara, Santa Barbara, CA, USA

TuC2.1 10.30 - 11.00 (Invited)
CMOS Technologies for Future Optical Communications, H. Onaka, Fujitsu Limited, Kawasaki, Kanagawa, Japan
ABSTRACT NOT AVAILABLE

TuC2.2 11.00 - 11.30 (Invited)
Recent Activity in Development of Optical Interconnection Sub-System and Devices, K. Kurata, NEC Corporation, Kanagawa, Japan
ABSTRACT NOT AVAILABLE

TuC2.3 11.30 - 11.45
Fabrication of Metallic Hard Mold for Polymeric Waveguides with Embedded Micro-Mirrors, X. Dou, University of Texas at Austin, Austin, TX, USA, X. Wang, Omega Optics Inc., Austin, TX, USA, H. Huang, X. Lin and R. T. Chen, University of Texas at Austin, Austin, TX, USA

In this paper, we presented fabrication of nickel metal mold with 45º tilted surfaces on both waveguide ends through electroplating process. To obtain 45º angle, SU-8 was exposed under D.I. water, with repeatable 0.5º error.

TuC2.4 11.45 - 12.00
Optimization of Two-Dimensional Filter for Photonic Label Recognition by Genetic-Algorithm, N. Kamitani, N. Goto and S.-I. Yanagiya, University of Tokushima, Tokushima, Japan

Two-dimensional filter for photonic label recognition system using time-space conversion and delay compensation is designed by Genetic-Algorithm. For four-bit BPSK labels at 160Gb/s, eight different labels are distinguished with contrast ratio of 2.74.

12.00 – 13.30
LUNCH BREAK

13.30 - 15.00
Session TuC3: DEVICES AND NETWORKING
Session Chair: Dominique Chiaroni, Alcatel-Lucent, Nozay, France

TuC3.1 13.30 - 14.00 (Invited)
TBD, F. A. Kish, Infinera, Sunnyvale, CA, USA
ABSTRACT NOT AVAILABLE

TuC3.2 14.00 - 14.15
Throughput Differentiation in Data Vortex Switch Network, Q. Yang, Harvey Mudd College, Claremont, CA, USA

QoS in switching networks requires throughput differentiation support. In Data Vortex networks, a partially unwrapped layout is proposed to create such differentiation by leaking lower priority traffic at some angles. Network performance is reported.
TuC3.3  14.15 - 14.45 (Invited)
Transparent Multicolor Optical Packet Routing by InP Phased-Array Optical Switches for Low Power Network Nodes, Y. Nakano,
University of Tokyo, Tokyo, Japan
ABSTRACT NOT AVAILABLE

TuC3.4  14.45 - 15.00
We demonstrate a 1x16 optical packet switch sub-system for 160 Gbps RZ-OOK and 12 x 10 Gbps multi-wavelength DPSK packets. We show error-free operation with maximum penalties of 0.7 dB for 160 Gbps RZ-OOK and 0.6 dB for multi-wavelength DPSK packets.

15.00 – 15.30  COFFEE BREAK

15.30 - 17.00
Panel 2:  GREEN NETWORKS
Session Chair:  TBD

Wednesday, 13 January 2010

08.30 - 10.00
Session WC1:  DATA CENTER CHALLENGES
Session Chair:  Lionel Kimerling, Massachusetts Institute of Technology, Cambridge, MA, USA

WC1.1  08.30 - 09.00  (Invited)
Future IT Infrastructure and the Role of Optical Networks, T. Kudoh, National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan
ABSTRACT NOT AVAILABLE

WC1.2  09.00 - 09.30  (Invited)
An Introduction To The SKA and how Innovation in Photonics and Optoelectronics can Make a Difference, C. Shenton, University of Manchester, Macclesfield, Cheshire, UK
The SKA is “The International Radio Telescope for the 21st Century”. It will be constructed over the next 20 years or so to provide the worldwide community of radio astronomers with an instrument capable of opening up new opportunities in transformational science research. The SKA will be located in a radio quite zone in the southern hemisphere, in either South Africa or Western Australia. The technological challenge in designing and implementing the instrument is huge, and many opportunities exist for innovation and creative contribution. Not least of these exist in digital & analogue data transport, low cost fibre infrastructure, digital signal processing and many others.

WC1.3  09.30 - 10.00  (Invited)
Optical Switching and Routing for the Data Center, M. Glick, Intel Corporation, Pittsburgh, PA, USA
Data intensive applications are driving up bandwidth requirements and creating new challenges in data centers. To achieve acceptance of optical switching and routing as a viable solution, technical challenges must be overcome and end-to-end solutions demonstrated.

10.00 – 10.30  COFFEE BREAK
WTM 2010 IEEE Photonics Society Winter Topical Meeting on Photonics for Routing and Interconnects

Session WC2: NOVEL DEVICES
Session Chair: Kazuhiko Kurata, NEC Corporation, Nakahara, Kanagawa, Japan

WC2.1 10.30 - 11.00 (Invited)
Silicon-on-Insulator based Nanophotonic Devices for Optical Interconnects, R. G. Baets, D. J. Van Thourhout and G. Roelkens, Ghent University, Gent, Belgium
This paper discusses a number of device-oriented developments that will enable on-chip and off-chip optical interconnects with high density and low power consumption. The focus will be on CMOS-compatible silicon devices and heterogeneous III-V on silicon devices.

WC2.2 11.00 - 11.30 (Invited)
Resonant Si/Ge Avalanche Photodiode with an Ultra high Gain Bandwidth Product, J. E. Bowers, D. Dai, W. S. Zaoui, University of California - Santa Barbara, Santa Barbara, CA, USA, Y. Kang and M. Morse, Intel Corporation, Santa Clara, CA, USA
A resonant Ge/Si APD is presented. The inductance arising from impact ionization can resonant the APD capacitance, resulting in ultra-high gain-band products (>860GHz) and operation at higher gains and higher bit rates.

WC2.3 11.30 - 11.45
We report a new family of ultra-fast all-optical wavelength converters. The device architecture employs a single SOA and filtering elements integrated in silicon-on-insulator substrates. These schemes enable high-integration density and low power consumption.

WC2.4 11.45 - 12.00
A simple and efficient cascaded operation of wavelength conversion for any arbitrary input and output wavelengths over 30 nm can be realized, using two dispersion-decreasing highly nonlinear fibers with SBS suppressed by distributed strain.

12.00 – 13.30 LUNCH BREAK

Session WC3: ADVANCED PHOTONICS
Session Chair: Bert-Jan Offrein, IBM Research, Rueschlikon, Switzerland

WC3.1 13.30 - 14.00 (Invited)
Photonics for Interconnect Inside Machines, D. A. B. Miller, Stanford University, Stanford, CA, USA
Future high performance information switching and processing systems face severe problems especially in interconnect density and energy. We project the requirements for optoelectronic and optical devices for optics to solve such problems and suggest solutions.

WC3.2 14.00 - 14.30 (Invited)
CMOS Photonic Processor-Memory Networks, V. M. Stojanovic, Massachusetts Institute of Technology, Cambridge, MA, USA, A. Joshi, Boston University, Boston, MA, USA, C. Batten, Massachusetts Institute of Technology, Cambridge, MA, USA, Y.-J. Kwon, S. Beamer, University of California - Berkeley, Berkeley, MA, USA, S. Chen, Massachusetts Institute of Technology, Cambridge, MA, USA and K. Asanovic, University of California - Berkeley, Berkeley, MA, USA
This paper presents a monolithically integrated dense WDM photonic network for manycore processors, optimized for loss and power footprint of optical components, which can achieve up to 10x better energy-efficiency and throughput than electrical interconnects.

WC3.3 14.30 - 14.45
On the Design of Highly Dispersive Photonic Crystal Waveguides for Optical Delay Lines, A. Hosseini, D. Kwong, Y. Liu and R. T. Chen, University of Texas at Austin, Austin, TX, USA
We present a design methodology for optimized highly dispersive photonic crystal waveguide delay lines. The results indicate that higher group-indices lower the total propagation loss as long as perturbative backscattering is the dominant loss mechanism.
All Optical Logical Operations Using Excitable Cavity Solitons, A. Jacobo, D. Gomila, P. Colet and M. A. Matías, University of Illes Balears, Palma de Mallorca, Illes Balears, Spain

We show theoretically that dissipative solitons arising in the transverse plane of nonlinear optical cavities show oscillatory and excitable regimes that can be used to perform all-optical logical operations. This allows for the construction of reconfigurable optical gates that can operate in parallel.

15.00 – 15.30 COFFEE BREAK

15.30 - 17.00
Rump Session: OPPORT FOR OPTICS
Session Chair: TBD

END OF PROGRAM
Final Program
Semiconductor Nanolasers

Tuesday, 12 January 2010

ALL SESSIONS TO BE HELD IN GRECO

08.30 - 09.45
Session TuD1: PLENARY AND QUANTUM DOT LASERS I
Session Chair: Cun-Zheng Ning, Arizona State University, Tempe, AZ, USA

TuD1.1 08.30 - 09.15 (Plenary)
Single Dot Photonic Crystal Nanocavity Lasers in Strong/Weak Coupling Regime, Y. Arakawa, University of Tokyo, Meguro-ku, Tokyo, Japan
ABSTRACT NOT AVAILABLE

TuD1.2 09.15 - 09.45 (Invited)
Strong Purcell Enhancement of Emission from Close-Packed Colloidal Quantum-Dots in a Photonic-Lattice Cavity, T. S. Luk, Sandia National Laboratories, Albuquerque, NM, USA, S. Xiong, B. Farfan, University of New Mexico, Albuquerque, NM, USA, W. Luk, I. El-Kady, X. Miao, P. J. Resnick, Sandia National Laboratories, Albuquerque, NM, USA, M. Su, University of New Mexico, Albuquerque, NM, USA, G. Subramania, Sandia National Laboratories, Albuquerque, NM, USA, M. Taha, University of New Mexico, Albuquerque, NM, USA and J. Brinker, Sandia National Laboratories, Albuquerque, NM, USA
High Purcell spontaneous emission enhancement factor of 116 is achieved by integrating a self-assembled, close packed monolayer of colloidal PbS quantum dots with a L3-type silicon photonic crystal cavity.

10.00 – 10.30 COFFEE BREAK

10.30 - 12.15
Session TuD2: PLASMONIC NANOLASERS I
Session Chair: Cun-Zheng Ning, Arizona State University, Tempe, AZ, USA

TuD2.1 10.30 - 11.00 (Invited)
Nanopatch Laser, M. C. Wu, University of California - Berkeley, Berkeley, CA, USA
ABSTRACT NOT AVAILABLE

TuD2.2 11.00 - 11.15
Novel Features of the Confinement Factor in a Plasmonic Waveguide, D. Li and C.-Z. Ning, Arizona State University, Tempe, AZ, USA
We considered the net modal gain and the confinement factors for semiconductor gain and metal loss in a metal-semiconductor-metal waveguide. We found that these confinement factors can have extraordinarily large values and can be gain-dependent and strongly enhanced by pumping in the semiconductor.

TuD2.3 11.15 - 11.30
Semiconductor-Metal Core-Shell Plasmonic Nanolasers: Recent Experimental Results, K. Ding, R. Liu, H. Wang, Arizona State University, Tempe, AZ, USA, M. T. Hill, R. Noetzel, M. K. Smit, Technical University of Eindhoven, Eindhoven, The Netherlands and C.-Z. Ning, Arizona State University, Tempe, AZ, USA
We systematically characterized semiconductor-metal core-shell plasmonic nanolasers of various sizes and shapes under electrical injection. New experimental results will be presented including detailed temperature-dependent and duty cycle dependent performance measurements, as well as polarization measurements.

TuD2.4 11.30 - 11.45
Distributed Bragg Grating Frequency Control in Metallic Nano Lasers, M. Marell and M. T. Hill, Eindhoven University of Technology, Eindhoven, The Netherlands
We show that Bragg gratings can be readily incorporated into metallic nano-lasers which exploit waveguides with semiconductor cores, via modulation of the waveguide width. This provides a simple way to implement laser wavelength control.
TuD2.5 11.45 - 12.15 (Invited)
Experimental Demonstration of a Spaser, M. A. Noginov, Norfolk State University, Norfolk, VA, USA
ABSTRACT NOT AVAILABLE

12.00 – 13.30 LUNCH BREAK

13.30 - 15.00
Session TuD3: PLASMONIC NANOLASERS II
Session Chair: Jaime Gomez Rivas, Institute for Atomic and Molecular Physics, Amsterdam, The Netherlands

TuD3.1 13.30 - 14.00 (Invited)
Sub-Wavelength Scale Metalo-Dielectric Lasers, Y. Fainman, University of California - San Diego, La Jolla, CA, USA
ABSTRACT NOT AVAILABLE

TuD3.2 14.00 - 14.30 (Invited)
TBD, O. J. Painter, California Institute of Technology, Pasadena, CA, USA
ABSTRACT NOT AVAILABLE

TuD3.3 14.30 - 15.00 (Invited)
Plasmon Lasers at Deep Subwavelength Scale, X. Zhang, University of California - Berkeley, Berkeley, CA, USA
ABSTRACT NOT AVAILABLE

15.00 – 15.30 COFFEE BREAK

15.30 - 17.30
Session TuD4: MICROCAVITY LASERS
Session Chair: Yong-Zhen Huang, Chinese Academy of Sciences, Beijing, China

TuD4.1 15.30 - 16.00 (Invited)
Compact Low-Threshold Hybrid Silicon Microring Resonator Lasers, D. Liang, University of California - Santa Barbara, Santa Barbara, CA, USA, M. Fiorentino, HP Laboratories, Palo Alto, CA, USA, R. G. Beausoleil, HP Laboratories, Redmond, WA, USA and J. E. Bowers, University of California - Santa Barbara, Santa Barbara, CA, USA
Low-threshold lasing is achieved on compact hybrid silicon microring resonator devices (radii: 7.5, 12.5, 25 micrometer) through both optical and electrical pumping. The limiting factor in scaling down for sub-mA operation is the thermal impedance.

TuD4.2 16.00 - 16.30 (Invited)
TBD, A. Scherer, California Institute of Technology, Pasadena, CA, USA
ABSTRACT NOT AVAILABLE

TuD4.3 16.30 - 17.00 (Invited)
Nanofabrication of Photonic Active, N. Frateschi, State University of Campinas, Campinas, São Paulo, Brazil
ABSTRACT NOT AVAILABLE

TuD4.4 17.00 - 17.30 (Invited)
TBD, A. Lagendijk, University of Amsterdam, Amsterdam, The Netherlands
ABSTRACT NOT AVAILABLE

19.00 – 21.30
Rump Session: RUMP SESSION
Session Chair: TBD
Wednesday, 13 January 2010

08.30 - 10.00
Session WD1: NANOWIRE LASERS
Session Chair: Cun-Zheng Ning, Arizona State University, Tempe, AZ, USA

WD1.1 08.30 - 09.00 (Invited)
Exciton Polaritons Confined in ZnO Nanowires, H.-Y. Y. Li, L. K. van Vugt, S. Ruhle, University of Utrecht, Utrecht, The Netherlands, L. Kuipers, F. Koenderink, FOM Institute, Amsterdam, The Netherlands, D. H. van Dorp and D. Vanmaekelbergh, University of Utrecht, Utrecht, The Netherlands

Individual ZnO nanowires show bright luminescence and lasing far below the electronic bandgap, mediated by linearly polarized exciton-polariton modes trapped between the wire ends. Light-matter interaction in these wires is extremely strong.

WD1.2 09.00 - 09.15
Optical Gain Properties of Quantum Dot Arrays Fabricated by the Edge-defined Nanowires, J. C. Yi, Hong-Ik University, Seoul, Korea

The optical gain properties of the quantum dot arrays fabricated by the edge-defined nanowires have been investigated to quantitatively assess the modulation bandwidth for various minibandgap of the quantum dot arrays on GaN wurtzite substrate.

WD1.3 09.15 - 09.30
Directional Emission InGaAsP/InP Microcylinder Lasers, S.-J. Wang, Y.-Z. Huang, Y.-D. Yang, J.-D. Lin and Y. Du, Chinese Academy of Sciences, Beijing, China

Electrically injected InGaAsP/InP microcylinder lasers connected to an output waveguide are fabricated. Observed mode jump versus temperature with an interval of two times of longitudinal mode interval is agreement with that predicted by mode coupling.

WD1.4 09.30 - 10.00 (Invited)
Lasing in GaAs-based Nanowires Grown by Selective-Area MOVPE, J. Motohisa, B. Hua, K. S. K. Varadwaj, S. Har, K. Hiruma, and T. Fukui, Hokkaido University, Sapporo, Japan

GaAs-based nanowires were grown by selective-area MOVPE. Micro-PL measured on individual nanowires showed the series of peaks, indicating the formation of Fabry-Perot cavity. GaAs/GaAsP core-shell NWs exhibited much stronger PL and lasing under pulsed excitation.

10.00 – 10.30 COFFEE BREAK

10.30 - 12.30
Session WD2: QUANTUM DOT LASERS II
Session Chair: Cun-Zheng Ning, Arizona State University, Tempe, AZ, USA

WD2.1 10.30 - 11.00 (Invited)
Single Photon Sources based on Semiconductor Quantum Dots, D. Bimberg and E. Stock, Technical University Berlin, Berlin, Germany

Efficient generation of single polarized photons or entangled photon pairs will be based on semiconductor quantum dots (QDs). Using submicron oxide current apertures, we were able to realize single InAs/GaAs QD based LEDs.

WD2.2 11.00 - 11.30 (Invited)
Patterned Quantum Dot Molecule Laser Fabricated by Electron Beam Lithography and Wet Chemical Etching, V. B. Verma, U. Reddy, N. Dias, K. Bassett, X. Li and J. J. Coleman, University of Illinois at Urbana-Champaign, Urbana, IL, USA

We report a semiconductor laser with gain medium consisting of two layers of patterned, vertically coupled quantum dots (QDs) using a wet-etching technique. Emission from QD excited states is evidence of three-dimensional quantum confinement.

WD2.3 11.30 - 12.00 (Invited)
Photon Correlations and Coherence Properties of Quantum-Dot Microcavity Lasers, F. Jahnke, University of Bremen, Bremen, Germany

ABSTRACT NOT AVAILABLE

WD2.4 12.00 - 12.30 (Invited)
Rolled-up InGaAs/GaAs Quantum Dot Micro- and Nanotube Lasers, Z. Mi and F. Li, McGill University, Montreal, QC, Canada

We report on the achievement of lasing in rolled-up semiconductor tubes at room temperature, wherein self-organized InGaAs/GaAs quantum dots are incorporated as the gain media. The devices exhibit an ultralow threshold of ~ 4µW, an intrinsic linewidth of ~ 0.2-0.3nm, and a linear polarization.
12.00 – 13.30  LUNCH BREAK

13.30 - 15.00  
**Session WD3:** PHOTONIC CRYSTAL LASERS  
**Session Chair:** Michael D. Gerhold, US Army Research Laboratory, Research Triangle Park, NC, USA

**WD3.1  13.30 - 14.00  (Invited)**  
**Approaches for Electrical Injection into Photonic Crystal Nanocavities,** A. V. Giannopoulos, C. Long, V. B. Verma, J. J. Coleman and K. D. Choquette, University of Illinois at Urbana-Champaign, Urbana, IL, USA  
We discuss two approaches for current injected photonic crystal defect membrane emitters. A vertical pn junction using spatially selective gain is reported as well transverse pn junctions created using selective ion implantation.

**WD3.2  14.00 - 14.30  (Invited)**  
**TBD,** Y.-H. Lee, Korea Advanced Institute of Science and Technology, Taejon, Korea  
**ABSTRACT NOT AVAILABLE**

**WD3.3  14.30 - 15.00  (Invited)**  
Based on site- and energy-controlled quantum wires (QWR) and quantum dots (QD), diverse photonic-crystal microcavity laser systems are proposed and discussed. Results demonstrating QWR lasing, cavity coupling and QD ordered arrays are presented.

15.00 – 15.30  COFFEE BREAK

15.30 - 17.30  
**Session WD4:** PLASMONIC NANOLASERS III  
**Session Chair:** Martin T. Hill, Eindhoven University of Technology, Eindhoven, The Netherlands

**WD4.1  15.30 - 16.15  (Tutorial)**  
**New Horizons of Nanoplasmonics: SPASER, Nanolasers and Attoseconds,** M. I. Stockman, Georgia State University, Atlanta, GA, USA  
**ABSTRACT NOT AVAILABLE**

**WD4.2  16.15 - 16.45  (Invited)**  
**Fundamental Formulation of Nanoplasmonic Lasers,** S.-L. Chuang and S.-W. Chang, University of Illinois at Urbana-Champaign, Champaign, IL, USA  
We have developed a fundamental formulation for nanoplasmonic lasers, which accounts for the negative permittivity and dispersion of metal plasma. We applied our theory to investigate a Fabry-Perot plasmonic waveguide laser and a nano-bowtie laser.

**WD4.3  16.45 - 17.00**  
A new plasmonic bowtie nanolaser structure is fabricated where a semiconductor gain core is enclosed by a metal shell with bowtie cross section built-in. Light emission characteristics under electrical injection will be reported.

**WD4.4  17.00 - 17.30  (Invited)**  
**TBD,** J. S. Harris, Stanford University, Stanford, CA, USA  
**ABSTRACT NOT AVAILABLE**

**END OF PROGRAM**
CALL FOR TOPIC PROPOSALS!!

Photonics Society is announcing a call for proposals for Summer/Winter Topical Meeting series in 2011. The proposals can be new topics, or can repeat a subject area from a past successful Topical meeting. Eight topics will be selected which will form the Winter and Summer conferences each consisting of four topics. Those individuals submitting topic proposals, if accepted, will be expected to organize and plan the topical meeting.

If you are an enthusiastic individual willing to spend some time managing one of the topicals at the conference we encourage you to consider submitting your proposal for Photonics Society Winter/Summer Topical Meeting series. All Photonics Society related areas of research and/or technical development will be considered. The Photonics Society staff will assist you every step of the way and with every aspect of the conference.

Conference Description:
The Topical Meeting Series serves as an international forum to facilitate information exchange between various technical communities using or affected by rapidly growing areas of technology or "Hot Topics" related to the general field of Photonics. The conference is limited to 4 topical meetings. Each topical should target a minimum of 30 presentations and should encompass both invited and contributed papers.

ALL TOPIC PROPOSALS MUST BE SUBMITTED NO LATER THAN:

Feb 15, 2010 FOR THE 2011 SERIES

PLEASE VISIT:

http://www.photonicsconferences.org/TOPICALS/

AND SUBMIT YOUR TOPIC PROPOSAL TODAY!