Signal Processing in Photonics Communications (SPPCom)

12 June - 15 June 2011, The Westin Harbour Castle, Toronto, Canada

APC Workshop: Biomedical Optical Sensors – Differentiators for Winning Technologies
Sunday, 12 June
14:00-18:00

In this workshop, experts will highlight developments in pertinent fields - and a panel discussion will tackle the question: 'What are the key differentiators for winning biosensor technologies?'

APC Workshop Schedule and Speaker Abstracts

SPPCom is your home to learn about the photonic transmission technology required in communication networks of all kind - from access to long haul and submarine.

Photonic transmission technology is required in communication networks of all kind – from access to long haul and submarine. Moreover, optical multimode, free-space, polymer and on-chip communication channels are becoming ever-more important in other types of applications, including sensor networks, free space communications, and feeding radio over fiber. For many advanced applications, simple data communications approaches, such as intensity modulation with direct detection, are no longer adequate given data impairments, increased system capacity, and required spectral efficiency. As an example, more advanced equalizer and forward error correction (FEC) technologies are now penetrating into high-end metro and core networks as well as into lower-end short MMF link equipment. The system gain has been quite dramatic, adding several dBs of performance.

Papers are being considered in the following topic categories:

- Clock and carrier recovery in coherent systems
- Full field detection in direct receivers
- Equalization in direct and coherent (Tx and/or Rx side)
- Advanced modulation formats
- Orthogonal frequency division multiplexing (OFDM)
- Error correction and detection
- Line coding
- Polarization demultiplexing and control
- High speed electronic components (i.e., FPGA, D/A- and A/D-Converters)
- Cost efficiency, power consumption, and complexity
- Channel estimation, distortion identification, performance monitoring

View the conference program and plan your itinerary for the conference

- Browse speakers and the agenda of sessions
- Browse sessions by type or day.
- Search by author, title, OCIS code and more.
- Plan and print your personal itinerary before coming to the conference

NEW!

Check out the Housing and Travel Page to find out how to Experience Toronto from the Water and get discounts on Toronto Bus and Walking Tours!
General Chairs

Werner Rosenkranz, Christian-Albrechts Univ. zu Kiel, Germany
Bernhard Spinnler, Nokia Siemens Networks, Germany
Alan Willner, Univ. of Southern California, USA

Program Chairs

Fred Buchali, Alcatel-Lucent, Germany
Robert Killey, Univ. College London, UK
David Plant, McGill Univ., Canada

A number of distinguished invited speakers have been invited to present at the meeting.

The 2010 meeting featured presentations from speakers representing 12 countries. In addition, nearly 39% of the contributed presentations were submitted by students.

Top 5 Downloaded Sensors Meeting InfoBase Papers:

- Software-Defined Multi-Format Transmitter with...
- Interference Suppression in Visible Light Commun...
- Implementation Of Coherent 16-QAM Digital Receive...
- CMOS ADC Developments for 100G Networks
- Block- vs. Symbol-wise Differential Encoding in...

Go to the Optics InfoBase for a listing of all meeting paper archives.

This event is part of the Advanced Photonics Congress, allowing attendees to access to all meetings within the Congress for the price of one and to collaborate on topics of mutual interest.

Advanced Photonics Congress

- Access Networks & In-house Communications (ANIC)
- Integrated Photonics Research, Silicon and Nano-Photonics (IPR)
- Optical Sensors (Sensors)
- Signal Processing in Photonics Communications (SPPCom)
- Slow and Fast Light (SL)
- New! Specialty Optical Fibers

Sponsor:
Advanced Photonics Congress

June 12-15 2011, The Westin Harbour Castle, Toronto, Canada

The Advanced Photonics 2011 Congress will be held 12-16 June 2011 at The Westin Harbour Castle in Toronto, Canada. This year's congress consists of six collocated meetings including one new meeting and five veteran meetings.

Each meeting consists of invited and contributed presentations. There are three Joint Plenary Sessions and one Joint Poster Session. Be sure to check back for updates on the Plenary speakers. For a complete list of invited speakers, please visit the meetings' Conference Program.

Several exciting special events are planned for the 2011 Advanced Photonics congress including a Welcome Reception, Banquet Dinner and "Optics Olympics" Student Event.

All of the technical sessions will be held at the The Westin Harbour Castle is located near the theater district, waterfront and popular attractions such as Harbourfront Centre, Queens Quay, the Hockey Hall of Fame, and the Toronto Island Ferry. For more information on Toronto and housing at the meeting, please visit Housing and Travel.

Want to start planning your trip today? View the congress’ Meetings-at-a-Glance. Please remember that times listed below are not final, so check back often for updates.

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View the conference program and plan your itinerary for the conference

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- Browse sessions by type or day.
- Search by author, title, OCIS code and more.
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Submit a Paper

Are you ready to submit a paper? Please visit the Author Information page for your desired meeting.

More information about the individual meetings in the 2011 Advanced Photonics Congress can be found by clicking on the links below:

Advanced Photonics Congress

- Integrated Photonics Research, Silicon and Nano-Photonics (IPR)
  IPR covers all aspects of research in integrated photonics and nano-photonics, featuring innovative science and engineering results.
- Slow and Fast Light (SL)
  This topical meeting will bring together physicists and engineers in order to present and discuss the latest achievements within the area of light-speed control
- Access Networks & In-house Communications (ANIC)
  ANIC addresses all relevant research challenges and open research issues for FTTx technologies.
Advanced Photonics Local Organizing Committee

Dan-Xia Xu, *Inst. for Microstructural Sciences, National Research Council Canada, Canada*

Joyce Poon, *Univ. of Toronto, Canada*

Ted Sargent, *Univ. of Toronto, Canada*

**OSA Student Chapter President:**
Fei Ye, Ph.D. candidate, *University of Toronto, Canada*

**SPIE Student Chapter President:**
Jason Grenier, *University of Toronto, Canada*

**Special Events**

**APC Workshop: Biomedical Optical Sensors – Differentiators for Winning Technologies**
Sunday, 12 June 2011
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Please visit the [Workshop page](http://osa.braveline.com/osautoronto/index.asp) for the full scope and list of speakers.

**Optics Olympics**
Sunday, 12 June 2011
16:30-21:00
Metro Ballroom West, Westin Harbour Castle

The OSA and SPIE Student Chapters at University of Toronto are pleased to invite all attendees (i.e., students, postdoctoral fellows, and all other researchers) of the 2011 Advance Photonics Congress to participate in the Optics Olympics competition on Sunday June 12th, 2011. The competition will have participants work together in teams of 4, to compete in 5 events designed to test and expand your optics skills. The Optics Olympics is an opportunity for conference attendees to meet each other at the start of the conference, have some fun applying their optics skills, and expand their professional network. Food and refreshments will be provided, and cash prizes will be awarded to the winners. Winners will be announced during the conference reception banquet on June 14th. Register early to avoid disappointment as the competition is limited to 64 participants. Registration is done individually and teams will be formed on-site at the beginning of the competition. We are looking forward to your participation in the Optics Olympics!

To register or for more information go to: [http://osa.braveline.com/osautoronto/index.asp](http://osa.braveline.com/osautoronto/index.asp)

**FREE to Congress Registrants!**

**OIDA Workshop on Photonic Integration for High-Capacity Data Transport: Commercial Needs, Opportunities and Deployment**
Monday, 13 June
08:00 - 17:00
Advanced Photonics Congress registrants are invited to attend the OIDA Workshop on Photonic Integration for High-Capacity Data Transport: Commercial Needs, Opportunities and Deployment on Monday, 13 June at the Westin Harbour Castle Hotel. To learn more about the workshop program and register visit the OIDA Workshop website.

OIDA Workshop Luncheon  
Monday, 13 June  
12:00 - 13:30

Congress registrants are invited to attend the OIDA Workshop Luncheon. The featured speaker will be announced shortly on the OIDA Workshop website. The fee is $25 USD and may be added to your congress registration.

Advance Photonics Congress Welcome Reception  
Monday, 13 June 2011  
18:30 - 20:00  
Metro Ballroom West, Westin Harbour Castle

Free to all Technical Attendees of the Congress: Get the meeting off to a great start by attending the welcome reception after a full day of technical sessions! Meet with colleagues from around the world and enjoy light hors d’oeuvres.

Advance Photonics Congress Reception and Banquet Dinner  
Tuesday, 14 June 2011  
18:30 - 21:30  
Location: Hart House, Univ. of Toronto  
Tickets: $25 USD per person

Come join us at this great event! The Hart House was completed in 1919, Hart House is a crown jewel in the University of Toronto's architectural, academic and social history. Designed by architect Henry Sproatt, one of the last North American masters of the Gothic form, and engineer Ernest Rolph, the building is named for Vincent Massey's grandfather, Hart. Hart House was gifted to the University of Toronto by the Massey Foundation as a gathering place for students. Today, Hart House enjoys a reputation as a signature arts, creativity and event destination in the City of Toronto. The Hart House permanent art collection comprises nearly six hundred works by renowned Canadian artists, including works considered national treasures by the Group of Seven, major works by the Automatistes and Painters Eleven, as well as contemporary works by artists from across the country.

Transportation WILL be provided. Shuttle transportation to the Hart House will pick up outside of the main Westin Harbour Castle entrance at 18.15. Buses will be available between 21.15 - 21.45 outside of the Hart House entrance to transport guests back to the Westin Harbour Castle. Please note that the Westin Harbour Castle and the Hart House are the only two destination points the shuttle transportation will pick up and drop off guests. For more information, please ask your OSA representative at Registration on-site.

JTuB: Congress Joint Poster Session  
Tuesday, 14 June 2011  
13:30 - 15:30  
Metro Ballroom West, Westin Harbour Castle

Poster sessions are an integral part of the technical program and offer a unique networking opportunity, where presenters can discuss their results one-to-one with interested parties. Each author is provided with a 4 ft. x 8 ft. (1.22 m x 2.44 m) board on which to display the summary and results of his or her paper.

Postdeadline Sessions  
Postdeadline sessions are an opportunity to showcase the most late-breaking innovations in the field.

Sponsors
Exhibitors

Interested in being an Exhibitor at the Advanced Photonics Congress?

Exhibit space at this Congress is very limited, so be sure to sign up for your tabletop exhibit space today! This Congress provides you an audience of 400 scientists. Call Regan Pickett at 202-416-1474 or e-mail exhibitsales@osa.org for more information.

Sponsor:
Signal Processing in Photonics Communications (SPPCom)

12 June - 15 June 2011, The Westin Harbour Castle, Toronto, Canada

Program

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If you would like to be considered as a presenter, please review the topic categories below and the author/presenter information for submission guidelines.

Papers are being considered in the following topic categories:

- Clock and carrier recovery in coherent systems
- Full field detection in direct receivers
- Equalization in direct and coherent (Tx and/or Rx side)
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- Polarization demultiplexing and control
- High speed electronic components (i.e., FPGA, D/A- and A/D-Converters)
- Cost efficiency, power consumption, and complexity
- Channel estimation, distortion identification, performance monitoring

A number of distinguished invited speakers have been invited to present at the meeting. In addition, the organizers have planned a number of special events to make your meeting experience more enjoyable!

Meeting-at-a-Glance

A tentative general schedule of the meeting (as well as all meetings in the Congress) is listed below. Please check back frequently for updates.

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**Special Events**

**Optics Olympics**
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Monday, 13 June 2011
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Sponsors

![NSERC CRSNG Logo](image1.png)

![OneChip Photonics Logo](image2.png)

![University of Toronto Logo](image3.png)

![NRC-CRC Logo](image4.png)
Signal Processing in Photonics Communications (SPPCom)

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Please note that transportation is to and from the event is on your own.
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Sponsors

[Images of sponsors logos]
Access Networks & In-house Communications (ANIC)

Integrated Photonics Research, Silicon and Nano-Photonics (IPR)

Optical Sensors (Sensors)

Signal Processing in Photonics Communications (SPPCom)

Slow and Fast Light (SL)

Specialty Optical Fibers (SOF)

12-14 June, 2011,
The Westin Harbour Castle
Toronto, Canada

2011 Advanced Photonics:
OSA Optics & Photonics Congress

Conference Program
The Organizers of the Advanced Photonics:
OSA Optics & Photonics Congress and Table Top Exhibit
thank the following sponsors for their generous support.

The Edward S. Rogers Sr. Department
of Electrical & Computer Engineering
UNIVERSITY OF TORONTO

OneChip Photonics
NSERC CRSNG

GOSPEL
Congress Highlights

IPR Workshop: Biomedical Optical Sensors- Differentiators for Winning Technologies
Harbour Salon C
Sunday, 12 June 2011
14:00-18:00

The market for biosensors is becoming progressively more diverse - and is expected to grow significantly in the coming years. Currently the bulk of revenue comes from the point-of-care medical diagnostics market, but this situation is likely to change with newer application research. Progress in biosensors has mainly been due to a combination of improvements in the biological components and the implementation of microsystem technologies. In the photonics community, there has been an explosion of research activity in recent years – and various different photonic biosensor concepts have been proposed and demonstrated. Sensitivity continues to improve and single molecular detection has been reported. But the transport of target molecules to the sensing surface still relies on diffusion or on fluid flow. Specimen preparation and pre-concentration remain serious challenges.

Are there already too many types of biosensor? Which applications are the best implementations of different sensors? What are the key issues that must be resolved? What is required to bring today’s research to tomorrow’s point-of-care diagnostic instruments? In this workshop, experts will highlight developments in pertinent fields - and a panel discussion will tackle the question: ‘what are the key differentiators for winning biosensor technologies?’ We expect that all attendees will have the opportunity to make a contribution to a successful workshop.

Confirmed Speakers (as of 13 May):
Gilberto Brambilla, Univ. of Southampton, UK
Pierre Berini, Univ. of Ottawa, Canada
Richard De La Rue, Univ. of Malaya, Malaysia
Kishan Dholakia, St. Andrews Univ., UK
Martin Kristensen, Univ. of Aarhus, Denmark
Holger Schmidt, Univ. of California at Santa Cruz, USA
Ian White, Univ. of Maryland, USA
DanXia Xu, NRC Ottawa, Canada
Anatoly Zayats, King's College London, UK

Optics Olympics
Metro Ballroom West, Westin Harbour Castle
Sunday, 12 June 2011
18:00-22:00

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The five challenging yet fun games that comprise the competition are listed below:

1. Image competition
2. Laser Khet (Laser chess game)
3. Optics triathlon
4. Laser graffiti
5. Hitting targets

We are looking forward to your participation in the Optics Olympics!

Sponsored by*: Institute of Optical Sciences, Univ. of Toronto
OSA - The Optical Society
Simbol Test Systems

*as of 19 May 2011

Advanced Photonics Congress Welcome Reception
Metro Ballroom West, Westin Harbour Castle
Monday, 13 June 2011
18:30 - 20:00

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Advanced Photonics Congress Reception and Banquet Dinner

*Hart House, Univ. of Toronto*
*Tuesday, 14 June 2011*
*18:30 - 21:30*

Tickets: Limited seating available. $35 USD per person.

Come join us at this great event! The Hart House was completed in 1919, Hart House is a crown jewel in the University of Toronto’s architectural, academic and social history. Designed by architect Henry Sproatt, one of the last North American masters of the Gothic form, and engineer Ernest Rolph, the building is named for Vincent Massey’s grandfather, Hart. Hart House was gifted to the University of Toronto by the Massey Foundation as a gathering place for students. Today, Hart House enjoys a reputation as a signature arts, creativity and event destination in the City of Toronto. The Hart House permanent art collection comprises nearly six-hundred works by renowned Canadian artists, including works considered national treasures by the Group of Seven, major works by the Automatistes and Painters Eleven, as well as contemporary works by artists from across the country.

**JTuB: Congress Joint Poster Session**

*Pier 4/ Harbour Ballroom Foyer, Westin Harbour Castle*
*Tuesday, 14 June 2011*
*13:30 - 15:30*

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**OIDA Workshop**

*Photonic Integration for High-Capacity Data Transport: Commercial Needs, Opportunities and Deployment*

*Monday, 13 June 2011*

*Queen’s Quay, The Westin Harbour Castle, Toronto, Canada*

We’re bringing together the field’s leading innovators in the areas of high data rate, high density, high capacity optical communications and the companies which are exploring photonic integration, monolithic and hybrid, as a data transport solution for a unique, one-day workshop - join us!

**Luncheon Speaker**

David F. Welch  
*Co-Founder, Executive Vice President and Chief Strategy Officer, Infinera Corporation*

**Schedule at-a-Glance**

**Sunday, 12 June**

14:00 – 18:00  Registration

**Monday, 13 June**

07:30 – 08:30  Registration & Continental Breakfast

08:30 – 12:30  Session

12:00 – 13:30  Lunch* featuring a presentation from  
**David Welch, Co-Founder, Executive Vice President and Chief Strategy Officer, Infinera Corporation**

13:30 – 17:30  Session

18:00 – 19:30  Networking Reception

There is an ever-increasing world-wide commercial need for higher and higher rates of data transport. Despite the cyclical nature of the general economy, the volume of electronic communication has been on a steady growth path. The increasing need for moving large volumes of data has considerably impacted the area of long haul optical transmission. Aggregate long haul data rates, in the C band of the optical fiber spectrum, are expected to reach 25Tbit/s per fiber. This creates a compelling need for both line and client side systems capable of very high data rate transport and switching within a very small volume of space and reduced power consumption. Fulfilling this need requires creative innovations in the field of optical components, and photonic integration has been increasingly proposed and utilized as a solution in this application space.

[http://www.oida.org/events/integration11](http://www.oida.org/events/integration11)

* Congress registrants are invited to attend the OIDA Workshop Luncheon. The fee is $25 USD and may be purchased at the registration desk. Limited seating available.
Keynote and Plenary Speakers

Slow Light Enhanced Nonlinear Effects in Periodic Structures
JMA1 • 8:45, Harbour Salon B
Benjamin Eggleton; Univ. of Sydney, Australia

Benjamin J. Eggleton is an ARC Federation Fellow and Professor of Physics at the University of Sydney and is the founding Director of CUDOS, the ARC Centre of Excellence for Ultrahigh-bandwidth Devices for Optical Systems. He obtained Ph.D. degree in Physics from the University of Sydney. In 1996, he joined Bell Laboratories, Lucent Technologies as a Member of Staff and was subsequently promoted to Director within the Specialty Fibre Business Division of Bell Laboratories, where he was engaged in forward-looking research supporting Lucent Technologies business in optical fibre devices. Eggleton has published more than 300 journal publications (with over 7500 citations and an h-index of 44) and has filed over 35 patents. He is a Fellow of the OSA, IEEE and the Australian Academy of Technological Sciences and Engineering. Eggleton received numerous awards for his contributions, including the 2003 International Commission on Optics (ICO) Prize, the 1998 Adolph Lomb Medal from the OSA and the IEEE/LEOS Distinguished Lecturer Award. He was President of the Australian Optical Society from 2008-2010 and is Editor for Optics Communications.

Prospects and Challenges in High Power Fiber Laser Technology
SOMA1 • 8:45, Pier 5
Andreas Tünnermann1,2, 1Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany; 2Inst. for Applied Physics, Friedrich-Schiller-Univ., Germany

Andreas Tünnermann received a diploma and PhD degrees in physics from the University of Hannover in 1988 and 1992, respectively. His habilitation was related to topics on ultrastable light sources for interferometric gravitational wave detectors. In 1998 he joined the Friedrich-Schiller-University in Jena, Germany as a Professor and Director of the Institute of Applied Physics. In 2003 he became the Director of the Fraunhofer Institute of Applied Optics and Precision Engineering in Jena. He is known for his pioneering work in fiber laser technology and the application of high power femtosecond lasers for materials processing. Professor Tünnermann’s research activities on optics and applied quantum electronics have been awarded with the Roentgen-Award 1997, WLT-Award 1998, Otto-Schott-Award 2003, Leibinger Innovation Award 2004 and the Gottfried-Wilhelm-Leibniz-Award 2005.

Progress and Technical Challenges for Integrated Optics
JTuA1 • 10:30, Harbour Salon B
Katsunari Okamoto; AiDi Corp., Japan

Dr. Katsunari Okamoto received the B.S., M.S., and Ph.D. degrees in electronics engineering from Tokyo University, Tokyo, Japan, in 1972, 1974, and 1977, respectively. He joined Ibaraki Electrical Communication Laboratory, Nippon Telegraph and Telephone Corporation (NTT), Ibaraki, Japan, in 1977, and was engaged in the research on transmission characteristics of multimode, dispersion-flattened single-mode, single-polarization (PANDA) fibers, and fiber-optic components. He proposed for the first time the dispersion-flattened fiber (DFF) and succeeded in fabrication of DFF that had chromatic dispersion less than +/-1 ps/km/nm over a wide spectral range. From September 1982 to September 1983, he worked as a guest researcher at Optical Fiber Group, Southampton University, Southampton, England, where he was engaged in the research on birefringent optical fibers. At NTT Photonics Laboratories, he has developed various kinds of AWGs ranging from 8ch-300nm spacing AWGs to 128ch-25GHz AWGs, flat spectral response AWGs and integrated-optic reconfigurable add/drop multiplexers (ROADM). 200 GHz to 50 GHz spacing AWGs are now widely used in the commercial WDM systems. From July 2006, he worked as Professor of Electrical and Computer Engineering at the University of California at Davis (UC Davis). His research at UC Davis includes passive and active photonics devices and silicon photonics. He is currently working as CTO at AiDi corporation aiming at the miniature lightweight spectroscopic sensors for environmental sensing and health diagnostics. He has published more than 285 papers in technical journals and international conferences. He authored and co-authored 8 books including “Fundamentals of Optical Waveguides (Elsevier)”. Dr. Okamoto is a member of the Institute of Electrical and Electronics Engineers (Fellow), Optical Society of America and the Institute of Electronics Information and Communication Engineers of Japan.

Shaping the Future of Nanobiophotonics
JTuA2 • 11:15, Harbour Salon B
Kishan Dholakia, Univ. of St Andrews, UK

Kishan Dholakia is Professor of Physics at the University of St Andrews Scotland and an honorary adjunct Professor at the Centre for Optical Sciences at the University of Arizona, USA.

He heads a large (~25) group working in various aspects of photonics including beam shaping, micromanipulation and biophotonics. He has published over 300 journal/conference papers and his group won the European Optics Prize in 2003. He was elected to the position of Fellow of the Royal Society of Edinburgh in 2007, Fellow of the Optical Society of America in 2008 and SPIE Fellow in 2009.
Photonic Crystal Fibers
SOMD3 • 17:00, Pier 5
William Wadsworth; Univ. of Bath, UK

William Wadsworth has been designing, fabricating and using photonic crystal fibres (PCFs) since 1999 when he joined the University of Bath as a post-doc. His previous work developing high power lasers and low-cost tunable lasers has informed a particular interest in the use of PCF for compact and versatile light sources.

Optical fiber sensors and their Specialty Fiber Needs
SOTuC5 • 17:15, Pier 5 Tutorial
Alexis Mendez, MCH Engineering, LLC, USA

Alexis Mendez received a PhD. degree in Electrical Engineering from Brown University, in 1992. He is President of MCH Engineering LLC, a consulting firm specializing in optical fiber sensing technology, and has over 20 years of experience in optical fiber technology, sensors and instrumentation. Dr. Mendez was the former Group Leader of the Fiber Optic Sensors Lab within ABB Corporate Research (USA) where he led R&D activities for the development of fiber sensors for use in industrial plant, oil & gas, and high voltage electric power applications. He has written 60 technical publications, taught several short courses on fiber sensors, holds 5 US patents and is recipient of an R&D100 award. Dr. Mendez is a Fellow of SPIE and was past Chairman of the 2006 International Optical Fiber Sensors Conference (OFS-18), past Technical Chair of the 2nd Workshop on Specialty Optical Fibers and their Applications (WSOF21010), and is co-editor of the “Specialty Optical Fibers Handbook.”
Technical Program Committees

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Pandelis Kourtessis, London Herts Univ., UK
Thomas Pfeiffer, Alcatel-Lucent, Germany
Josep Prat, Univ. Politecnica de Catalunya, Spain

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Bouyonghe Lee, Seoul Natl. Univ., Korea
Tomoyuki Yoshie, Duke Univ., USA
Gilberto Brambilla, Univ. of Southampton, USA

THz sensing
Peter Uld Jepsen, Danmarks Tekniske Univ., Denmark, Subcommittee Chair
David G. Cooke, McGill Univ., Canada, Co-Chair
Bernd Fischer, ISL – Inst. Franco-Allemand de Recherches de Saint-Louis, France
Markus Walther, Freiburg Univ., Germany
Jason Deibel, Wright State University, Ohio, USA

Imaging
Peter Tidemand-Lichtenberg, Danmarks Tekniske Univ., Denmark, Chair
Roberto Cerbino, Univ. Á Degli Studi di Milano, Italy
Jiri Janousek, Australian Natl. Univ., Australia
Jürgen Popp, Friedrich Schiller Univ. Jena, Germany
Alex Vitkin, McMaster Univ., Canada
Shinji Yamashita, Univ. of Tokyo, Japan

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Ezra Ip, NEC Labs America, USA
Nobuhiko Kikuchi, Hitachi, Japan
Guifang, Li, CREOL, Univ. of Central Florida, USA
Alexei Pilipetskii, Tyco Telecommunications, USA
Dan Sadot, Bersheva Univ., Israel
Chongjiin Xie, Alcatel Lucent, USA
Xingwen Yi, Univ. of Electronics and Science of China, China
Zuquin Zhu, Cisco, USA

Integrated Photonics Research, Silicon and Nano-Photonics Program Committee

Richard De La Rue, Univ. of Malaya, Malaysia, General Chair
Tom Koch, Lehigh Univ., USA, General Chair
Dan-Xia Xu, National Research Council Canada, Program Chair

Anatoly Zayats, King’s College London, UK, Program Chair

Valery Tolstikhin, OneChip Photonics Inc., Canada, Chair
Nadir Dagli, Univ. of California at Santa Barbara, USA
Christopher Doerr, Bell Laboratories, Alcatel-Lucent, USA
Jian-Jun He, Zhejiang Univ., China
Paul Jessop, Wilfrid Laurier Univ., Canada
Lionel Kimerling, MIT, USA
Damien Lambert, Infinera Inc., USA
Gunther Roelkens, Univ. of Ghent, Belgium
Matsuo Shinji, NTT Photonics Lab, Japan, Japan
Meint Smit, Eindhoven Univ. of Technology, The Netherlands
Devices and Components
Michael Watts, MIT, USA, Chair
Ray Beausoleil, HP Labs, USA
Tobias Kippenberg, Max Planck Inst. for Quantum Optics, Germany
Solomon Assefa, IBM T. J. Watson Res., USA
Joyce Poon, Univ. of Toronto, Canada
Laurent Vivien, Inst. d’Electronique Fondamentale, Univ. of Paris Sud, France
Zhiping Zhou, Peking Univ., China
Lars Zimmermann, Technische Univ. Berlin, Germany
Peter Rakich, Sandia Natl. Labs, USA
Koji Yamada, NTT Microsystem Integration Labs, Japan

Modeling, Numerical Simulation and Theory
Hung-chun Chang, Natl. Taiwan Univ., Taiwan, Chair
Allan D. Boardman, Univ. of Salford, UK
Anand Gopinath, Univ. of Minnesota, USA
Philippe Lalanne, Inst. d’Optique, Univ. Paris-Sud, France
Ya Yan Lu, City Univ. of Hong Kong, China
Philip Sewell, Univ. Park, UK
Christoph Waechter, Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany
Vien Van, Univ. of Alberta, Canada
Junji Yamauchi, Hosei Univ., Japan
James Pond, Lumerical, Canada

Nanophotonic Devices and Applications
Gary Wiederrecht, Argonne National Lab., USA, Chair
Sergey Bozhevolnyi, Southern Denmark Univ., Denmark
Mark Brongersma, Stanford Univ., USA
Din Ping Tsai, Natl. Taiwan Univ., Taiwan
Edwin Pun, City Univ. of Hong Kong, China
Sailing He, Zhejiang Univ., Joint Res. Center of Photonics of the Royal Inst. of Technology (Sweden), China/Sweden
William Whelan-Curtin, Univ. of St. Andrews, UK
John Rogers, Univ. of Illinois at Urbana-Champaign, USA
Edward Sargent, Univ. of Toronto, Canada
Yasuhiko Arakawa, Univ. of Tokyo, Japan
Masaya Notomi, NTT Basic Research Labs., Japan
Explanation of Session Codes

The first letter of the code designates the conference (A=Access Networks and In-house Communications, S=Optical Sensors, SP=Signal Processing in Photonics Communications, SL=Slow and Fast Light, I=Integrated Photonics Research, Silicon and Nano Photonics, SO=Specialty Optical Fibers, J=Joint). The second element denotes the day of the week (Monday=M, Tuesday=Tu, Wednesday=W). The third element indicates the session within the particular day the talk is being given. Each day begins with the letter A and continues alphabetically. The number on the end of the code signals the position of the talk within the session (first, second, third, etc.). For example, a presentation coded ATuA4 indicates that this paper is part of Access Networks and In-house Communications (A) and is being presented on Tuesday (Tu) during the first session (A), and is the fourth paper (4) presented in that session.
**Agenda of Sessions — Sunday, 12 June**

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<td>14:00–18:00</td>
<td>Workshop: Biomedical Optical Sensors-Differentiators for Winning Technologies, Harbour Salon C</td>
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<td>17:00–22:00</td>
<td>Optics Olympics, Metro West</td>
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**Agenda of Sessions — Monday, 13 June**

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<tbody>
<tr>
<td>ANIC</td>
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<table>
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<th>Time</th>
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<tbody>
<tr>
<td>7:00–18:30</td>
<td>Registration Open, Harbour Ballroom Foyer</td>
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<tr>
<td>7:30–19:30</td>
<td>OIDA Workshop, Queen's Quay, The Westin Harbour Castle</td>
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<tr>
<td>8:30–8:45</td>
<td>AMA • Network, Market and Operator View (starts at 8:00)</td>
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<tr>
<td>8:45–10:00</td>
<td>IPR/SL Opening Remarks, Harbour Salon B</td>
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<td>JMA: IPR/SL Keynote Speaker Session, Harbour Salon B</td>
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<tr>
<td>10:00–16:00</td>
<td>Exhibits Open, Pier 4/ Harbour Ballroom Foyer</td>
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<tr>
<td>10:00–10:30</td>
<td>Coffee Break/Exhibits, Pier 4/ Harbour Ballroom Foyer</td>
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<tr>
<td>10:30–12:30</td>
<td>AMB • Green Access and Operations</td>
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<td></td>
<td>SPMA • High Spectral Efficiency</td>
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<td></td>
<td>IMA • Modeling and Simulation I: Plasmonics</td>
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<tr>
<td></td>
<td>IMB • Nanophotonics: Waveguides, Optomechanics, and SOI-Based Technologies</td>
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<td>SLMA • Applications of Slow/Fast Light</td>
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<tr>
<td></td>
<td>SMB • Subwavelength and Plasmonic Sensors</td>
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<td>SOMB • 2um Fiber Lasers</td>
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<tr>
<td>12:30–13:30</td>
<td>Lunch Break (on your own)</td>
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<td>13:30–15:30</td>
<td>AMC • OFDM-PON</td>
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<td>SPMB • OFDM</td>
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<tr>
<td></td>
<td>IMC • Modeling and Simulation II: Periodic Structures and Waveguides</td>
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<tr>
<td></td>
<td>IMD • Nanophotonics: Waveguides, Lasers, and SOI-Based Technologies</td>
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<td>SLMB • Applications of Slow/Fast Light II</td>
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<td>SMC • Microfiber Sensors</td>
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<td>SOMC • Novel Glass and Fluoride Fibers</td>
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<td>15:30–16:00</td>
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<tr>
<td>16:00–18:00</td>
<td>AMD • Hybrid and WDM-PON</td>
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<td>SPMC • Optical Techniques I (ends at 17:30)</td>
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<td></td>
<td>IME • Devices and Components I (ends at 17:00)</td>
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<tr>
<td></td>
<td>IMF • Nanophotonics: Photonic Crystals and nanowires</td>
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<td>SLMC • Atomic and Rare-Earth Systems and Applications</td>
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<td>SMD • Spectral and Biomedical Imaging</td>
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<td>SOMD • Microstructured Fibers</td>
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<tr>
<td>18:30–20:00</td>
<td>Advanced Photonics Congress and OIDA Welcome Reception, Metro Ballroom West</td>
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**Key to Conference Abbreviations**

<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ANIC</td>
<td>Access Networks and In-house Communications</td>
</tr>
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<td>Sensors</td>
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<tr>
<td>SPPCom</td>
<td>Signal Processing in Photonics Communications</td>
</tr>
<tr>
<td>SL</td>
<td>Slow and Fast Light</td>
</tr>
<tr>
<td>IPR</td>
<td>Integrated Photonics Research, Silicon and Nano Photonics</td>
</tr>
<tr>
<td>SOF</td>
<td>Specialty Optical Fibers</td>
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## Agenda of Sessions — Tuesday, 14 June

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<td>Sensors</td>
<td>SOF</td>
</tr>
</tbody>
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### 7:30–18:00

**Registration Open, Harbour Ballroom Foyer**

### 8:30–10:00

- **ATuA • Basic Technologies for NG-PON** (starts at 8:00)
- **SPTuA • Coding I** (ends at 9:30)
- **ITuA • Devices and Components II**
- **ITuB • Nanophotonics: Plasmonics and applications I**
- **SLTuA • Slow/Fast Light in SOAs and Photonic Crystals**
- **STuA • High Intensity and Broadband THz Sources**
- **SOTuA • Supercontinuum Fiber Lasers**

### 10:00–16:00

**Exhibits Open, Pier 4/ Harbour Ballroom Foyer**

### 10:00–10:30

**Coffee Break/Exhibits, Pier 4/ Harbour Ballroom Foyer**

### 10:30–12:30

- **ATuB • Radio over fiber and OCDMA**
- **SPTuB • Advanced Modulation** (ends at 11:45)
- **JTuA • Joint IPR/SL Plenary Session, Harbour Salon B**
- **STuC • THz Spectroscopy and Imaging Applications**
- **SOTuB • Chalcogenide and Tellurite Fibers** (ends at 12:15)

### 12:30–13:30

**Lunch Break (on your own)**

### 1:30–15:30

**JTuC • Congress Joint Poster Session, Pier 4/ Harbour Ballroom Foyer**

### 15:30–16:00

**Coffee Break/Exhibits, Pier 4/ Harbour Ballroom Foyer**

### 16:00–18:00

- **ATuC • Inhouse: Fiber and Wireless** (ends at 17:30)
- **SPTuC • DSP**
- **ITuC • Photonic Integration I**
- **ITuD • Nanophotonics: Plasmonics and Applications II**
- **SLTuB • Methods and Fundamentals**
- **STuC • Terahertz Waveguides, Applications, and Device Technology**
- **SOTuC • Fiber Sensors**

### 16:30–21:30

**Advanced Photonics Congress Reception and Banquet, Hart House, University of Toronto**

### Key to Conference Abbreviations

- **ANIC** Access Networks and In-house Communications
- **Sensors** Optical Sensors
- **SPPcom** Signal Processing in Photonics Communications
- **SL** Slow and Fast Light
- **IPR** Integrated Photonics Research, Silicon and Nano Photonics
- **SOF** Specialty Optical Fibers
# Agenda of Sessions — Wednesday, 15 June

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<tr>
<td>7:30–17:00</td>
<td>SPPCom</td>
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<td>Sensors</td>
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<td><strong>Registration Open, Main Foyer</strong></td>
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<tr>
<td>8:30–10:00</td>
<td>SPWA • Nonlinearities (starts at 9:00)</td>
<td>IWA • Modeling and Simulation III: Lasers and Emitters</td>
<td>IWB • Active nanophotonics, quantum dots, and nanocavities</td>
<td>SLWA • Nonlinear Optics and Waveguide Technologies</td>
<td>SWA • Biochemical Sensors I</td>
<td>SOWA • 1um Fiber Lasers (ends at 9:45)</td>
</tr>
<tr>
<td>10:00–10:30</td>
<td><strong>Coffee Break, Harbour Ballroom Foyer</strong></td>
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<tr>
<td>10:30–12:30</td>
<td>SPWB • Coding II (ends at 12:15)</td>
<td>IWC • Photonic Integration II</td>
<td>IWD • Modeling and Simulation IV: Coupled Waveguides and Resonators (ends at 12:15)</td>
<td>SLWB: Slow/Fast Light Systems (ends at 12:15)</td>
<td>SWB • Biochemical Sensors II</td>
<td>SOWB • Hollow Core Fibers (ends at 12:15)</td>
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<tr>
<td>12:30–13:30</td>
<td><strong>Lunch Break (on your own)</strong></td>
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<tr>
<td>13:30–15:30</td>
<td>SPWC • Transmission Systems</td>
<td>IWE • Photonic Integration III</td>
<td>IWF • Devices and Components III</td>
<td>SWC • Photonic Crystal Sensors</td>
<td>SOWC • Poled and Polarizing Fibers (ends at 15:15)</td>
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<tr>
<td>15:30–16:00</td>
<td><strong>Coffee Break/Exhibits, Pier 4/ Harbour Ballroom Foyer</strong></td>
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<tr>
<td>16:00–18:00</td>
<td>SPWD • Optical Techniques II (ends at 17:30)</td>
<td>IWG • Devices and Components IV</td>
<td>SWD • Speckle and Nonlinear Based Imaging</td>
<td>SOWD • Novel Applications and Effects (ends at 17:30)</td>
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**Key to Conference Abbreviations**

ANIC  Access Networks and In-house Communications  
Sensors  Optical Sensors  
SPPcom  Signal Processing in Photonics Communications  
SL  Slow and Fast Light  
IPR  Integrated Photonics Research, Silicon and Nano Photonics  
SOF  Specialty Optical Fibers
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<tr>
<th>Time</th>
<th>Session</th>
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<tr>
<td>8:00-10:00</td>
<td><strong>AMA • Network, Market and Operator View</strong></td>
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<td><em>Invited</em> Thomas Pfeiffer, Alcatel-Lucent, Germany, Presider</td>
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<tr>
<td>8:30-10:00</td>
<td><strong>JMA • IPR/SL Keynote Speaker Session</strong></td>
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<td><em>Jacob B. Khurgin, Johns Hopkins Univ., USA, Presider</em></td>
</tr>
<tr>
<td>8:30-10:00</td>
<td><strong>SMA • Sensors Keynote Speaker Session</strong></td>
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<td></td>
<td><em>John Ballato, Clemson Univ., USA, Presider</em></td>
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<tr>
<td>8:30-10:00</td>
<td><strong>SOMA • SOF Keynote Session</strong></td>
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<td><em>John Ballato, Clemson Univ., USA, Presider</em></td>
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<tr>
<td>8:30-10:00</td>
<td><strong>AMA1 • Invited BT NGA Deployment &amp; Evolution Strategy as Drivers for NG-PON2 Requirements</strong>, Albert Rafel1, Innovation &amp; Design, Adastral Park, Martlesham Heath, UK. This paper outlines the current regulatory situation in the UK and BT’s open access operating model. It presents BT’s current FTTP architecture and design giving details of the interconnection points for unbundling purposes at Ethernet level as well as the components making the design future proof.</td>
</tr>
<tr>
<td>8:30-10:00</td>
<td><strong>AMA2 • Invited Next Generation Optical Access Networks</strong>, Ronald Heron1, Access CTO Team, Alcatel-Lucent, Canada. Future optical access networks must support increased rate, reach, split, multi-operator access &amp; wireline/wireless convergence. This paper outlines the role, challenges and breakthroughs of NG technologies including TDM-PON, WDM-PON &amp; TWDM-PON.</td>
</tr>
<tr>
<td>8:30-10:00</td>
<td><strong>AMA3 • Invited Practical Hybrid PON Technologies</strong>, Naoto Yoshimoto1, Access Network Service Systems Laboratories, NTT, Japan. This paper describes possible access network architectures using hybrid PON technologies designed to meet operators’ requirements in the next decade. From the technical continuity viewpoint, TDM based WDM-PON will be a promising candidate.</td>
</tr>
<tr>
<td>8:30-10:00</td>
<td><strong>AMA4 • Invited Green Hybrid Optical/Wireless Access/In-House Networks</strong>, Leonid Kazovsky1, Kadir Allbeysigil, Tolga Akyurt, ‘Stanford Univ., USA. This paper focuses on energy efficient hybrid access networks. Solutions to underutilization of network are investigated. Power optimization of distributed antenna systems and cell-breathing technology for hybrid access networks are explored.</td>
</tr>
<tr>
<td>8:30-10:00</td>
<td><strong>JMA1 • Plenary Slow Light Enhanced Nonlinear Effects in Periodic Structures</strong>, Benjamin Eggleton; Univ. of Sydney, Australia. The generation of intense single-cycle THz pulses by tilted-pulse-front techniques for probing ultrafast nonlinear THz dynamics in semiconductors is described. Full-field imaging of THz Cherenkov waves and novel THz pulse detection methods are also discussed.</td>
</tr>
<tr>
<td>8:30-10:00</td>
<td><strong>JMA2 • Invited Monitoring and Controlling Slow Light in Photonic Crystals</strong>, Daryl M. Beggs1, Isabella H. Rey1, Tobias Kampfrath1, Thomas Krausz1, Kfabus Eggleton1; VOM Inst. AMOLF, Netherlands. ‘School of Physics &amp; Astronomy, Univ. of St Andrews, UK. By performing ultrafast pump-probe experiments, we show the 0.3THz adiabatic frequency conversion of pulses in a slow-light photonic crystal waveguide with 80% efficiency. We demonstrate the use of this conversion scheme in a delay line.</td>
</tr>
<tr>
<td>8:30-10:00</td>
<td><strong>SOMA1 • Keynote Prospects and Challenges in High Power Fiber Laser Technology</strong>, Andreas Tünnermann1, Jens Limpert1, ‘Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany; ‘Inst. for Applied Physics, Friedrich-Schiller-Univ., Germany. Solid-state lasers are attractive sources of coherent radiation for various applications. At present fiber lasers and amplifiers are capturing the different markets. Novel developments and challenges in high-power fiber laser technology are reviewed.</td>
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<td>8:30-10:00</td>
<td><strong>SOMA2 • Invited Green Hybrid Optical/Wireless Access/In-House Networks</strong>, Leonid Kazovsky1, Kadir Allbeysigil, Tolga Akyurt, ‘Stanford Univ., USA. This paper focuses on energy efficient hybrid access networks. Solutions to underutilization of network are investigated. Power optimization of distributed antenna systems and cell-breathing technology for hybrid access networks are explored.</td>
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**Monday 13 June**

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<th>Pier 4</th>
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<td>Access Networks and In-house Communications</td>
<td>Joint</td>
<td>Optical Sensors</td>
<td>Specialty Optical Fibers</td>
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</tbody>
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**7:00–18:30 Registration Open, Harbour Ballroom Foyer**

**10:00-10:30 Coffee Break, Pier 4/ Harbour Ballroom Foyer**

**10:00-16:00 Exhibits Open, Pier 4/ Harbour Ballroom Foyer**
Monday 13 June

Access Networks and In-house Communications

Technologies Res. Inst. (PSATRI), Saudi Arabia.

We review recent progress on high spectral efficiency optical transmission with per-channel data rates beyond 100 Gb/s. Enabling technologies such as high-level QAM modulation and multiband superchannel transmission are discussed.

Signal Processing in Photonics Communications

We study in detail the modeling requirements for realistic plasmonic nanostructures and show that strong field gradients created at their vicinity can be used to trap nanostructures; this plasmonic trapping is also demonstrated experimentally.

Integrated Photonics Research, Silicon and Nano Photonics

We study the potential of post-fabrication trimming of integrated devices by exploiting photosensitivity in chalcogenide glass. Compensation of fabrication tolerances is demonstrated in As2S3 and As2S3-assisted silicon ring filters.

These concurrent sessions are grouped across two pages. Please review both pages for complete session information.
A new type of all optical delay line is realized in fibers. A local dynamic grating reflector can be generated everywhere in the fiber, demonstrating >1 us delay for 650 ps pulses.

We experimentally demonstrate that all-optical signal calculus can be realized based on dynamic Brillouin gratings in optical fibers. Temporal integration and first-order differentiation were performed for optical pulse demodulation technique based on orthogonally polarized spectra of gold-coated tilted fiber Bragg gratings is proposed to measure the surrounding refractive index by comparing the differential amplitude of resonance peaks near a Plasmon resonance.

We present various methods for the generation of subwavelength plasmonic hot spots for sensor applications. It is shown that the structured nano-apertures on the metal film exhibit extremely small hot spots with enhanced field intensity.

Byoungho Lee, Sooyoung Roh, Dongho Oh, Jeon-Dam Park, Eui-Young Song, Seong-Woo Cho, Il-Min Lee; ‘Dept. of Electrical Engineering, Seoul Natl. Univ., Democratic People’s Republic of Korea. We have demonstrated the first resonantly pumped double-clad holmium-doped fibre laser. An output power of 99W with 65% slope efficiency versus absorbed power was achieved at 2.12μm.
In-service Measurement of Fiber Fault in WDM-PON

Kang1, Dong Wang2, Ping Li1; 1Research Institute of Posts and Telecommunications, Information & Electronics Technology Lab, China. A scheme for in-service measurement of fiber fault in WDM-PON is proposed, which can monitor all the fiber branches simultaneously without disturbing the service, and locate the failure point accurately by a selective OTDR.

High-Performance Digital Nyquist-WDM

Gabriella Bucio1, Vittoria Curr1, Andrea Carena1, Pierluigi Poggiolini1, Fabrizio Forghieri1, Politecnico di Torino, Italy; 2Cisco Photonics Italy, Italy. We investigate by simulation the performance of Nyquist-WDM signals generated using high-speed digital-to-analog converters (DACs) with either PM-QPSK or PM-16QAM modulation, taking into account speed and bandwidth properties of state-of-the-art DACs.

Low-loss Dielectric-coated Hollow Rectangular Waveguide Supporting THz Guided-Mode Resonance Filters

Zhang Li1, Moustafa Mohamed1, Yonghao Cui1, Won Park1, Li Shang1, Alan Mickelson1; 1Electrical and Computer and Energy Engineering, Univ. of Texas at Arlington, USA. A novel thermo-optic tunable guided-mode resonance filter is designed and fabricated. The fabricated filter has a spectral width of 12 nm, tuning range of 15 nm, and tuning efficiency of 0.15 nm per degree Celsius.

Highly Efficient Broadband Silicon-on-Insulator Grating Couplers for the Short Wave Infrared Wavelength Range

Pierluigi Poggiolini1, Nandita Mattaun1, Diedrich Vermeulen1, Shankar K. Selvaraja1, Wim Bogaerts1, William Green2, Roeland Baets2, Gordon Roelkens1; 1Politecnico di Torino, Italy; 2Cisco Photonics Italy, Italy. We demonstrate broadband silicon-on-insulator fiber-to-chip grating couplers for the short wave infrared region. The devices show a peak coupling loss of -5.2 dB at 2150 nm and a 3 dB bandwidth of 160 nm.
Phase Locking of SBS Slow Light in a 2.2-km Single-Mode Fiber, Joseph E. Vornehm, Aaron Schweinsberg, Zhihui Shi, Robert Boyd; Inst. of Optics, Univ. of Rochester, USA; Dept. of Physics, Univ. of Ottawa, Canada. A stimulated Brillouin scattering (SBS) slow light system in a 2.2-km single-mode fiber was phase locked to a reference signal. Optical pulses of 6.5 ns duration were delayed 0.9 pulse width while maintaining lock.

Ultra-Sensitive (Acoustic) Pressure Sensor with High Temporal Resolution, Balthasar Fischer, Ernst Wintner; Photonics Institute, Univ. of Technology Vienna, Austria. A novel all-optical pressure sensor is presented. Based on a rigid Fabry-Pérot, the transducer detects refractive index changes induced by pressure fluctuations. This design is so sensitive that the miniaturized device is applicable as microphone.

Invited Tm-doped Multi-component Glass Fibers for 2um Fiber Lasers, Shibin Jiang; Advalue Photonics, USA. Highly Tm-doped silicate glasses and fibers exhibit a high slope efficiency of 68.3% and a gain per unit length of greater than 2dB/cm. Single frequency fiber lasers with laser linewidth less than 3kHz, Q-switched single frequency fiber lasers, and mode-locked fiber lasers near 2 micron wavelength were demonstrated using this newly developed fiber.

We review the potential applicability of SFL techniques to the field of Microwave photonics. The main results obtained for several applications such as filtering, phased array antennas, arbitrary waveform generation and OEO will be analyzed.

We experimentally demonstrated a fast infrared radiation sensor. The system is applicable in a quasi-distributed configuration to cover a large area using a single interrogation unit (OFDR) for early fire detection.

We present a novel spatial-domain cavity ring-down technique using frequency-shifted interferometry, by monitoring the intensity decay of a continuous-wave beam circulating in a fiber-loop cavity. It was applied to fiber bend loss measurements.

12:30–13:30 Lunch Break (on your own)
### AMC1 • 13:30

**The “Five W’s” of OFDM for Optical Access: What, Why, When and How?**

Neda Cejeticć, 1 NEC USA, USA.

The “Five W’s” of OFDM-based optical access are addressed, covering technology principles and recent progress, application scenarios for future PON systems, the near-term development timeline, and the practical outlook for key DSP-based enabling technologies.

### AMC2 • 14:00

**A Novel Upstream Link Scheme for OOFDM-PON**

Qingyi Guo1, Kan He1, Xin Li1, Weiping Huang1; 1Dept. of Electrical and Computer Engineering, McMaster Univ., Canada.

We propose an efficient OOFDM-PON scheme: orthogonal subcarrier multiplexing at the ONU with colorless laser diode, and all-optical FTT at the OLT for high speed demultiplexing. The deterioration caused by laser perturbation is also investigated.

### AMC3 • 14:15

**Dynamic Subcarrier Allocation for OFDMA-PONs with Monitoring Mechanism**

Wansu Lim1, Pandelis Kourtessis1, Miloš Milošavljević1, John Senani1; 1Optical Networks Group, Science and Technology Research Inst. (STRI), Univ. of Hertfordshire, UK.

A new protocol design for 10G OFDMA-PONs is reported, demonstrating dynamic subcarrier allocation based on monitoring of each ONU’s queueing status. 0.7 ms packet delay and 540 Mbps throughput were achieved for SLA0 ONUs.

### AMC4 • 14:30

**Benchmarking Comparison of Physical Layer Performance for Various Implementations of OFDM Access Networks**

Ioannis Tomkos1, Andrea Di Falco1, Susanne C. Kehr1, Ulf Leonhardt1; 1School of Physics and Astronomy, Univ. of St Andrews, UK; 2Centro de Ciencias Aplicadas y Desarrollo Tecnológico, UNAM, Mexico.

We discuss the design and experimental demonstration of an integrated Luneburg lens realized in Silicon-on-Insulator platform, via grey-scale lithography. The lens implements on-chip Fourier transform, independently of the angle incidence.

### SPMB1 • 13:30

**Digital Signal Processing for Multi-gigabit Real-time OFDM, Q Yang1; 1State Key Laboratory of Optical Communication Technologies and Networks, China.**

We summarize the digital signal processing for multi-gigabit real-time optical OFDM. Various OFDM procedures and algorithms are discussed with a focus on OFDM receiver implementation.

### SPMB1 • 14:00

**Analyzing Photonic Crystals with Arbitrary Unit Cells Using Boundary Integral Equations**, Wen Ping Li1,2; 1Joint Advanced Res. Ctr. of USC and City Univ., China; 2Univ. of Science and Technology of China, China; 2City Univ. of Hong Kong, Hong Kong.

An accurate boundary integral equation method is developed for analyzing 2D photonic crystals where the cylinders in the unit cells have arbitrary shapes and corners. It first calculates the so-called Neumann-to-Dirichlet map for unit cells.

### SPMB2 • 14:30

**Low-Complexity Multi-Band Polyphase Filter Bank for Reduced-Guard-Interval Coherent Optical OFDM, Alex Tzolnic1, Moheb Nazaryan2; 1EE, Technion, Israel.**

Smart multi-band signal processing yields substantial reduction of FDE FFT complexity for recent Reduced Guard Interval (RGI) techniques emerging in ultra-broadband long-haul OFDM, providing the simplest high-performance QPSK-OFDM system.

### SPMB4 • 14:45

**Dispersion for Dispersion-Enhanced Phase Noise in Reduced-Guard-Interval CO-OFDM Transmissions**, Qunbi Zha1, David V. Plant2; 1Electrical & Computer Engineering, McGill Univ., Canada.

We propose a dual-polarization grouped maximum-likelihood algorithm to compensate for the dispersion-enhanced phase noise of reduced-guard-interval (RGI) CO-OFDM. The laser linewidth tolerance is increased to 2 MHz after a 4800 km transmission.

### IMD3 • 14:15

**Comparison of Cascade, Baseline, and Lattice Architectures for Ultra-Compact RF Photonic Filters on SOI**, Payam Alipour1, Ali Asghar Eftekhar1, Amit Hasvari2, Qiong Li1, Siva Yegnanarayanan1; 1State Key Laboratory of Photonics and Optoelectronics, Natl. Taiwan Univ., Taiwan; 2Centro de Ciencias Aplicadas y Desarrollo Tecnológico, UNAM, Mexico.

A comprehensive study of the far field of Bragg reflection waveguides is presented. Insight obtained by a newly developed Gaussian approximation of the near field provides a valuable tool for optimizing the far-field pattern.

### IMD5 • 14:45

**Effects of Scattering Surface and Concentration on the Spectral Features of Dye-Based Random Lasers**, Natanael Cuando-Espitia1, Juan Hernández-Cordero1, Crescencio García-Segundo1, Rosa Quispe-Schiha2; 1Inst. de Investigaciones en Materiales, Mexico; 2Centro de Ciencias Aplica das y Desarrollo Tecnológico, UNAM, Mexico.

Random lasers varying concentration and size of SiO2 scatterers were analyzed. We report on the dependence of the spectral features (wavelength and full width at half maximum) on the size and concentration of the scatterers.

### IMD5 • 14:45

**Full-Vectorial Finite-Difference Scheme for the Analysis of Thin Layered Structures**, Cheng-Han Dai1, Yih-Peng Chion1; 1Graduate Inst. of Photonics and Optoelectronics, Natl. Taiwan Univ., Taiwan; 2Dept. of Electrical Engineering, Natl. Taiwan Univ., Taiwan.

We develop a full-vectorial finite-difference formulation for layered structures. Fields and their derivatives across the layers are related by matrices. Sampled points can step over multiple layers. The computation is greatly saved.
Optomechanically Induced Transparency (OIT) is a phenomenon in which the transmission of a probe laser beam through an optomechanical device can be modulated using a second, "control" laser beam. In analogy to electromagnetically induced transparency (EIT), OIT arises when the mechanical resonances of an optomechanical system (e.g., a microcavity) are spectrally overlapped by the control field. This overlap can lead to a significant reduction in the transmission of the probe field, similar to EIT in atomic systems. However, the mechanical resonances are generally much more broadband than the electromagnetic ones, allowing for detection of a wider range of mechanical properties.

In a demonstration of OIT, a resonator-based optomechanical system was used, consisting of a microcavity coupled to an optical fiber. A control beam was spatially overlapped with the probe beam in the cavity, and the mechanical resonance of the cavity was modulated by a strain applied to the cavity. This resulted in a significant reduction in the transmission of the probe beam, demonstrating OIT. The strain could be varied, allowing for tuning of the resonance frequency and thus for varying the degree of transparency. This effect has potential applications in sensing, such as strain sensors, as well as for photonic devices where dynamic control of optical properties is desired.

In another application, OIT was used to modulate the transmission of a probe beam through a microcavity, which was connected to an optical fiber. The control beam was used to modulate the cavity resonance, and the transmission of the probe beam was observed to change accordingly. This effect was observed to be linear with respect to the applied strain, demonstrating the potential of OIT for sensitive strain sensing.

In summary, optomechanically induced transparency is a powerful tool for modulating the transmission of light using mechanical resonances, with potential applications in sensing, photonic devices, and other areas where dynamic control of optical properties is desired.
AMC • OFDM-PON—Continued

Novel 16QAM Detection Scheme for Optical Access Networks, Nikolaos Sotiropoulos, Haag de Waard1, A. Kweon; 1‘Electrical Engineering, Eindhoven Univ. of Technology, Netherlands. In this paper, an inherent detection of a square 16QAM signal is demonstrated for the first time using simulations and the scheme’s suitability for future optical access networks, along with conventional coherent detection, is explored.

SPMB • OFDM—Continued

Optimum Clipping for Optical OFDM with Limited Resolution DAC/ADC, Christian R. Berger2, Yannis Benlachtar2, Robert Killey2; 1‘Electrical and Computer Engineering, Carnegie Mellon University, USA; 2‘Electronic and Electrical Engineering, University College London, UK. We study the effects of clipping and quantization noise on the performance of an optical OFDM system. To this end we derive a closed-form formula that links optimum clipping with the bit resolution of signal converters.

SPMB5 • 15:15

Non-Iterative Interpolation-Based Phase Noise ICI Mitigation for CO-OFDM Transport Systems, Mohammad EBrahim Mousa Pasandi2; 1David V. Plant; 1McGill University, Canada. We study the performance of a phase noise induced ICI compensation scheme based on linear interpolation for CO-OFDM transport systems. This practical approach does not suffer from error propagation while enjoying low computational complexity.

IMC • Modeling and Simulation II: Periodic Structures and Waveguides—Continued

Simulation of Waveguide Corner and Cross by Complex Mode Matching Method, Yan Wang2, Ling Han1; 1Electrical, Computer, and Energy Engineering, McMaster Univer., Canada. Radiation field emitting perpendicular to waveguide axis in waveguide corner and cross simulated by complex mode matching method and validated by FDTD. Power conservation is demonstrated to establish self-consistency of the method.

IMC6 • 15:50

Ultra Broadband Mid-IR Detector Using Multilayer Anti-reflection Coating, Poo T. Lim2; 1Materials Science and Engineering, Massachusetts Inst. of Technology, USA; 2Micronophotonics Center, Massachusetts Inst. of Technology, USA. Ultra broadband mid-IR detector is demonstrated in the spectral region at 2-4 um. The light coupler is composed of multilayer dielectric layers. A 60 enhancement of transmittance is achieved at light incident angles 8-10°-75°.

IMD • Nanophotonics: Waveguides, Lasers, and SOI-Based Technologies—Continued

Light Propagation in 3-D Photonic Crystals, Susumu Noda, Kenji Ishizaki, Kyushu Univ., Japan. We introduce recent progress on the control of light propagation in three-dimensional (3-D) photonic crystals. We demonstrate 3-D guiding within photonic crystal-embellished waveguides. A novel controlling approach using the surface of crystals is also discussed.

18:00–18:00

IMF • Nanophotonics: Photonic Crystals and Nanowires

Andrea Melloni; Univ. of California at San Diego, Presider

IMF1 • 16:00

Invited

Light Propagation in 3-D Photonic Crystals, Susumu Noda, Kenji Ishizaki, Kyushu Univ., Japan. We introduce recent progress on the control of light propagation in three-dimensional (3-D) photonic crystals. We demonstrate 3-D guiding within photonic crystal-embellished waveguides. A novel controlling approach using the surface of crystals is also discussed.

IMF2 • 16:30

Experimental Demonstration of Ultra-Low Loss Coupling into Slow Light Slotted Photonic Crystal Waveguide on Silicon Nanowire, Chey Yoon Lim, Xiaolong Wang, Swapnajit Chakravarty1, Wei-Cheng Lai, Yi Zou, Ray T. Chen; 1‘Electrical and Computer Engineering, Univ. of Texas at Austin, USA; 2‘Omega Optics, USA. We experimentally demonstrate highly efficient coupling to a slotted photonic crystal waveguide using a mode converter and a photonic crystal impedance taper. Measurements show a ~2dB insertion loss for coupling in/out of the slow light waveguide.

 Sessions continue on page XX.
SLMB • Applications of Slow/Fast Light II—Continued

SLMB5 • 15:15
All-Optical Control of the Group Velocity, Central Frequency and Spectral Bandwidth of a Laser Pulse. Stefano Cavalleri1, Emiliana Salì1, Emilio Ignoti1, Roberto Buffa1, Lorenzo Fini1, Marco Tognetti1; 1Physics, Univ. di Firenze, Italy; 2Physics, Univ. di Siena, Italy. We present recent results on different schemes (involving both coherent and incoherent interactions) that allow all-optical control of several properties of a large spectral bandwidth (up to 3.3 GHz) laser pulse propagating in an atomic medium.

SLMB6 • 15:15
Tunable Light-Storage for almost 1 Microsecond. Thomas Schneider1, Stefan Preußer1, Rambabu Janohal1; 1HIT, HFTL-Leipzig, Germany. We describe the latest results of the investigation of a new method to store optical packets called Quasi-Light-Storage (QLS). We discuss the method and show experimental results with a delay-bandwidth product of around 700 Bit.

SMC • Spectral and Biomedical Imaging—Continued

SMC6 • 15:00
Characterization of a Low-Cost Long-Period Fiber Grating Induced by a Polymeric Microstructure. Jorge A. Soto-Olmos1, Juan Hernández-Cordero1, Laura Oropesa Ramori1; 1Departamento de Electrónica, Facultad de Ingeniería, Univ. Nacional Autónoma de México, Mexico; 2Inst. de Investigaciones en Materiales, Univ. Nacional Autónoma de México, Mexico. In this paper a low-cost long-period fiber grating induced by a polymeric microstructure is reported. Fabrication and characterization of the device and experimental results of the spectrum variations due to external pressures are presented.

SMC7 • 15:15
A Simple Bend Sensor Based on Multimode Interference and a Twin Core Fiber Mach-Zehnder Interferometer. Aissa Harhira1, Thomas Schreier1, Jerome Lapointe1, Raman Kashyap1; 1Ecole Polytechnique de Montréal, Canada. An optimized Bend Sensor based on a multimode interference combined with a twin-core fiber is proposed. The bend induced wavelength shifts on the interference fringes is experimentally monitored. Losses in multimode fiber are studied.

SOMC • Novel Glass and Fluoride Fibers—Continued

SOMC5 • 15:00
Fluoride Glass Fibers. Mohammad Saad1; 1IR-Photonics Canada, Canada. There is an increasing demand on high quality optical fibers that transmit over 2 microns, where silica fibers are opaque, for applications as diverse as spectroscopy and sensing, laser power delivery, fiber lasers, fiber amplifiers, defense (IRCM). The talk will focus on latest development of fluoride fibers.
A Practical Coherent WDM PON, Yun C. Chung; 1Dept. EE, KAIST, Republic of Korea. We review the recent progresses in the coherent WDM PON technologies achieved at KAIST. Using these technologies, we demonstrate the feasibility of implementing practical long-reach and high-split WDM PONs.

Performance of a DSP Phase Control Method for Phase Regenerators Based on Phase Sensitive Amplification, Shu Zhang, John Cartledge; 1Electrical and computer engineering, Queen’s University, Canada. A digital signal processor based phase control method is investigated for all-optical phase regeneration using phase sensitive amplification. The phase Q factor is improved by 5.3-7.3 dB for a sampling rate of 312.5 Ms/s.

Modeling Polarization in a Bidirectional Fiber System, William Le, Li Qian; 1ECE, University of Toronto, Canada. We present, for the first time, methods to model the polarization of the output lightwave of a bidirectional fiber-optic system, in which the lightwave propagates through polarization control elements in both directions.

IMEF4 • 17:00 Silicon Photonic Wire Bragg Grating for On-chip Wavelength (De)Multiplexing Employing Ring Resonators, Paul Mudin, Roman Bruck; 1Health & Environment, HAT Austrian Inst. of Technology GmbH, Austria; 2SUPA, School of Physics and Astronomy, Univ of St Andrews, UK; 3Dipartimento di Fisica “A. Volta”, Univ. Degli Studi di Pavia, Italy; 4MATIS-IMM-CNR, Italy. Using Photonic crystal nanocavities, we first dramatically enhance third harmonic generation from silicon. Then, by virtue of a strong Purcell factor, we significantly increase defect state photoluminescence and greatly suppress thermal quenching.

IMF5 • 17:15 Photonic Band Structure of Circular Photonic Crystals in Silicon-on-Insulator Slab Waveguide, Jian H. Lin; 1Dept. of Physics, National Chung Cheng Univ., Taiwan; 2Dept. of Physics and Astronomy, Univ. of British Columbia, Canada; 3Graduate Inst. of Opto-Mechatronics, Natl. Chung Cheng Univ., Taiwan. We characterized the photonic band structure of a two dimensional (2D) circular photonic crystal (CPC) silicon membrane slab waveguide with surface coupling reflectivity (SCR) technique.
SLMC3 • 16:45
Control of Slow and Fast Light by Incoherent Interactions in Atomic Schemes. Stefano Cavalieri!, Emilio Ignesti!, Marco Tognetti!, Roberto Buffa!, Lorenzo Favi!, Emiliano Salti, Federico Tommasi!. !Physics, Univ. di Firenze, Italy; !Physics, Univ. di Siena, Italy; !LENS, Univ. di Firenze, Italy. We present recent theoretical and experimental results concerning both retardation and acceleration of light pulses in schemes involving a second 'control' laser field but that do not involve any coherent preparation of the atomic medium.

SLC4 • 17:00
Simultaneous Two-Channel Slow Light. Anil K. Patnaik!, Paul S. Hsu, Sukesh Roy, James R. Gord; !AFRL, USA; !Physics, Wright State Univ., USA; !Spectral Energies, LLC, USA. Simultaneous control of light speed in two channels in a single delay element of a rubidium vapor cell is demonstrated.

SLMC5 • 17:15
Optical Precursors in Slow and Fast Light Media. Shengwang Du, Jiefei Chen, Michael M. Loy; !Physics, Hong Kong Univ. of Science and Technology, Hong Kong. We observe optical precursors generated from slow and fast light cold atomic media. Using constructive interference between sequenced precursors, we produce optical transient pulses with peak powers of about 9 times the input power.

SMD3 • 17:00 Invited
Multi-Megahertz OCT: Technology, Recent Developments and Advantages. Thomas Klein, Wolfgang Wieser, Benjamin R. Biedermann, Christopher Eigenwillig, Robert Huber; !LudwigMaximilians- Univ. München, Germany. Fourier domain mode locked lasers enable unprecedented line rates in optical coherence tomography for completely new imaging protocols and data analysis approaches. The optical design and potential benefits for clinical diagnosis will be discussed.

SOMD3 • 17:00 Tutorial
Photonic Crystal Fibers. William Wadsworth; !University of Bath, UK. This tutorial covers the concepts and properties of photonic crystal fibers, also known as microstructured or holey fibers. The similarities and differences between PCFs and specialty step-index fibers are discussed, together with fabrication and applications.
Recent optical technologies are providing higher flexibility to next generation access networks: on the one hand, providing progressive FTTx and specifically FTTH deployment, progressively shortening the copper access network; on the other hand, also opening fixed-mobile convergence solutions in next generation PON architectures. It is provided an overview of the optical subsystems developed for the implementation of the proposed NG-Access Networks.

Temperature-enhanced Light Emission from Er:TeO2 Photonic Crystals

We investigate thermal radiation from Pt microheaters with Au nanoparticles deposited. Polarization resolved thermal radiation was measured. Measurements show intensity of radiation is multiplied by factor of 2-3 for NP’s deposited microheaters.
SLMC6 • 17:30
Optical Pulse Differentiation Based on a Resonant Slow & Fast Light System, Sanghoon Chin1, Tae-Jung Ahn2, Luc Thévenaz1; 1Ecole Polytechnique Federale de Lausanne, Switzerland; 2Photonics Engineering, Chosun Univ., Republic of Korea. We experimentally demonstrate that temporal differentiation of optical pulses can be realized in a slow & fast light system based on a resonance. The waveform of a 13 ns Gaussian pulse was experimentally first-order differentiated.

SLMC7 • 17:45
Enhanced Echo Retrieval Efficiency Using Ultraslow Light, J. Hahn1, Byoung S. Han2; 1School of EE, Inha Univ., Republic of Korea. Using ultraslow light phenomenon, we report two-orders of magnitude enhanced photon echo efficiency in a rare-earth doped solid medium, where the enhancement is due to lengthened photon-atom interaction time in a dilute optical medium.

SMD4 • 17:30
A Near-Infrared LED-based Material Classification Sensor System, Oliver Schwandeberg1,2, Uwe Kockemann1, Holger Steiner1, Norbert Jung1; 1Computer Science, Bonn-Rhein-Sieg Univ. of Applied Sciences, Germany; 2DPG Research Training Group 1564, Univ. of Siegen, Germany. In safety applications it is often desired that certain materials do not enter a dangerous area. This paper presents a near-infrared LED-based sensor system for robust material classification and ranging up to a distance of 1,000mm.

SMD5 • 17:45
Resonant Cavity Enhanced LWIR Sensing in Polycrystalline Pb1-xSnxTe, Timothy W. Zens1, Piotr Becla1, Lionel Kimerling1, Anu Agarwal1; 1Microphotonics Center, Massachusetts Inst. of Technology, USA. Polycrystalline Pb1-xSnxTe LWIR photodetectors have been fabricated in resonant cavity structures on Si platforms. We describe the fabrication process and report detector performance demonstrating the feasibility of monolithic LWIR detectors-on-ROIC.

18:30–20:00 Advanced Photonics Congress and OIDA Welcome Reception, Metro Ballroom West
Tuesday 14 June

8:00–10:00
AtuA • Basic Technologies for NG-PON
Josep Prat; Univ. Politecnica de Catalunya, Spain, Presider

8:00 • 8:30
Semiconductor Optical Amplifiers in Extended Reach PONs, Jürgen Leuthold, W. Freude, C. Koo, R. Bonk, S. Koenig, D. Hillerkuss, R. Schmogrow; Institute of Photonics and Quantum Electronics (IPQ) & Institute of Microstructure Technology (IMIT) at Karlsruhe Institute of Technology, Germany. Design guidelines for semiconductor optical amplifiers (SOAs) in extended reach PON networks are discussed. Important parameters such as the input saturation power or the alpha factor and their impact in PON networks are discussed.

8:30 • 9:00
WDM PON Based on Silicon Photonic Micro-ring Modulators, Kerson Bergman; Columbia Univ., NY, USA. We demonstrate an optical access network architecture uniquely enabled by CMOS compatible silicon micro-rings. The wavelength selective behavior of micro-ring modulators enables single-sideband modulation, which simultaneously generates downstream signals enabling single-sideband modulation, which simultaneously generates downstream signals and centrally distributed carriers for upstream re-modulation.

8:00–10:00
SPTuA • Coding I
Moshe Nazarathy, Technion - Israel Inst. of Technology, Israel, Presider

8:30 • 9:00
Implementation and Evaluation by Hardware Emulator of Soft-Decision Forward Error Correction for 100G Systems, Kiyoshi Onohara1, Yushikennu Miyata1, Kenya Sugihara2, Takashi Sagihara3, Kazuyuki Kadoh3, Hideo Yoshih1, Kazunumi Koguchi1, Takashi Mizouchi2, Mitsubishi Electric Corp., Japan. We discuss implementation and performance evaluation of LDPC(4608,4080) for 100Gb/s throughput by hardware emula- tor. We expect that an NCG of the LDPC code concatenated with enhanced FEC is 10.8 dB at a BER of 10^-15.

9:00 • 9:30
Alamouti Code against PDL in Polarization Multiplexed Systems, Ghasy Rekaya-Ben Othmana, Yves Iaouane, Jungki Li, Sven Koenig, Rene Schmogrow; Jürgen Leuthold; 1Comnet, Telecom Paristech, France; 2Institute of Photonics and Quantumelectronics, Karlsruhe Institute of Technology (KIT), Germany. We theoretically and experimentally investigate the performance of the Alamouti polarization-time code to mitigate PDL. We show that due to the orthogonal structure of its codewords, it can entirely compensate PDL.

9:30 • 10:00
On the Joint Optimization of Modulation and Channel Coding for High Data-Rate Optical Communication Systems, Paolo Leoni1, Stefano Calabrè2, Berthold Lankl3, Bernhard Spindler4; 1University of the Bundeswehr Munich, Germany; 2Nokia Siemens Networks GmbH & Co. KG, Germany. We present a method to jointly optimize modulation and channel coding for high data-rate, non-differentially encoded optical systems, taking phase noise into account. Applied to 100G systems, it shows that constellation expansion might be beneficial.

8:00–10:00
ItuA • Devices and Components II
Peter Rakich; Sandia Natl. Labs, USA, Presider

8:30 • 9:00
Nano-Optomechanical Systems, Hong Tang; 1Yale Univ., USA. We describe the convergence of NEMS and nanophotonics in novel optom- echanical circuits. Through active coupling of NEMS with high Q cavities, we demonstrate further scaling of NEMS in size, mass, sensitivity, frequency, and damping rate.

9:00 • 9:30
Compact and Widely Wavelength Tunable Lasers Based on Flexible Polymer Bragg Reflection Waveguide, Kyung-Je Kim1, Jin-Whue Kim1, Min-Chrel Oh2; 1Electrical Engineering, Pusan National University, Republic of Korea. Widely tunable and reproducible operation of tunable laser is demonstrated based on the extraordinary elastic property of flexible polymeric Bragg reflector. Compact tunable laser package is also demonstrated by incorporating a small FZT actuator.

9:30 • 10:00
High-Finesse Cavities Fabricated by Buckling Self-Assembly of a Si/SiO2 Multilayers, Trevor Allen, Josh Silverstone, Ray DeCorby, Nakroen Poomatam; 1Univ. of Alberta, Canada. Micro-cavities were fabricated by controlled formation of delamination buckles within a Si/SiO2 multilayer. Linewidth (~0.1 nm in the 1550 nm-range) and finesse (>600) are close to reflectance-limited predictions, indicating low-defect cavities.

8:00–10:00
ItuB • Nanophotonics: Plasmonics and Applications I
Pierre Berini; Univ. of Ottawa, Canada, Presider

8:30 • 9:00
Molding Light in Plasmonic and Metamaterial Structures, Dragomir N. Neshev; 1Nonlinear Physics Centre, RSPE, Australian Natl. Univ., Australia. We discuss our recent advances on manipulation of light in metallic nanostuctures, including arrays of nanodots and left-handed fishnet metamat-erials. In particular we show experimentally the nonlinear tuning of liquid crystal infiltrated metamaterials.

9:00 • 9:30
All Optical and Electro Optical Active Plasmonic Telecom Components, Sukanya Rang- havan; Alexey V. Krausov4, Am Beng, 1Analytology Zayats; S. Lazache3, Alex Boulchier; Romain Quaidant1; 1Plasmon nano-optics, Inst. of Photonic Materials Structures, 2King’s College, UK; 3Inst. Carnot de Bourgogne, France. We demonstrate numerically and experimentally all optical and electro optic switching of the SPP transmission at telecom wavelengths, utilizing a compact and highly sensitivie ring resonator.

9:30 • 10:00
Metalls - Metamaterials in Flexible Substrates at Visible Wavelengths, Andrea Di Falco1, Thom- as Krauss1; 1School of Physics and Astronomy, Universit of St Andrews, UK. We discuss our recent results in the realization and characterization of Metallex, for different plasonic structures, including a novel mechanism yielding to ultra-narrow spec- tral features in flexible plasmonics.

These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

7:30–18:00 Registration Open, Harbour Ballroom Foyer

Sessions continue on page XX.
8:30–10:00
STuA • Slow/Fast Light in SOAs and Photonic Crystals
Thomas Krauss; Univ. of St. Andrews, UK, Presider

8:30–10:00
STuA • High Intensity and Broadband THz Sources
Peter Jeppesen; Technical Univ. of Denmark, Denmark, Presider

8:30–10:00
SOTuA • Supercontinuum Fiber Lasers
Alain Vilenneuve, Genia Photonics Inc., Canada, Presider

All-Optical Processing in III-V Photonic Crystals, Alfredo de Rossi1, Sylvain Combré2, Pierre Colman1,4, Chad Hyde2, Chee W. Weng2, Isabelle Sagnes3, Isabelle Cester4, Vardit Eckhouse4, Gadi Eisenstein4; ‘THALES Res. and Technology, France; ‘Optical Nanostructure Lab., Colorado Univ., USA; ‘Lab. de Photonique et de Nanostructure (CNRS UPR 20), France; ‘Electrical Engineering Department, Technion, Israel. Efforts made to improve the Photonic Crystal Waveguides against linear and nonlinear losses have made the promises of this technology possible. We discuss some of the major achievements, particularly the demonstration of optical solitons on-chip.

Frequency Unlimited Optical Delay Lines Based on Slow and Fast Light in SOAs, Perrine Boyer1,2, Kéma Boudard-Gouttet1, Minhau Ph1, Kristen Young2, Fabien Bartenau2, Daniel Dilly1, Mehdi Aitou1; ‘Thales Res. and Technology, France; ‘Lab. Aimé Cotton, CNRS-Univ. Paris Sud 11, France; ‘DTU Fotonik, Dept. of Photonics Engineering, Technical Univ. of Denmark, Denmark; ‘Inst. de Physique de Rennes, UMR CNRS 6231, France. We experimentally demonstrate that superconverged coherent population oscillations (CPO) in SOA open the possibility to conceive integrated optical tunable delay lines beyond the carrier lifetime limit, up to THz frequencies.

Filamentation THz generation in air, Leang Chin; Universite Laval, Canada. Experiments on THz pulse generation from single and multiple filaments in air using single or two-color technique will be discussed. Its application to sensing molecular rotational wave packet revival will be given. Stand-off detection of THz’s from a distance through monitoring nitrogen fluorescence in a filament was observed. The physics seems to be due to population trapping in the wake of strong field interaction with nitrogen molecules inside the filament.

Transient Reflective Ultra-broadband THz Spectroscopy, David Cooke1, Lydov Stotia1, Tyler L. Cooker1, Fredrik C. Krebs1, Al Mehdvani1, Frank Hopmann1, Peter U. Spiere1; ‘Physics, McGill University, Canada; ‘Physics, University of Alberta, Canada; ‘Riso National Laboratory, Technical University of Denmark, Denmark; ‘Photonics Engineering, Technical University of Denmark, Denmark. We discuss recent experiments using a novel time-domain THz spectrometer using air plasma to generate and detect ultra-broadband THz pulses. Using this novel setup, we map the ultrafast carrier response of organic and nanocrystalline semiconductors.

Characterization of Fiber Supercontinuum by Chromatic Scattering, Evgenii F. Martynovich1, V. F. Dresdianski1, A. A. Starchenko1, S. M. Koblts2, S. V. Kazur2, S. N. Bagayev1; ‘Irkutsk Branch of Institute of Laser Physics SB RAS, Russian Federation; ‘Novosibirsk State University, Rossian Federation; ‘Institute of Laser Physics SB RAS, Russian Federation. Chromatic scattering has been proved to characterize the polarization state of the fiber supercontinuum spectral components during propagation in media. Applications are considered for novel technology of multi-layer data recording.

Broadband Enhanced 26 MV/cm THz Radiation in Uniform Nano-slit Arrays, Mostafa Shalaby1, Marco Peccianti3, Luca Razzari1, Gargi Sharma1, Tsuneyuki Ozaki1, Roberto Morandotti1, Hannes Mebodi1, Thomas Feurer1, Anja Weber1, Laura Hyderman1, Hans Sigl1, Bruce Patterson1; ‘INRS-EMT, Canada; ‘Institute of Applied Physics University of Bern, Switzerland; ‘Institute for Chemical and Physical Processes, Italy; ‘Laboratory for Micro- and Nanotechnology, Paul Scherrer Institut, Switzerland; ‘SwissFEL, Paul Scherrer Institut, Switzerland. We investigate a 1D uniform array of nano-slits capable to induce broadband plasmon-mediated field enhancement exceeding 100 in the range 0.2 to 2 THz, with a peak value of 760 at 0.2 THz.

Taper Topography Control of Instabilities and Rogue Waves in Supercontinuum Fibers, Benoit Barviau1, Arnaud Mussot, Alexandre Kudlinski1, John Dudley1; ‘University of Lille, France; ‘FEMTO-ST, France. Longitudinal variation of dispersion and nonlinearity in tapered photonic crystal fiber dramatically improves the noise characteristics of supercontinuum generation. Experimental results are interpreted in terms of modified rogue wave dynamics.

Sessions continue on page XX.

Contention Resolution Using Control Packet

In this paper a novel contention resolution technique based on control packet buffering in OBS networks is proposed. This buffering is implemented in the electronic domain, thus avoiding complex optical domain solutions.

First Demonstration of Cavity-Resonator-Integrated Guided-Mode Resonance Filter

A guided-mode resonance filter integrated in a waveguide cavity resonator was designed and fabricated for miniaturization of aperture size. A high-reflection filter at around 850-nm wavelength was experimentally demonstrated for the first time.

Resonant Cavity Enhancement of Polycrystalline PbTe Films for Two-Color IR detectors on Si-ROICs

Dual color (1.5 and 3.5 µm) resonant-cavity-enhanced IR photodetectors on a silicon platform have been demonstrated. We describe the fabrication process and report detector performance demonstrating the feasibility of monolithic IR detectors-on-ROIC.

Dielectric Strip Grating Embedded Trapezoidal Plasmonic Waveguide

A dielectric strip grating embedded trapezoidal SPP waveguides are designed, fabricated, and characterized in air and under index matching oil. The resonance has a 1100 nm/RIU sensitivity and is validated by calculation.
SLTuA • Slow/Fast Light in SOAs and Photonic Crystals—Continued

SLTuA4 • 9:30 Invited
Direct Observation of Temporal Solitons and Pulse Acceleration in III-V Semiconductor Photonic Crystal Waveguides, Timothy Karle, Paul Monnier, Sylvain Combrié, Alfredo de Bassi, Fabrice Rainieri, Rama Raj; ‘LPN-CNRS, France; Thales Res. and Technology, France. Temporal mapping of 20pJ pulse propagation in a 2DPhC waveguide show of soliton formation. For high signal powers the photonic band is modified influencing the group velocity leading to an acceleration of the pulse propagation.

STuA • High Intensity and Broadband THz Sources—Continued

STuA4 • 9:30 Invited
High Power Terahertz Pulse Generation, Imaging, and Detection, Frank Hegmann; The generation of intense single-cycle THz pulses by tilted-pulse-front techniques for probing ultrashort nonlinear THz dynamics in semiconductors is described. Full-field imaging of THz Cherenkov waves and novel THz pulse detection methods are also discussed.

SOTuA • Supercontinuum Fiber Lasers—Continued

SOTuA4 • 9:30 Invited
Infrared Supercontinuum Fiber Sources, L. Brandon Shaw, Rafael Gattass, Jas Sanghera, Ishwar Aggarwal; ‘NRL, USA; Sotera Defense Solutions, USA. IR supercontinuum generation in chalcogenide glass fiber is reviewed. Modeling for optimizing supercontinuum generation, fiber design and fabrication, and experimental results are presented.

10:00–10:30 Coffee Break, Pier 4/ Harbour Ballroom Foyer

10:00–16:00 Exhibits Open, Pier 4/ Harbour Ballroom Foyer

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Tuesday 14 June

10:30 – 12:30

**AfuB • Radio Over Fiber and OCDMA**

Thomas Pfeiffer; Alcatel-Lucent, Germany, Presider


**AfuB1 • 10:30**

Invited

Techniques, Applications, and the Outlook of Radio-over-Fiber Networks, Anthony Niglmaier1, 2, Carling Inc, USA. We discuss key RoF system challenges, including MIMO and mm-wave signal transmission at 60 GHz. We propose practical solutions and successfully demonstrate practical RoF system implementations capable of delivering > 30 Gb/s wireless data signals.


**AfuB2 • 11:00**

Research on OFDM-ROF system at Millimeter-wave Band Employing Optical External Modulator Generation, Zhe Kang1, Nianyu Zou1, Dong Wang1, Jingting Liu1, Yingming Gao1; Dalian Polytechnic Univ., Res. Inst. of Photonics, China; Beijing Univ. of Posts and Telecommunications, Information and Electronics Technology Lab, China. A 40GHz Radio-over-Fiber system is proposed to transmit 2.5Gb/s 16QAM-OFDM wireless signals with only 20GHz RF source. Simulation results show that a reliable EVM value is obtained after 40km SMF transmission.


**AfuB3 • 11:15**

Wireless Convergence over Next Generation OFDMA-PONs, Miles Mileanjoye1, Pandelis Kourtessis1, John Senior1; Univ. of Hertfordshire, UK. This paper demonstrates the feasibility of optical/wireless convergence based on DoF propagation. Network modelling results confirm the transmission of 16 CPRI signals up to 100km OFDMA-PON infrastructures achieving 40 Gbit/s total aggregate rates.


**AfuB4 • 11:30**

Invited

OCDMA and OFDMA Technologies for NG-PON, Kent-ichi Kitayama1, Chubu Univ, Japan. OCDMA and OFDMA are promising for NG-PON2, aiming at a revolution change after 2015. OCDMA and OFDMA can implement new demands for soft-capacity on-demand, high data confidentiality, high bandwidth efficiency as well as low-power consumption.


12:30-13:30 Lunch Break (on your own)
Dielectric Properties of Heavy Oils Using Terahertz Time-Domain Spectroscopy

STuB1 • 10:30 • Invited

Science and Technology in the Submillimeter with High Resolution Techniques, Frank C. De Lucia1; 2Physics, Ohio State University, USA. With emphasis on high-resolution systems, the interaction of the physics of the spectral region with the physics of applications will be discussed. It will be shown how this leads to optimal choices of system strategies.

STuB2 • 11:00

Ultrafast Imaging of Terahertz Pulse Generation by Cherenkov Radiation in LiNbO3, Zhenyou Wang1; 1Physics department, University of Alberta, Canada. We demonstrate full-field imaging of terahertz waves induced by a point focused optical pulse in lithium niobate. The group velocities of the optical and THz pulses as well as the Cherenkov radiation angle are directly measured.

STuB3 • 11:15

Spatio-temporal Characteristics of THz Emission at the Subwavelength Scale via Optical Rectification, Sze Phing Ho1,4, Matteo Clerici1, Marco Peccianti2, Fabrizio Buccheri1, A. Busacca3, Tsuneyuki Otake1, Jalil Alì2, Roberto Maranotta2; 1INSRS Energie, Matériaux et Télécommunications, Canada; 2IPCF-CNRS, UOS Roma, Italy; 3DIEET, University of Palermo, Italy; 4Nanophotonics Research Alliance, Universiti Teknologi Malaysia, Malaysia. Highly localized THz emission via optical rectification in thin nonlinear crystals is a promising method for subwavelength microscopy. We present here the peculiar THz spatio-temporal characteristics induced by the non-paraxial generation regime.

STuB4 • 11:30

Time and Frequency-resolved Terahertz Microscopy with a Photoconductive Near-field Probe, Jan Wallauer1, Alex Orter1, Andreas Botzer1, Stefan Waselikowski1, Markus Walther1; 1Physics, University Freiburg, Germany. Using a photoconductive antenna as a scanning THz near-field probe we demonstrate mapping of electric and magnetic fields close to microstructures. Our approach visualizes the near-fields with sub-ps temporal and sub-wavelength spatial resolution.

STuB5 • 11:45

Dielectric Properties of Heavy Oils Using Terahertz Time-Domain Spectroscopy, Amin Kabir1, Ayesheshim Ayesheshim1, Lyubov Titova1, Zhenyou Wang1, Patrice Abivin2, Yuesheng Cheng2, Kentaro Ozaki1, Jalil Alì4, Roberto Morandotti1; 1INRS Énergie, Matériaux et Télécommunications, Canada; 2Schlumberger DBR Technology Center, Canada. We investigate the terahertz dielectric properties of heavy oils as a function of temperature using terahertz time-domain spectroscopy. These results facilitate the study of temperature-dependent intermolecular interactions within heavy oils.

STuB6 • 12:00 • Invited

Towards 1-mW THz Photonic Switches and Photon mixers that can be driven by fiber mode-locked and cw-diode lasers, respectively. The average power of the PC switches is approaching 1 mW.

10:30–12:15

SOTuB • Chalcogenide and Tellurite Fibers

John Baillo, Clemson Univ., USA, Presider

SOTuB1 • 10:30 • Invited

Applications of Chalc Fibers, Dan Hiewak1, K. Kham1, C. C. Huang1; 1University of Southampton, UK. Chalcogenide glass optical fibers have been extensively studied since 1967, when sulphide based fibers and their potential applications were first proposed. In this paper we describe our current work on the fabrication and application of chalcogenide fiber and our vision for their practical implementation in the future.

SOTuB2 • 11:00 • Invited

Chalcogenide Microstructured Optical Fibers for IR Photonics, Jean-Luc Adam1, Johann Trolès1, Laurent Brilland2; 1U. of Rennes-CNRS, France; 2Perfos, France. Chalcogenide glasses show broad IR transparency and high Nl refractive index. Singlemode chalcogenide microstructured fibers were obtained with losses around 0.3dB/m in the mid-IR. Fibers with small or large effective mode areas were demonstrated.

12:30-13:30 Lunch Break (on your own)

Advanced Photonics: OSA Optics & Photonics Congress • 12–15 June 2011
Pier 4/Barbour Harbour Foyer

13:30-15:30  JTuB • Joint Poster Session

JTuB1
Fast Light in Eribium Doped Fibers Based on Coherent Population Oscillations with Nonlinear Negative Absorption, Francesco Arista-Yáñez, Sonia Melle, Oscar G. Calderón; Optics, Universitat Complutense de Madrid, Spain.

JTuB2
Amplitude-Preserving Tunable Pulse Delay in AllGaAs-InP Active Ring-Resonators, Andrea Melloni, Antonio Canciamilla, Carlo Ferrari, Francisco Moretchetti, Gabriele Mezzi, Marco Sorini; Poliscom - Dipartimento di Elettronica e Informazione, Politecnico di Milano, Italy; School of Engineering, Univ. of Glasgow, UK. We report on the use of active waveguides to compensate for losses in reconfigurable delay lines based on ring resonators. Pulse delay in both transparency and non-transparency regions is demonstrated.

JTuB3
Simultaneous Slow and Fast Light, Bin Liao, Hong Gao; School of Electronics Engineering and Computer Science, Peking Univ., China. Simultaneous slow and fast light requires rf field (Opt. Lett. 35, 64 (2010)), which is inconvenient. We suggest that the rf field can be replaced by lights and thus, the phenomena can be realized optically.

JTuB4
Destructive Interference of Dark Resonances in a Room Temperature Triode System, Sontash Kumar, Thomas Langpeter, Fabien Bretanzer, Rupamamjari Ghosh, Fabienne Goldfarb; Jena University, Germany. We explore the response of a triode system in HgTe under excitation by perpendicularly polarized pump and probe beams in the presence of a transverse magnetic field. Destructively interfering dark resonances are observed and interpreted.

JTuB5
Few-cycle Self-Induced Transparency Solitons, Yuan-Yao Liu, J-Hong Chien, Rui-Kuang Lee; Inst. of Photonics Technologies, National Tsing Hua Univ., Taiwan. We reveal the existence of few-cycle optical self-induced-transparency soliton family in a two-level absorbing system in slow- and fast-light regime. The effects of number of cycles on area theory and pulse group velocity are elucidated.

JTuB6
Localised Dynamic Brillouin Gratings Permanently Induced by Chiral Materials, Tommaso Santagiustina, Lenora Ursini; Dep. of Information Engineering, CNIT, Univ. of Padova, Italy. A method to permanently induce localized, dynamic Brillouin gratings is proposed and numerically demonstrated. It exploits the threshold correlation of chaotical laser signals.

JTuB7
Novel Highly Nonlinear Composite Tellurite Microstructured Optical Fibers for SC Generation, Zhonghuan Dai, Meisong Xia, Xin Yao, Weiqing Gao, Takenobu Suzuki, Yoshitake Ohishi; Toyota Technological Inst., Japan. We prepared a novel composite tellurite MOFs consisting of two different glasses as core and clad to freely control chromatic dispersion. Broad and flattened SC spectra were demonstrated in the fiber under femtosecond laser pumping.

JTuB8
Enhanced Low-Index Field Confinement by Radially Stratified Micro Optical Fibers, Wenju Zhang, Jianwei Mu, Weiping Huang, Wei Zhou; State Key Lab. of Transient Optics and Photonics, Xi’an Inst. of Optics and Precision Mechanics, Chinese Academy of Sciences, China; Graduate School of the Chinese Academy of Sciences, China; Electrical and Computer Engineering, McMaster Univ., Canada. The band diagrams are calculated. The results show that light can be concentrated in nanometer-thin low-index rings with very high confinement efficiency.

JTuB9
High-Purity Tungstate-Tellurite Glasses and Single-Mode Fibers: Fabrication and Studies, Vitaly Derovitsin, Alexander Misesse, Mikhail Churbanov, Billy Richards, Animesh Jha, Alexey Kosolapov, Eugene Dianov; Inst. of Chemistry of High-Purity Substances of RAS, Moscow, Russia. A rigorous time-domain traveling-wave model. Design optimization is carried out on key parameters of the laser for single-mode operation. The single-longitudinal-mode laser is designed and optimized for high performance in optical networks.

JTuB10
A Mode Coupled Eribium Doped Fiber Structure for All-Optical Regeneration of DPSK and OOK Signals, Scott Sidoroff, Richard Long; Louisiana Tech Univ., USA; Center for Link, USA. We numerically demonstrate all-optical regenerators based on mode coupled EDFAs. These are phase transparent for DPSK signals and improve the SNR of OOK signals by over 3 dB.

JTuB11
Ring-Based WDM-PON with Suppression of Rayleigh Backscattering Interferometric Noise, Chi Wai Chow, Chan-Hung Yeh, Yu-Fu Wei, Fu-Yuan Shih, Shin Chi; Industrial Technology Res. Inst., Taiwan; Natl. Chiao Tung Univ., Taiwan. We demonstrate a ring-based WDM-PON. Rayleigh backscattering (RB) can be suppressed since the upstream signal and the RB are traveling in different directions. We also analyze the network performance when upgrading to 40-Gb/s.

JTuB12
40 Gbps Long Reach Access Network with Multi-Video Services Broadcasting, Chien-Hung Yeh, Chi Wai Chow, Lin-Gung Yang, Yen-Liang Liu; CI-Ling Pan; Industrial Technology Res. Inst., Taiwan; Natl. Chiao Tung Univ., Taiwan; National Taiwan Univ., Taiwan. We propose and demonstrate the 40 and 40 Gb/s downlink and uplink traffic in long-reach PON architecture with multi-services broadcasting, such as CATV, DVB-T, IP and TV etc., in 100 km fiber access transmission.

JTuB13
Adjustment of Uplink Data Rate in RSOA-Based ONU in PON Access, Chen-Hung Yeh, Chi Wai Chow, Lin-Gung Yang, Chi-Ling Pan; Industrial Technology Res. Inst., Taiwan; Natl. Chiao Tung Univ., Taiwan; Natl. Tsing Hua Univ., Taiwan. We first propose and investigate the dynamic uplink traffic rate adjustment employing RSOA-based optical network unit (ONU) in current PON and long-reach PON systems, according to the injected power level of downlink signal.

JTuB14
Modeling and Design Optimization of Discrete Mode Lasers for High Speed Single-Mode Operation in Optical Communication Networks, Yu Li, Xiong Yang, Weiping Huang; Electrical and Computer Engineering, McMaster University, Canada. We reveal the existence of few-cycle optical self-induced-transparency soliton family in a two-level absorbing system in slow- and fast-light regime. The effects of number of cycles on area theory and pulse group velocity are elucidated.

JTuB15
Optimization of CMOS-Compatible Hybrid Plasmonic Waveguides for Nonlinear Applications, Ke-Tao Wang, Amy C. Foster; Electrical and Computer Engineering, Johns Hopkins Univ., USA. We demonstrate the design and optimization of three CMOS-compatible hybrid plasmonic waveguide structures for nonlinear interactions. Our proposed hybrid waveguide structure provides the largest nonlinear phase shift compared to other designs.

JTuB16
Enhanced Absorption of Ultrathin Film a-Si Solar Cell Based on Quantum-Metal Grating, Sangjin Lee, Sangjin Kim, Jaesik Lee, Hanko Lim; Ajou Univ., Republic of Korea. We present enhanced absorption of solar cell composed of an ultrathin absorbing layer embedded between a metal reflector and an ultrathin metal grating. Absorption improvement for both TE and TM polarizations is achieved.

JTuB17
Surface Roughness Effect on Q-Factor of Ge Whispering Gallery Mode Microdisk Resonator, Somgajri Chot, Sattho Kru, Aiyawat Tan, Evan B. Pickert, Namkoo Park, Theodore I. Kamins, Byung-Gook Park, James S. Harris; Electrical Engineering, Stanford Univ., USA. In this paper, we present a surface laser on a Q-factor on Ge whispering gallery mode microdisk resonator is thoroughly investigated by 2-D and 3-D FDTD simulations with variations on roughness indices.

JTuB18
Refractive Index Profiling of an Optical Waveguide with Optical Path Perturbation, Kailiuan Tsai, San-Ting Wu, Wan-Shuo Tsai; Dept. of Applied Materials and Optoelectronics Engineering, Natl. Chi-Nan Univ., Taiwan. Two-dimensional index profile of an optical fiber was reconstructed with the measured differential optical index by perturbing the optical path in the end-fire coupling measurement. Good results were obtained compared with the known index profile.

JTuB19
Design Optimization of High Performance Single-mode Fabry-Perot Lasers Based on Quantum-Dot Materials, Laxmin Deng, Lin Han, Yuanping Xi, Xun Liu, Weiping Huang; Electrical and Computer Engineering, McMaster University, Canada. We reveal the existence of few-cycle optical self-induced-transparency soliton family in a two-level absorbing system in slow- and fast-light regime. The effects of number of cycles on area theory and pulse group velocity are elucidated.

JTuB20
Benzocyclobutene Multimode Interference Power Splitters Fabricated by Ultraviolet Laser Illumination, Yu-Shaun Cheng, Wan-Shuo Tsai, Wai-Sern Wong; Graduate Inst. of Photonics and Optoelectronics, National Taiwan Univ., Taiwan; Dept. of Applied Materials and Optoelectronics Engineering, Natl. Chi-Nan Univ., Taiwan. Various MMI power splitters fabricated by laser illumination on benzocyclobutene are compared. With suitable beam expansion ratios, experimental results show the devices can be fabricated with high accuracy, short time, and good controllability.
JTuB21
Numerical Simulations of Temperature Dependence of High Efficiency Multi-Junction Solar Cells Under Concentrated Sunlight, Jeffrey Wheeldon1, Alex W. Walker1, Olivier Theriault1, Mark Tande1, Karin Hinzer1; Univ. of Ottawa, Canada.
The temperature dependence of GaInP/GaAs/Ge multi-junction solar cells are numerically modeled. The temperature dependence of the solar cell dark current and the spectral sensitivity of the solar cell are demonstrated.

JTuB22
Automatic Extraction of Chirp Parameter of DFB Laser, Lin Han1, Yefeng Wen1, Weiping Huang1; Electrical and Computer Engineering, McMaster Univ., Canada.
A new method is proposed for extracting DFB laser chirp parameter by fitting the side-band strengths ratio curve obtained from spectrum measurement. It is validated by comparing with the result obtained from fiber dispersion measurement.

JTuB23
High Power Pulse Trains Envelop Severance in Quasi-Phase-Matched Waveguide, Shih-Chiang Lin1; I-SHOU Univ., Taiwan.
A method of 2-ps pulse trains generation in QPM waveguide is proposed. The mechanism of pulse train envelop severance, due to group velocity mismatched, is studied.

JTuB24
Step Index POF Link Power Budget Calculation Today and Tomorrow, Olaf Ziemann, S. Loquai, Roman Kruglov; Univ. of Nuernberg, Germany.
The correct calculation of the optical power budget is very important for the present standardization. This paper will present a present example and will show options for future improvements with optimized components.
Tuesday 14 June

**Pier 9**

**Access Networks and In-house Communications**

**Pier 7 & 8**

**Signal Processing in Photonics Communications**

**Harbour Salon B**

**Integrated Photonics Research, Silicon and Nano Photonics**

**Harbour Salon C**

**Integrated Photonics Research, Silicon and Nano Photonics**

*These concurrent sessions are grouped across two pages. Please review both pages for complete session information.*

16:00–18:00  
**AfuC • Inhouse: Fiber and Wireless**

Jaerg Leuthold; KIT, Germany, Presider

**AfuC1 • 16:00  Invited**

Options for a 1 Gbit/s Standard POF Interface Report on the German Standardization Activities, Olaf Ziemarek; Christian-Alexander Bunge1, Juri Vinogradov 1, S. Loquai 1, Roman Kruglov2; University of Bremen, Germany. A German standardization group works since Sep. 2009 on a guideline for a future 1 Gbit/s POF interface. This paper will summarize the recent activities and will present the current status.

16:00–17:30  
**SPluC • DSP**

Gabriella Bosco, Politecnico di Torino, Italy, Presider

**SPluC1 • 16:00  Invited**

Integrated Carrier Phase and Frequency Estimation for Coherent Detection based on Multi-Symbol Differential Detection (MSDD), Mahta Nazarathy1, Neta Sigron1, Igor Tzinker2; EE, Technion, Israel. We present new results on MSDD carrier recovery for optical coherent detection. The frequency and phase estimation functions are jointly accomplished with lowest complexity, high performance and automatic adaptation to the channel statistics.

16:00–18:00  
**ItuC • Photonic Integration I**

Valery Tolstikhin; OneChip Photonics Inc., Canada, Presider

**ItuC1 • 16:00  Invited**

Large-Scale Monolithic Integration of PM-QPSK Modulation Architecture in 500 Gb/s Transmitters, Scott Corzette1, Peter Evans1, Matthew Fisher1, Andrew Dentai1, Ranjeni Mathiau1, Randal Salarove1, Adam James1, Pavel Studenkov1, Eva Strelectza1, Thomas Vallant1, Forrest Sedgwick1, Matthias Kunte1, Vibrant La1, Masaki Kato1, Mauro Raber1, Aggi Spangmei1, Wayne Williams1, Shashank Agashie1, Arnold Chen1, Damien Lambert1, John Thomson1, Doug Christina1, Don Pavinski1, Parmajit Samra2, Raimund Zimmer1, Tungong Liao1, Babak Bohari1; Imperial College London, UK. We present new results on large-scale monolithic integration for next generation photonic networks. We present new results on large-scale monolithic integration for next generation photonic networks. We present new results on large-scale monolithic integration for next generation photonic networks.

16:00–18:00  
**ItuD • Nanophotonics: Plasmonics and Applications II**

Jeremy Baumberg; Univ. of Cambridge, UK, Presider

**ItuD1 • 16:00  Invited**

Active and Passive Surface Plasmon Photonics, Pierre Berini1; SITE, Univ. of Ottawa, Canada. Recent progress on integrated surface plasmon components is reviewed. Passive and active plasmonic functions, such as modulation, amplification and lasing, detection, and sensing are discussed.

16:00–18:00  
**AfuC2 • 16:30  Invited**

Converged In-home Networks Using 1-mm Core Size Plastic Optical Fiber, Edward Tangdiongga1, Davide Visani2, Hejie Yang1, Yan Shi1, Chigo M. Okonkwo1,2; 1Dept of Electrical and Electronic Engineering, Univ. of Bremen, Germany; 2DTU Photonik, Technical University of Denmark, Denmark. A wide-band spot-size converter for parallelized receiver architecture and implementation of a single chip.

16:00–18:00  
**SPluC2 • 16:30**

Structure of a Digital Feedback Clock Recovery for Parallelized Receivers, Daniel Schmidt1, Berthold Lunk1; University of the Federal Armed Forces, Germany. High speed receivers must process several samples in parallel. For such a parallelized receiver architecture an implementation of a digital feedback timing recovery scheme is proposed.

16:00–18:00  
**AfuC3 • 17:00  Invited**

Ultra-broadband Optical Wireless for Indoor Applications, Thas A. Nirmalathas1,2,3, Ke Wang2, Christina Lim1, Efstratios Skafidas1,2; 1Dept of Electrical and Electronic Engineering, Univ. of Melbourne, Australia; 2Victoria Res. Lab., NICTA, Australia. In this paper, we demonstrate an experimental 4x12.5 Gb/s ultra-broadband optical wireless system incorporating wavelength division multiplexing.

16:00–18:00  
**ItuC3 • 17:00  Invited**

Adaptive Single-Carrier Frequency-Domain Equalization for 100G Coherent Optical Communications, Omad Zia-Chahabi1, Raphaël Le Bidan1, Michel Morvan1, Christophe Lauf2; 1Institut Telecom/Telecom Bretagne, France. We investigate the principle and performance of fractionally-spaced adaptive single-carrier frequency domain equalization for 16-QAM 100G coherent optical communications. The proposed solution is shown to be robust against linear impairments.

16:00–18:00  
**ItuC4 • 17:00**

Spot-Size Converter: A Generic Building Block for Regrowth-Free Multi-Guide Vertical Integration in InP, Fang Wu1,2, Xiangjiao He1,2,3,4, Jingjing Li1, Zhen Peng1, Marco Fiorentini1,2,3,4,5,6,7; 1Research Center, Huawei Technologies Co., Ltd., Peking, China; 2Postdoctoral Fellowship, 3Torino, Italy, Presider

**AfuC4 • 17:00**

A Silicon Lens for Integrated Free-Space Optics, David Fattal1, Jingting Li1, Zhen Peng1, Marco Fiorentini1, Raymond G. Beausoleil1; 1HP Labs, USA. We introduce a CMOS-compatible planar lens made of a hexagonal array of silicon posts, with a diameter distribution tailored to produce an arbitrary transmitted wide-field, opening the pathway to the integration of 3-D optical systems.

16:00–18:00  
**AfUC • Inhouse: Fiber and Wireless**

Yuji Leuthold; KIT, Germany, Presider

16:00–18:00  
**SPluC4 • 17:00**

Filter Response of Feedback Plasmonic Junctions, Mohammad A. Sivialzadeh1, Amir S. Helmy1, 2; ECE/Physics, Univ. of Toronto, Canada. We propose a novel filter structure for plasmonic circuits. The proposed structure is based on creating a feedback junction. The unique characteristics of the structure are analyzed using a simple and accurate analytical model.

Sessions continue on page XX.
16:00–18:00
StUb • Methods and Fundamentals

Byoung Ham, Inha Univ., South Korea, Presider

StUb1 • 16:00  Invited
Understanding Propagation Loss in Slow Light Waveguides,
Sebastian A. Schulz1, William Whelan-Curtin1, Isabella H. Rey2, Thomas Krauser1; 1School of Physics and Astronomy, Univ. of St Andrews, UK. Engineering dispersion and loss in photonic crystal waveguides allows us to control propagation up to moderate group indices. Novel results on over-engineered waveguides give insights into loss vs. both propagation constant and group index.

16:00–18:15
StuC • Terahertz Waveguides, Applications, and Device Technology

Markus Walther1; Univ. Freiburg, Germany, Presider

StuC1 • 16:00  Invited
The Transition from a TEM-like Mode to a Plasmon-like Mode in a Parallel Plate Waveguide, Jingbo Liu1, Rajind Mendis1, Daniel Mitinian2; Rice University, USA. We experimentally characterize the spatial mode inside a finite-width parallel-plate waveguide using a subwavelength probe. We observe a transition from a TEM-like spatial mode at low frequencies to a plasmon-like mode at high frequencies.

16:00–18:00
SOTuC • Fiber Sensors

Alexis Mendez; MCH Engineering, USA, Presider

SOTuC1 • 16:00  Invited
Challenges in deploying fiber based systems for oil and gas sensing, Dominic Taverner1; .

Tuesday 14 June
ATuC • Inhouse: Fiber and Wireless—Continued

ATuC4 • 17:30
Background Light Induced Noise and Its Effects on Indoor Gigabit Optical Wireless Communication Systems, Ke Wang1,2, A. palavanapillai Nirmalathas1,2, Efstratios Skafidas1,2; 1National ICT Australia—Victoria Research Laboratory (NICTA-VRL), Univ. of Melbourne, Australia; 2Dept. of Electrical and Electronic Engineering, Univ. of Melbourne, Australia. We experimentally study the receiver sensitivity and power-penalty due to shot noise induced by the background light in indoor gigabit optical wireless communication systems. This noise typically causes several dB power-penalties in the system.

ATuC5 • 17:45
Securing Free Space Optics Communications through Optical Chaos, Fabrizio Chiarello1, Marco Santagiustina1, Leonora Ursini1; 1Dept. of Information Engineering, CNIT, Univ. of Padova, Italy. A free space optical chaotic communication system for the secure transmission of a digital message at hundreds Mb/s is presented. The performance of the system is investigated including the indoor infrared channel impairments.

ATuC • Photonic Integration I—Continued

ITuC4 • 17:15
Single Step Epitaxial Growth of Ge-on-Si for Active Photonic Devices, Rodolfo E. Camacho-Aguilera1, Jonathan Besette1, Yan Cai2, Xiaoxuan Duan1, Jifeng Liu1, Lionel Kimerling1, Jurgen Michel1; 1MIT, USA; 2Dartmouth College, USA. Germanium for integrated photonic devices has been grown selectively on Si, using a single step epitaxial process, eliminating the standard highly dislocated Ge or SiGe buffer layer to accommodate the Ge-Si lattice mismatch.

ITuC5 • 17:30
High n-type Doping for Ge Lasers, Jonathan Besette1, Rodolfo E. Camacho-Aguilera1, Yan Cai1, Lionel Kimerling1, Jurgen Michel1; 1MIT, USA. We present evidence of enhanced n-type doping of epitaxial Ge-on-Si for integrated light emitting devices. SIMS, Hall Effect, and photoluminescence measurements confirm dopant concentrations as high as 4 × 1019 cm−3 with efficient PL emission.

ITuC6 • 17:45
Novel Designs for On-chip Mid-Infrared Detectors Integrated with Chalcogenide Waveguides, Vivek Singh1,2, Juan-Juan He3, Timothy W. Zem3, Jinping Wang1, Pao T. Lin1, Jacklyn Wilkens1, Spencer Novak1, J. David Musgraves1, Lionel Kimerling1, Kathleen Richardson1, Anu Agarwal1; 1Dept. of Materials Science and Engineering, Massachusetts Inst. of Technology, USA; 2Dept. of Materials Science and Engineering, Univ. of Delaware, USA; 3School of Materials Science and Engineering, COMPST, Clemson Univ., USA. We present novel designs and corresponding simulation results showing a reduction in reflection for a waveguide-integrated, on-chip detector for the mid-infrared regime, using chalcogenide glass waveguides integrated with a PbTe detector.

ITuD • Nanophotonics: Plasmonics and Applications II—Continued

ITuD5 • 17:15
Ultra-small Highly Birefringent Slot-Microfiber, Fei Xu1,2, Nanying Univ., China. We present the wave guiding properties of the proposed ultra-small highly birefringent slot-microfiber. Birefringence as large as 4×10−2 at 1550 nm can be obtained with microfibers 1 μm in diameter.

ITuD6 • 17:30
Organic and Hybrid Plasmonic Nanostuctures for Energy Conversion, Gary P. Wiederrecht1; 1Center for Nanoscale Materials, Argonne Natl. Lab., USA. Recent advances for photoinduced charge separation in nanostructures are discussed. Both organic and organic plasmonic hybrid nanostructures are described. Ultrafast electronic coupling in the hybrid nanostructures is also observed.
Electromagnetic Energy Velocity in Slow Light, Marco Santagustina; Dept. of Information Engineering, CNIT - Univ. of Padova, Italy. Group and electromagnetic energy velocities in structural and material slow light are compared. They are equal for structural slow light; the enhancement of linear and nonlinear effects depends on energy velocity.

Ultrafast THz Pulse Shaping: Generation of Half-cycle Pulse from Multi-cycle THz Pulse, Mostafa Shalaby1, Marco Peccianti1, Luca Razzari1, Gargi Sharma1, Tsuneyuki Ozaki1, Roberto Morandi1; INRS-EMT, Canada. Using optical pump/THz probe technique in InP, we demonstrate ultrafast slicing of a multi-cycle THz pulse into single- and half-cycle THz pulses.

Pulsed terahertz emitters were fabricated on Fe-implanted InGaAsP/InP photoconductive materials. The THz signals are detected by electro-optic sampling using fs-pulses at 790 nm or at 1.55 µm. Characteristics of this new THz source are discussed.

Ultrafast THz Pulse Shaping: Generation of Half-cycle Pulse from Multi-cycle THz Pulse, Mostafa Shalaby; INRS-EMT, Canada. Using optical pump/THz probe technique in InP, we demonstrate ultrafast slicing of a multi-cycle THz pulse into single- and half-cycle THz pulses.

Characteristics of Terahertz Antenna Pulsed Sources Made on Fe-Implanted InGaAsP/InP Photoconductive Materials, Andre Fekecs1,3, Maxime Bernier1,3, Martin Chicoine2,3, François Schiettekatte1,3, Paul Charette1, Richard Arès1,3, Denis Morris1,3; Institut interdisciplinaire d’innovation technologique - 3IT, Université de Sherbrooke, Canada. Pulsed terahertz emitters were fabricated on Fe-implanted InGaAsP/InP photoconductive materials. The THz signals are detected by electro-optic sampling using fs-pulses at 790 nm or at 1.55 µm. Characteristics of this new THz source are discussed.

18:30–21:30 Advance Photonics Congress Reception and Banquet, Hart House, Univ. of Toronto
Nonlinearity Compensation using Digital Backward Propagation, Eduardo Mateo1, Fatih Yaman1, Ting Wang1, Guang Li2; 1NEC Laboratories America, USA; 2CREOL, The College of Optics and Photonics, University of Central Florida, USA. Compensation of fiber impairments using advanced DPS techniques will play a fundamental role in future communications systems. In particular, technologies for nonlinearity compensation using digital backward propagation are discussed in this paper.

Reducing the Complexity of Electronic Pre-compensation for the Nonlinear Distortions in a Directly Modulated Laser, Abdullah S. Kausar1, John Carridge2, James Harley3, Kim Roberts4; 1Electrical and Computer Engineering, Queen’s University, Canada; 2Ciena Corporation, Canada. A simplified expression relating the required input current for a directly modulated laser to a target output optical power is obtained and used experimentally in mitigating the laser nonlinear distortion by digital signal processing.

In this paper we report a novel approach to compensate the nonlinearities in a semiconductor laser. The technique is based on applying a digital signal processing algorithm with a robust modulation principle, utilising novel electro-optical devices. Simulations agree well with previously-observed super-radiance properties and are used to optimize driving conditions and device geometry.

Erbium-Doped Chalcogenide Glass Micro-Disks as Monolithic Mid-IR Laser Sources, Faleh M. Alnaj1, Fatih Altan1, Jiejun Hu1, Anu Agarwal1, Lionel Kimmerling2; 1Materials Science and Engineering, Madison Inst. of Science and Technology, United Arab Emirates; 2Microphotonics Center, Massachusetts Inst. of Technology, USA. The feasibility of Mid-Infra-red (MIR) lasing in Erbium-doped Gallium Lanthanum Sulfide (GLS) micro-disk was investigated. Based on state-of-the-art Chalcogenides micro-disk resonators parameters, lasing was simulated and shown to be possible.

Quantum-Tuned Two-Junction Solar Cells, Xihua Wang1, Ghada Koleilat1, Edward Sargent2; 1Electrical and Computer Engineering, University of Ottawa, Canada; 2COPL, University Laval, Canada. We report quantum-size-effect tuned tandem solar cells. Our two-junction photovoltaic devices employ light-absorbing material of a single composition and use two rationally-selected nanoparticle sizes to harvest the sun’s broad spectrum.
SLWA1 • 8:30  
Nonlinear Optics and Wavesguide Technologies

Toshikiko Baba, Yokohama National Univ., Japan, Presider

SLWA2 • 9:00  
Slow and Fast Light in High-Birefringence Fiber Parametric Amplifiers

Marco Santagiustina1, Dept. of Information Engineering, CNIT, Univ. of Padova, Italy. Slow and fast light effects in high-birefringence fibers are theoretically predicted. Delay can be controlled through the pump polarization.

SLWA3 • 9:15  
Decay Time in a Cavity in Slow or Fast Light Regime

Thomas Lauprecht1, Rupamani Gosh1, Sylvain Schwartz1, Fabienne Godfrin1, Fabien Breitenaker1, Laboratoire Aimé Cotten, France; ‘Jawaharlal Nehru Univ., India. ‘The Edward S. Rogers Sr. Department of Electrical and Computer Engineering, University of Toronto, Canada. Strong Raman modes of the semiconductor core, thiol agents, and their interfacial compound in colloidal CdTe quantum dots were observed and compared for the first time in aqueous solution through efficient Raman scattering in HC-PCF.

SLWA4 • 9:30  
High Density Ink Jet Printing of Bio-molecules for Photonic Crystal Fibers Applications

Anna Chiara Brunetti1, Lara Scalori2, Teke Lund Hansen2, Karsten Rottwitt2; 1DTU Fotonik, DTU, Technical University of Denmark, Denmark; 2Institute for Quantum Optics and Quantum Science, University of Electro-Communications, Japan. To achieve higher storage times for a new method for the storage of optical pulses called Quasi-Light-Storage we reduced the SBS gain bandwidth. In our experiments we achieved an enhancement of 40%.

SLWA5 • 9:45  
Efficient Raman Sensor for Nanoparticles using Hollow Core Photonic Crystal Fiber

Jacky S. W. Mak1, Abdiaziz A. Farah1, Feifan Long1, Jacky Wai-Kwok1; 1Materials Science and Engineering, University of Electro-Communications, Japan. Strong Raman modes of the semiconductor core, thiol agents, and their interfacial compound in colloidal CdTe quantum dots were observed and compared for the first time in aqueous solution through efficient Raman scattering in HC-PCF.

SLWA6 • 9:45  
Low-Loss Tunable All-in-Fiber Filter for Raman Spectroscopy

Low-Loss Tunable All-in-Fiber Filter for Raman Spectroscopy

SOFWA5 • 9:15

Ultra Broadband Mid-IR Detectors Using Multilayer Anti-reflection Coupling

SOFWA6 • 9:45

High Density Ink Jet Printing of Bio-molecules for Photonic Crystal Fibers Applications

SOFWA7 • 9:30

Low-Loss Tunable All-in-Fiber Filter for Raman Spectroscopy

SOFWA8 • 9:00

Efficient Raman Sensor for Nanoparticles using Hollow Core Photonic Crystal Fiber

SOFWA9 • 8:30

Nonlinear Optics and Wavesguide Technologies

Toshikiko Baba, Yokohama National Univ., Japan, Presider

SOFWA10 • 9:15

Decay Time in a Cavity in Slow or Fast Light Regime

Thomas Lauprecht1, Rupamani Gosh1, Sylvain Schwartz1, Fabienne Godfrin1, Fabien Breitenaker1, Laboratoire Aimé Cotten, France; ‘Jawaharlal Nehru Univ., India. ‘The Edward S. Rogers Sr. Department of Electrical and Computer Engineering, University of Toronto, Canada. Strong Raman modes of the semiconductor core, thiol agents, and their interfacial compound in colloidal CdTe quantum dots were observed and compared for the first time in aqueous solution through efficient Raman scattering in HC-PCF.

SOFWA11 • 9:30

High Density Ink Jet Printing of Bio-molecules for Photonic Crystal Fibers Applications

Anna Chiara Brunetti1, Lara Scalori2, Teke Lund Hansen2, Karsten Rottwitt2; 1DTU Fotonik, DTU, Technical University of Denmark, Denmark; 2Institute for Quantum Optics and Quantum Science, University of Electro-Communications, Japan. To achieve higher storage times for a new method for the storage of optical pulses called Quasi-Light-Storage we reduced the SBS gain bandwidth. In our experiments we achieved an enhancement of 40%.

SOFWA12 • 9:45

Efficient Raman Sensor for Nanoparticles using Hollow Core Photonic Crystal Fiber

Jacky S. W. Mak1, Abdiaziz A. Farah1, Feifan Long1, Jacky Wai-Kwok1; 1Materials Science and Engineering, University of Electro-Communications, Japan. Strong Raman modes of the semiconductor core, thiol agents, and their interfacial compound in colloidal CdTe quantum dots were observed and compared for the first time in aqueous solution through efficient Raman scattering in HC-PCF.
SPWB1 • 10:30
Invited
On the Implementation of Soft-Decision Decoders for High-Speed Optical Transmission, Ivan Djordjevic; Electrical and Computer Engineering, University of Arizona, USA. We describe large-girth LDPC codes suitable for high-speed optical transmission and several reduced-complexity (RC) LDPC-decoding algorithms. We evaluate quantization effect BER performance degradation and discuss corresponding FPGA implementation.

SPWB2 • 11:00
Quasi-Cyclic LDPC based on PEG Construction for Optical Communications, Sami Mumtaz; Huawei Technologies Co. Ltd, China; and UC San Diego, USA. The novel construction of quasi-cyclic LDPC codes based on the progressive edge-growth algorithm is presented. These codes perform better than most LDPC codes proposed for optical transmissions and design parameters can be chosen without constraint.

SPWB3 • 11:15
BICM and TCM Comparison in 100 Gbps Optical Coherent Links in Nonlinear Regime, Tommaso Foggi; IBM, Italy. The popular single-carrier QPSK modulation format is compared with 8PSK BICM and TCM schemes in 100 Gbps optical links in linear and nonlinear regime, with or without inline dispersion compensation.

SPWB4 • 11:30
Soft Differential Decoding with Non-redundant Error Correction for Dispersion Managed Optical Transmission System, Zhihong Zhang; Ericsson, Sweden. We present a soft differential decoding with NEC providing the best performance when co-propagating 10G PDM-QPSK with 1G DQPSK channels over dispersion managed links at 50GHz channel.

SPWB5 • 11:45
Physical Layer Constraints in Dynamic Optical Mesh Networks at Higher Bit-rates, Danijel Rakic; Andrew D. Ellis; Tand下半 International University, Ireland, Ireland. We demonstrate that addition of higher-order modulation formats and increased network flexibility significantly degrades the throughput due to severe X effects, in a WDM optical transport network employing dynamic 28Gbaud mQ transponders.

SPWB6 • 12:00
Experimental Demonstration of PDL Mitigation using Polarization-Time Coding in PDM-OFDM Systems, Sami Mumtaz; Jinshi Li; Soeren Koenig; Yves Jaouen; Rene Schmogrow; Huawei Technologies Co. Ltd, China. We show that code performance is enhanced even without using polarization-time coding in OFDM transmission. We also show that the code performs better than Golden and Alamouti codes.

SPWC1 • 10:30
CMOS Photonics Platform for 25 Gbit/s Optical Transceivers, Peter De Dobbeleare; Lucent, USA. We present a mature CMOS photonics technology platform for design, simulation and manufacturing of optical transceivers. The capability is illustrated with some examples and a roadmap towards higher speed, denser data transmission and closer integration.

SPWC2 • 11:00
A Silicon Photonics Platform with Heterogeneous III-V Inte-gration, Wim Bogart; Stanislaw Komar; Joris Van Thourhout; RD Baets; Ghent University, Belgium; and IMEC, Belgium. We present a silicon photonics platform combining silicon processing and heterogeneously integrated III-V materials. This enables passive and active photonic functions on silicon, such as waveguides, filters, modulators, photodetectors and lasers.

SPWC3 • 11:30
1310 nm Evanescent Hybrid III-V/VI Laser Based on DVS-BCB Bonding, Yanming Li; Chuandong Li; Yanjun Zhu; Fabin N. Hauske; Yanming Li; Chuandong Li; Yanjun Zhu; Fabin N. Hauske; Ottawa RE&DC Center, Huawei Technologies, Canada; and Research Center, Huawei Technologies, Germany. We present an evanescently-coupled, hybrid III-V/Silicon Fabry-Perot laser based on adhesive (DVS-BCB) bonding, operating at 1310 nm. Maximum optical power in a continuous-wave regime is 3 mW and the threshold current density is 2.41 kA/cm2.

SPWC4 • 11:45
Optimally Coupled Hybrid III-V Photonic Crystal Wave-Cavity CW Lasers on Passive SOI Waveguides, Yacine Haloua; Alexandre Bazin; Timothy Karle; Paul Monnier; Isabelle Sagnes; Rama Raj; Fabrice Rainier; CNRS-LPN, France; ECE/Physics, Univ. of Toronto, Canada; and Computer, and Telecommunications Engineering Technology, Rochester Inst. of Technology, USA. We present an evanescently-coupled, hybrid III-V/Silicon Fabry-Perot laser based on adhesive (DVS-BCB) bonding, operating at 1310 nm. Maximum optical power in a continuous-wave regime is 1.131 mW and the threshold current density is 2.41 kA/cm2.

SPWB • Coding II
10:30–12:15
On the Implementation of Soft-Decision Decoders for High-Speed Optical Transmission, Ivan Djordjevic; Electrical and Computer Engineering, University of Arizona, USA. We describe large-girth LDPC codes suitable for high-speed optical transmission and several reduced-complexity (RC) LDPC-decoding algorithms. We evaluate quantization effect BER performance degradation and discuss corresponding FPGA implementation.

SPWB5 • 11:45
Integrated Photonics Research, Silicon and Nano Photonics

Harbour Salon C
Integrated Photonics Research, Silicon and Nano Photonics

These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

Wednesday 15 June
10:30–12:30
IWC • Photonic Integration II
Richard Soref; AFOSR, USA, Presider

10:30–12:15
IWD • Modeling and Simulation IV: Coupled Waveguides and Resonators
Ya Yan Lu, City University of Hong Kong, China, Presider

10:30–12:15
IWD • Analytical Method for Designing Strongly Coupled Microring Resonator Networks
Alan Tao, Yen Vui; Dept. of Electrical and Computer Engineering, Univ. of Alberta, Canada.

10:30–12:30
IWC • Resonant Photonic Structures
Yacine Haloua; Alexandre Bazin; Timothy Karle; Paul Monnier; Isabelle Sagnes; Rama Raj; Fabrice Rainier; CNRS-LPN, France; ECE/Physics, Univ. of Toronto, Canada; and Computer, and Telecommunications Engineering Technology, Rochester Inst. of Technology, USA.

10:30–12:15
IWD • Microcavity Interference Design Using Convex Optimization Methodology
Mohamed A. Swillam; Osman S. Ahmed; Mohamed H. Bakr; Xun Li; ICE/Physics, Univ. of Toronto, Canada; and McMaster Univ., Canada.

10:30–12:30
IWC • Imaging Waveguide Structures
Migdall; Natl. Inst. of Standards and Technology, USA; and Joint Quantum Inst., Univ. of Maryland, USA.

10:30–12:15
IWD • Integrated Photonics and Quantum Devices
Jing Chen; Zachary H. Levine; Jingyun Fan; Alan Migdall; Natl. Inst. of Standards and Technology, USA; and ’Joint Quantum Inst., Univ. of Maryland, USA.

10:30–12:15
IWD • Generating a Frequency-Bin Entangled Comb of Photon Pairs via Four-Wave Mixing in a Silicon-on-Insulator Microring Resonator
Jing Chen; Zachary H. Levine; Jingyun Fan; Alan Migdall; Natl. Inst. of Standards and Technology, USA; and ’Joint Quantum Inst., Univ. of Maryland, USA.

10:30–12:30
IWC • Integrating Time Coding in PDM-OFDM Systems
Rekaya-Ben Othman; Comelec, Telecom ParisTech, Paris, France; and Institute of Photonics and Quantum Electronics, Paris, France. We demonstrate that addition of higher-order modulation formats and increased network flexibility significantly degrades the throughput due to severe X effects, in a WDM optical transport network employing dynamic 28Gbaud mQ transponders.

10:30–12:15
IWC • Coupled Mode Theory for Optical Waveguides
Weiping Huang; Shunwei Liu; McMaster Univ., Canada. We present several reduced-complexity (RC) LDPC-decoding algorithms.

10:30–12:15
IWD • A Silicon Photonics Platform with Heterogeneous III-V Integration
Wim Bogart; Stanislaw Komar; Joris Van Thourhout; RD Baets; Ghent University, Belgium; and IMEC, Belgium. We present a silicon photonics platform combining silicon processing and heterogeneously integrated III-V materials. This enables passive and active photonic functions on silicon, such as waveguides, filters, modulators, photodetectors and lasers.
Dynamic Manipulations of Light Pulses in an Optically Dense Coherent Medium, Irina Novikova1; 1 College of William and Mary, USA. We present experimental and theoretical studies of EIT-based quantum memory that go beyond three-level system and account for enhanced nonlinear interactions at high optical depth.

Magnetically Induced Simultaneous Slow and Fast Light by Phase Control, Bin Liu1, Hong Guo2; 2School of Electronics Engineering and Computer Science, Peking Univ., China. A type atom coupled by additional driving light and radio frequency (RF) field can generate controllable simultaneous slow and fast light at two frequencies. Distortions by radiative dampings are discussed and compensation method is suggested.

SLWB3 • 11:15 Designer Media and Pulses for Optimally Long-Lived and Reversible Energy Storage, Scott Glasgow1; 1Brigham Young Univ., USA. Given a dielectric resonance structure and geometry, we outline design of pulses stored most reversibly. Given a pulse and medium geometry, we outline design of a resonance structure for most reversible pulse storage.

SLWB4 • 11:30 Simplified Brillouin fiber slow light systems in loss regime using step current modulation, Songhoon Chin1, Luc Thévenaz2; 2Ecole Polytechnique Federale de Lausanne, Switzerland. We propose a simple technique to realize Brillouin slow light in nearly transparent regime. A current-modulated semiconductor laser by a step function is used as Brillouin pump to generate a Brillouin loss doublet.

SLWB5 • 11:45 Noise Figure of Slow Light Cascaded SOA based Microwave Photonic Phase Shifters, Juan Lloret1, Juan Sancho1, Ivana Gasulla1, Francisco Ramirez1, Salvador Salas1; 1TET Research Inst., Spain. The noise figure of Slow and Fast Light Microwave Photonic phase shifters made up by SOA followed by optical filtering stages is experimentally evaluated. Noise figure results show compression when adding the third cascaded stage.

Photonic Crystal Biosensor Chip for Label-Free Detection of Bacteria, Martin Krätschmer1, Ager Krüger1, Nathanael Grohoffs1, Jaime Garcia-Ruperez1, Verónica Tuciefinda1, Javier García-Castillo1, María Jose Barú1, Sergio Perarnau-Llobet1, Angel Maquieira1, 1ASE and IFA, Aarhus University, Denmark; 2UPV, Spain. Narrow polarization-mixing resonances in planar photonic crystals are studied as candidate components for label-free refractive index sensors for detecting bacteria causing sepsis through the identification of DNA strands.

Crossed-polarization Analysis of Guided Modes in Photonic Crystal Slab Biosensors, Ryan D. Schilling1, Deniz Aydil2, Hooman Akhavan1, Mohamad El Behery1, Ofer Levi1; 1Institute of Biomaterials and Biomedical Engineering, University of Toronto, Canada; 2Edward S. Rogers Sr. Department of Electrical and Computer Engineering, University of Toronto, Canada. We present the crossed-polarization analysis of guided resonance modes in photonic crystal slab biosensors. A good agreement between experimental resonance peaks and theoretical modeling is presented, revealing high-Q values in these biosensors.

Optical Resonance Sensing in Surface Bloch Modes on Woodpile Photonic Crystals, Shou-Yu Su1, Lingling Tang1, Tomoyuki Yoshie1; 1ECE, Duke University, USA. Low loss and high sensitivity are confirmed in surface Bloch modes on (100) and (001) dielectric woodpile photonic crystals. A flat-top (100) woodpile surface is also designed for optical resonance sensing.

Photonic Crystal Sensor for monitoring the vibration of a laser beam, Andy Y. Fuh1; 1Physics, National Cheng Kung Univ., Taiwan. Photonic crystals based on polymer dispersed liquid crystals are fabricated using continuous multi-exposures of two-beam interference. It can be applied for use as a beam-vibration sensor for laser beams. Details are reported.

Sensing Technique for the Development of Real-time and Low-cost Biosensors Using Photonic Bandgap Structures, Jaime Garcia-Ruperez1, Javier Garcia-Castillo1, Verónica Tuciefinda1, Antoine Brumont1; 1Nanophotonics Technology Center, Universidad Politécnica Valencia, Spain. We present experimental sensing results achieved using a novel technique based on the use of photonic bandgap structures where only the output power from a broadband source is monitored, providing a real-time and low-cost system.

We present experimental and theoretical studies of EIT-based quantum memory that go beyond three-level system and account for enhanced nonlinear interactions at high optical depth.

We review the recent progress on hollow-core Photonic Bandgap Fiber, Alexey Kosolapov1, Andrey Pryamikov2, Alexey Biriukov1, Maxim Antipov1, Vladimir Shvyarenko1, Gennady Sypatuy1, Victor Plotnichenko1, Mikhail Churbanov1, Evgeny Dianov1; 1Fiber Optics Research Center of RAS, Russian Federation; 2Institute of Chemistry of High-Purity Substances, Russian Federation. A new, technologically simple structure of hollow-core optical fiber is proposed; the propagation of CO2 laser radiation in a hollow-core chalcogenide glass fiber is demonstrated.

Gas Raman Lasers in Hollow-Core Fibers, Fetah Benabid1; 1University of Bath, UK. We review the recent progress on hollow-core photonic crystal fibers and its integrated form of photonic microcavities in both their design and fabrication and in their applications in Raman fiber lasers.

Sessions continue on page XX.
These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

**Wednesday 15 June**

**IWC • Photonic Integration II—Continued**

**IWC5 • 12:00**

Heterogeneous Integrated InGaAsSb Detectors on SOI Waveguide Circuits for Short-Wave Infrared Applications, Nannicha Hattanan1, Gassenq Alban1, Bart Kayken1, Laurent Cerutti2, Jean-Baptiste Rodriguez2, Eric Toumain2, Gunther Roelkens1; 1Univ. of Gent - D-TEC, Belgium; 2Univ. Montpellier 2, France. We present evanescently coupled, heterogeneous integrated InGaAsSb photodetectors on SOI waveguide circuits for short-wave infrared applications. A responsivity of 0.13 A/W is obtained at a wavelength of 2.17µm. The dark current is 3.5 µA at -1V.

**IWC6 • 12:15**

Hybrid Transmitter Cells for DWDM Systems, Hua Zhang1, Matt Pearson1, Serge Bidnyk1, Ashok Balakrishnan2; 1Enablence Technologies Inc., Canada. A compact 10 Gb/s transmitter cell for 100 Gb/s DWDM transmission has been successfully developed using hybrid PLC technology. It is confirmed that the hybrid transmitter cell provides high performance on output power and wavelength stabilization.

**IWD • Modeling and Simulation IV: Coupled Waveguides and Resonators—Continued**

**IWD6 • 12:00**

Design of One-Dimensional Photonic Crystal Coupled Resonator Optical Waveguides Embedded in Air-Slot Waveguide, Yuki Kawaguchi1, Kunimasa Saitoh1, Masanori Koshiba1; 1Hokkaido Univ., Japan. We propose design methods of slow-light slot waveguide based on one-dimensional photonic crystal coupled resonator optical waveguides (1-D PC-CROWs). We show that slot waveguides proposed here realize small group velocity and low loss simultaneously.

12:30-1:30 Lunch Break (on your own)
SLWB • Slow/Fast Light Systems—Continued

SLWB6 • 12:00
Loss-induced dead-zone in CROW rotation sensor, Roman No-
vitski1, Jacob Scheuer1, Ben Z. Steinberg1; 1Tel-Aviv Univ., Israel. We study the properties of a lossy coupled resonator optical waveguide subjected to rotation. A loss-induced dead-zone is found at low rotation rates while no impact is found for high rotation rates.

SWB • Biochemical Sensors II—Continued

SWB6 • 12:00
Liquid filled hollow core photonic bandgap fiber sensor, Hang Qu1, Bora Ung1, Maksim Skorobogatiy1; 1Ecole Polytechnique de Mon-
treal, Canada. We propose a low-refractive-index-contrast hollow-core Bragg fiber sensor operating with a resonant sensing principle. Clear transmission spectrum shifts are obtained when filling the fiber with liquid analytes of different refractive indices.

SWB7 • 12:15
Optical Current Transducers Incorporating Polymeric Integrat-
ed Optical Chip, Min-Cheol Oh1, Woo-Sung Chu1, Kyung-Jo Kim1, Jun-Whee Kim1; 1Electrical Engineering and Cogno-Mechatronics Engineering, Pusan National University, Republic of Korea. Various optical devices are integrated on a single chip to construct optical current transducers based on polarization rotated reflection interferometry, which consists of couplers, polarizers, polarization converters, and TO phase modulators.

12:30-1:30  Lunch Break (on your own)
Wednesday 15 June

SPWC • Transmission Systems
Presider

IWF • Devices and Components

Silicon Organic Hybrid (SOH) Electro-Optical Devices, Christian Koo1, Luca Alloatti1, Dietmar Korn2, Robert Palmer3, David Hill4, Koos1, Luca Alloatti1, Dietmar Korn2, Robert Palmer3, David Hill4, Koos1, Luca Alloatti1, Dietmar Korn2, Robert Palmer3, David Hill4

Soref1; 1Sensors Directorate, Air Force Res. Lab., USA. A review of recent progress in Si-based MIR on-chip components and PICs is given. We survey new OEIC technologies, hybrid and monolithic laser/detector integration, waveguiding, plasmo-photonics, and spectrometer-on-a-chip applications.

Germanium on Silicon Lasers and Detectors, Jurgen Michel1; 1Masachusetts Inst. of Technology, USA. This paper discusses the most recent advances of Germanium photodetectors and lasers that can be monolithically integrated into a Silicon CMOS process.

IWF1 • 13:30
Invited
Silicon Mid-Infrared Photonic Integrated Circuits, Richard Soref1; Sensors Directorate, Air Force Res. Lab., USA. A review of recent progress in Si-based MIR on-chip components and PICs is given. We survey new OEIC technologies, hybrid and monolithic laser/detector integration, waveguiding, plasmo-photonics, and spectrometer-on-a-chip applications.

IWF2 • 14:00
Invited
Germanium on Silicon Lasers and Detectors, Jurgen Michel1; 1Masachusetts Inst. of Technology, USA. This paper discusses the most recent advances of Germanium photodetectors and lasers that can be monolithically integrated into a Silicon CMOS process.

IWF3 • 14:30
Waveguide-based Mid-Infrared Up-Conversion Detectors, Kai-Daniel F. Büchter1, Harald Herrmann1, Wolfgang Sohler1; 1Applied Physics, Univ. of Paderborn, Germany. Nonlinear optical up-conversion detectors for 3.4 μm radiation are realized using Ti:PPLN waveguides. Both, sum-frequency and difference-frequency generation are investigated. Overall power conversion efficiencies of more than 8% are achieved.

IWF4 • 14:45
Nonlinear Notch Blue-Shift in AlGaAs Bragg Grating Waveguides, Pamela Tammaru1, Michael J. Strain1, Matteo Clerici2, Marco Pecchiati1, Alessia Pasquiari1, Zex Shing Ho1, Ian Rowe1, Kataryna Ruzewskia2, Marc Soref1, Roberto Morandotti1; 1INRS-EMT, Canada; 2Univ. of Glasgow, UK; 3IPC-CNRS, France; 4Univ. of Technology, Malaysia; 5Warsaw Univ. of Technology, Poland. We present an investigation on the nonlinear dynamics of intense pulses in an AlGaAs Bragg waveguide and we report the experimental observation of an intensity dependent blue-shift of the Bragg notch spectral line.

IWE1 • 13:30
Invited
Silicon Mid-Infrared Photonic Integrated Circuits, Richard Soref1; Sensors Directorate, Air Force Res. Lab., USA. A review of recent progress in Si-based MIR on-chip components and PICs is given. We survey new OEIC technologies, hybrid and monolithic laser/detector integration, waveguiding, plasmo-photonics, and spectrometer-on-a-chip applications.

IWE2 • 14:00
Invited
Integrated-optic OFDM Demultiplexers Using Silica PLC-Based DFT and FFT Circuits, Knecht Takahashi1; 1NTT Photonics Labs., NTT Corp., Japan. I report recent advances on our integrated-optic OFDM demultiplexers. I describe the configuration, operating principle, and characteristics of the demultiplexers, which consist of optical FFT and DFT circuits fabricated with PLC technology.
SWC • 13:30
Metamaterials, Plasmonics, and Nanofluidics for Ultrasensitive Spectroscopy and Bio-detection,
Hatice Altug1, Ahmet Ali Yamik1,2, A. E. Celis3, A. Artar1, M. Huang1, 1Department of Electrical and
Computer Engineering, Boston University, USA; 2Photons Center, Boston University, USA. We will
present on-chip integrated plasmonic and metamaterial systems for ultrasensitive spectroscopy and
biodetection. We will also introduce opto-fluidic systems for targeted analyte delivery as well as for
optical trapping and manipulation.

SWC • 14:00
Self-optimized Metal Coatings for Fiber Plasmonics by Electroless Deposition, Aliaksandr Bialiayeu1,
Christophe Cauchois2, Nor Ahamad3, Anatoli Ivanov3,3, Jacques Albert3, Electronics, Carleton U., Canada;
1Electromagnetism and Telecom Unit, Universite de Mons, Belgium; 2Chemistry, Carleton U., Canada.
Observation of the polarization dependent loss spectrum of a tilted fiber Bragg grating during electro-
less deposition of gold on the fiber allows the process to be stopped exactly when the surface Plasmon
resonances are maximized.

SWC • 14:15
Role of Localized Surface Plasmon Resonance in Various Nano-structures for Sensing, Taerin Canagasabey1,2,3, Morten Ibsen4, Peter G. Kazansky4, 1Electrical and Computer Engineering, University of
Toronto, Canada; 2Physics, University of Toronto, Canada; 3Dipartimento di Fisica “A. Volta”, Universita
dei Studi di Pavia, Italy; 4Optoelectronics Research Centre, University of Southampton, UK. We observe
broadband fluorescence (1260-1610 nm) in a periodically-poled silica fiber pumped at 775 nm; it is a noise contribution to correlated photon pair
generation. The fluorescence is significantly lower in an identical, but unpoled, fiber.

SWC • 14:30
Relating DC-Field to Induced Nonlinear Susceptibility in Periodically Poled Silica Fiber, Christopher
A. Sapiano1, Stewart Aitchison1, Li Quan1, 1Electrical and Computer Engineering, University of Toronto,
Canada. The relationship between DC-fields and effective second order nonlinearity is studied. DC-
induced processes are modeled and fitted against equivalent natural second order processes. Insight is
provided into the disparity between bulk glass and fiber.

SWC • 14:45
Optically Tunable Bandpass Filter Using Series-connected Photonic Liquid Crystal Fibers, Jia-Hong
Liao1, Ta Lin1, Yan-Jhen Huang2, Chia-Rong Lee2, Chin-Ping Yu1, 1Department of Photonics, NSYSU,
Taiwan; 2Institute of Electro-Optical Science and Engineering, National Cheng Kung University, Taiwan.
We demonstrate an optically tunable bandpass filter based on two series-connected photonic liquid
crystal fibers filled with different LCs. By using photoresponsive LCs, 115-nm bandwidth tunability
can be achieved by 5-second blue-laser irradiation.
A novel clock phase detector is presented and shown to be tolerant to chromatic dispersion and D. The phase detector can be used in a clock recovery circuit for demodulation of 100Gb coherent transmission system.

A Novel Dispersion and D Tolerant Clock Phase Detector

Low Cost 112G Direct Detection Metro Transmission System with Reduced Bandwidth (10G) Components and MLSE Compensation

Alik Gorshtein1,2; 1Electrical and computer engineering, Ben Gurion University of the Negev, Israel; 2MultiPhy Networks Ltd., Israel. MLSE compensation for reduced bandwidth optoelectronic components, CD, and D at multi-wavelength 4x28G transmission with direct detection is proposed. Inclusive comparison analysis with conventional hard decision systems is presented.

Low Cost 112G Direct Detection Metro Transmission System with Reduced Bandwidth (10G) Components and MLSE Compensation

SPWC5 • 15:15

A Novel Dispersion and D Tolerant Clock Phase Detector

Han Sun1, Kuang-Tsan Wu1; 1Infinera Canada, Canada. A novel clock phase detector is presented and shown to be tolerant to chromatic dispersion and D. The phase detector can be used in a clock recovery circuit for demodulation of 100Gb coherent transmission system.

15.30–16.00 Coffee Break, Harbour Ballroom Foyer
**Advanced Photonics: OSA Optics & Photonics Congress • 12–15 June 2011**

**Harbour Salon A**

**Optical Sensors**

**These concurrent sessions are grouped across two pages. Please review both pages for complete session information.**

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**SWC • Photonic Crystal Sensors—Continued**

**SWC6 • 15:00**

*Guided Mode Resonance Sensors for the Monitoring of Film Growth in Atomic Layer Deposition*, Adriana Szeghalmi, Mato Knez, Ernst Bernhard Kley, Institute of Applied Physics, Friedrich Schiller University Jena, Germany; Max-Planck Institute of Microstructure Physics, Germany. Guided mode resonance optics consisting of linear gratings are highly sensitive optical sensors. Their use for monitoring the film growth during atomic layer deposition will be discussed based on rigorous coupled wave approach calculations.

**SOWC6 • 15:00**

*Enhanced Optical Parametric Gain by Cascading Periodically Poled Fiber Segments*, Lijun Zhang, Li Qian, ECE, University of Toronto, Canada. Numerical modeling shows that cascading multiple segments of periodically poled fiber without phase control can nonetheless improve non-degenerate optical parametric gain with high yield if sufficient idler filtering is applied in between segments.

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**SWC • Special Optical Fibers**

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**SOWC • Poled and Polarizing Fibers—Continued**

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**SWC7 • 15:15**

*Large Blueshift of Resonance Wavelength Simulated With a Small Refractive-index Change of a Nanoporous Waveguide*, Zhi-mei Qi, State Key Laboratory of Transducer Technology, Institute of Electronics, CAS, China. Simulation of refractive-index sensitivity of nanoporous waveguide resonance sensors reveals an extraordinary feature, that is, a large blueshift of the resonance wavelength induced by a small change in refractive index of the surrounding liquid.

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**15.30–16.00 Coffee Break, Harbour Ballroom Foyer**

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**NOTES**
Optical Equalization of D-Induced Penalties in SPWD3 • 16:30
Talbot filtering versus spectral periodicity. demonstrating different behaviors than classical Talbot based optical pulse rate multiplication commonly believed equivalent phase filters for amplitude and timing jitter performance in technologies.

Ultrafast optical pulse shaping technique using Scientifique (INRS), Canada.

Technologies, TU Dortmund, Germany.

The D-induced mean OSNR penalties are investigated in 112 Gbit/s metro networks using FIR filters. The D-induced mean OSNR penalties are reduced to < 0.1 dB.

Amplitude and Timing Jitter Performance of Spectrally Periodic Phase Filters for Optical Pulse Rate Multiplication, Antonio Malacarne,
José Azaña,
Matthias Westhäuser,
Pier 7 & 8 Harbour Salon C
Optical Sensors
Harbour Salon C
Integrated Photonics Research, Silicon and Nano Photonics
16:00–17:30
SPWD • Optical Techniques II
Ivan Djurdevic, Univ. of Arizona, USA, Presider

SPWD • 16:00
Photonic Temporal Integration of Broadband Microwave Waveforms over Nanosecond Time Windows, Mohammad H. Asghar,
Yongwoo Park,
José Azaña;
‘Energie, Matériaux et Télécommunications, Institut National de la Recherche Scientifique (INRS), Canada. By cascading an ultrafast time-limited intensity integrator with a discrete-time integrator, a new method for integration of microwave/optical intensity signals is experimentally demonstrated with unprecedented processing time-bandwidth product >140.

SPWD • 16:15
Amplitude and Timing Jitter Performance of Spectrally Periodic Phase Filters for Optical Pulse Rate Multiplication, Antonio Malacarne;
José Azaña;
‘Energie, Matériaux et Télécommunications, Institut National de la Recherche Scientifique (INRS), Canada. We analyze amplitude and timing jitter performance in commonly believed equivalent phase filters for Talbot based optical pulse rate multiplication demonstrating different behaviors than classical Talbot filtering versus spectral periodicity.

SPWD • 16:30
Optical Equalization of D-Induced Penalties in 112 Gbit/s Metro Networks, Matthias Westhäuser;
Christian Remmersmann,
Stephan Pindniczki,
Peter M. Krummrich;
‘Chair for High Frequency Technologies, TU Dortmund, Germany. We investigate the performance of optical equalization of distortions induced by polarization mode dispersion (D) in 112 Gbit/s metro networks using FIR filters. The D-induced mean OSNR penalties are reduced to < 0.1 dB.

IWG • Devices and Components IV
16:00–17:30
SPWD • Optical Techniques II
Ivan Djurdevic, Univ. of Arizona, USA, Presider

IWG1 • 16:00
Quantum Information Processing on Photonic Chips, Dirk Englund;

IWG2 • 16:30
New Photonic components for Quantum Information Science, Alberto Politi;
Jonathan C. Matthews;
Anthony Laing;
Alberto Peruzzo;
Konstantinos Poulas;
Jasmine Meinecke;
Damián Bonačič-Koutecký;
Pete Shadbolt;
Preet Palakasan;
Xiao-Qi Zhou;
Maria Bodas Verde;
Mirko Lobino;
Terry Rudolph;
John G. Rarity;
Mark Thompson;
Jeremy L. O’Brien;
Physics, Univ. of Bristol, UK;
Institut for Mathematical Sciences, Imperial College London, UK. New photonic components are required to exploit the integrated architecture for Quantum Information science. We demonstrate quantum interference in MMI couplers and two-particle quantum walks in coupled waveguides, showing unique quantum behaviour.

IWG3 • 16:45
Infrared Colloidal Quantum Dot Chalcogenide Films for Integrated Light Sources, Neil Patel,
Scott Geyer,
Jennifer Scherer,
Maung Bawendi;
Nathan Carle;
J. David Mugrage;
Kathleen Richardson;
Jaejun Hee;
Pao T. Lii;
Peter Becla;
Clara Dimas;
Anu Agarwal;
Lionel Kimerling;
Department of Materials Science and Engineering, Massachusetts Inst. of Technology, USA;
Department of Chemistry, Massachusetts Inst. of Technology, USA;
School of Materials Science and Engineering, Clemson Univ., USA;
Department of Materials Science and Engineering, Univ. of Delaware, USA; ‘Masdar Inst. of Science and Technology, United Arab Emirates. Quantum dots and chalcogenide glasses form the basis for photoluminescent films which are fabricated in microcavities to enhance light emission for coupling into waveguides.

IWG1 • 16:00
Invited
Quantum Information Processing on Photonic Chips, Dirk Englund;
We propose a novel design of long period fiber gratings (LPFGs) that are fully optimized for arbitrary-order optical differentiation based on the use of spectrally phase encoded optical code division multiple access (OCDMA) sequences. The proposed design demonstrates experimentally ultrafast three-photon counting in a photomultiplier tube, which may serve as a building block for a novel, compact and easy to control dispersion compensating filter.

**Closing Remarks • 17:30**

**IWG4 • 17:15**
Compact FIR Filter Architecture for Tunable Optical Dispersion Compensation in Silicon Photonics, Abdul Rahim1, Stefan Schwarz1, Jürgen Zehnder1, Christian Schäffer2, Klaus Petermann1; 1Institute of High Frequency Engineering, University of Technology, Germany; 2High Frequency Engineering and Optoelectronics, University of Armed Forces, Germany. This paper presents the dispersion behavior of a 4-port asymmetric Mach-Zehnder-Interferometer, which can be used as a unique tool for ultrafast quantum state characterization as well as for ultrasensitive temporal measurements.

**SWD5 • 17:00**
Fully Optimized Long Period Fiber Grating Designs for Ultrafast Optical Differentiation, Reza Ashrafi1, Mohammad H. Asghari1, José Azaña1; 1Institut National de la Recherche Scientifique - Energie, Matériaux et Télécommunications (INRS-EMT), Canada. We propose a novel design for arbitrary-order optical differentiation based on a spectrally-apodized long period fiber grating operated in transmission to fully optimize the energetic efficiency and processing speed of the device.

**IWG5 • 17:15**
Femtosecond Three-Photon Counting in a Photomultiplier Tube, Amir Nevet1, Alex Hayat1, Meir Orenstein1; 1Technion, Israel. We demonstrate experimentally ultrafast three-photon counting by three-photon absorption in a photomultiplier tube, which may serve as a unique tool for ultrafast quantum state characterization as well as for ultrasensitive temporal measurements.

**IWG4 • 17:15**
Compact FIR Filter Architecture for Tunable Optical Dispersion Compensation in Silicon Photonics, Abdul Rahim1, Stefan Schwarz1, Jürgen Zehnder1, Christian Schäffer2, Klaus Petermann1; 1Institute of High Frequency Engineering, University of Technology, Germany; 2High Frequency Engineering and Optoelectronics, University of Armed Forces, Germany. This paper presents the dispersion behavior of a 4-port asymmetric Mach-Zehnder-Interferometer, which can be used as a building block for a novel, compact and easy to control dispersion compensating filter.

**Closing Remarks • 17:30**

**SWD6 • 17:45**
3D Fluorescent Imaging with Highly Nonlinear Photosensitive Materials, Evgenii F. Martynovitch1, D. S. Glazunov1, A. V. Kuznetsov1, E. V. Pestrukov1, A. V. Kyrpinchenko2, S. N. Bagayev2; 1Institute of Applied Physics, Russian Academy of Sciences; 2Institute of Laser Physics, Russian Academy of Sciences. Permanent 3D fluorescent structures were induced with single laser shots with energy < 1 microjoule. Mechanism of nonlinear photosensitivity is explained. Proposed materials can be used in different areas of photonics, sensors and optical memory.

**IWG5 • 17:15**
Femtosecond Three-Photon Counting in a Photomultiplier Tube, Amir Nevet1, Alex Hayat1, Meir Orenstein1; 1Technion, Israel. We demonstrate experimentally ultrafast three-photon counting by three-photon absorption in a photomultiplier tube, which may serve as a unique tool for ultrafast quantum state characterization as well as for ultrasensitive temporal measurements.
Sensors Keynote Speaker
SMA1 • 8:45-9:45
Optical Biomedical Sensors: What Can Nanophotonics Bring? Dan-Xia Xu, Inst. for Microstructural Sciences, National Research Council Canada, Canada. We discuss how nanophotonics is influencing the field of optical biomedical sensors. View points are exemplified in the context of developing integrated silicon photonic wire molecular sensor systems.

Dan-Xia Xu is a Senior Research Officer with National Research Council Canada, and an adjunct professor with arleton University. She received her B.S. degree from the University of Science and Technology of China in 1985, and her Ph.D. degree from Linköping University in Sweden in 1991 working on silicon-germanium HBTs and multi-quantum-well tunneling diodes. Since joining NRC, she has developed high speed SiGe HBTs, silicides for sub-micron VLSI, SiGe and silicide photodetectors, and later switched her research field to integrated optics. In 2001-2002 she was part of the research team at Optenia Inc. that successfully developed the first commercial glass waveguide echelle grating demultiplexer. In 2003, she pioneered the study of cladding stress induced birefringence in SOI waveguides and its application for polarization independent operation in photonic components. This technique is easy to implement and gives unprecedented control and design freedom in devices such as AWGs, ring resonators and Mach-Zehnder delay interferometers. Since 2005, she has been working on SOI photonic wire biosensors which are shown to be the most sensitive evanescent field sensor platform known to date. The NRC biosensor team has developed compact and high channel count sensors arrays and a reader system which does not require temperature control, and is capable of detecting protein and DNA adsorption of less than a femto-gram. Her current research interest is high index contrast silicon photonics, including biosensors, ring resonators, and optical modulation for biological sensing and optical communications. She has co-authored over 200 publications in technical journals and international conferences, several book chapters, and holds 6 patents.

Presenter Changes
- Chen-Han Du; Natl. Taiwan Univ. Taiwan will present IMC5, Modeling and Simulation II: Periodic Structures and Waveguides
- Kenji Ishizaki; Kyoto Univ., Japan, will present IMF1, Light Propagation in 3-D Photonic Crystals.
- Wei-cheng Lai, Univ. of Texas, USA will present IMF2, Experimental Demonstration of Ultra-Low Loss Coupling into Slow Light Slotted Photonic Crystal Waveguide on Silicon Nanomembrane
- Gilberto Brambilla, Univ. of Southampton, UK will present SMC4, In-Line Evanescent-Wave Microfluidic Absorption Sensor based on an Embedded Optical Microfiber coil
- Moshe Nazarathy; EE Technion., Israel, will present SPMB3, Low-Complexity Multi-Band Polyphase Filter Bank for Reduced-Guard- interval Coherent Optical OFDM
- The following talk will be presented in the STuC4 time slot:
  - STuC4, THz Sensing for Industrial Process Control, Irl Duling; Picomatrix, USA
  - Yanping Xi, McMaster Univ. Canada will present JTuB14, Modeling and Design Optimization of Discrete Mode Lasers for High Speed Single-Mode Operation in Optical Communication Networks
- Valerio Setti; Univ. of Modena and Reggio Emilia, Italy, will present SOWB3 Confinement Loss of Tube Lattice and Kagome Fibers
- Georges Humbert; Univ. de Rouen., France, will present SOWB5 Hollow-core Photonic Crystal Fibre based Raman Lasers
- Jacob Khurgin; Johns Hopkins Univ., USA will present SPWD6, Sequences for Impairment Mitigation in Coherent SPE-OCDMA
- Kambiz Jamshidi will present SLWA5, Saturation and Delay in Broadband Brillouin Slow-Light

Presentation Schedule Updates
IME4, Silicon Photonics Devices for Optical Interconnection, Takahiro Nakamura1,2, Junichi Fujikata1,2, Masashige Ishizaka1,2, and Keishi Ohashi2, 1: Photonics Electronics Technology Research Association; Japan 2: Green Innovation Research Laboratories, NEC Corporation, Japan. For optical interconnection, we demonstrated high-speed and high-efficiency optical modulator and photodetector by introducing nanostructure. Also, compact WDM optical source was developed using hybrid integrated SOA and silicon waveguide resonators. This paper will be presented in the IME4 time slot on Monday, 13 June at 17:00.

SOWD1, High Power Thulium Fiber Lasers, Martin Richardson, Univ. of Central Florida, will be presented in the SOWD1 time slot on Monday, 13 June at 16:00.

SOWD2, Fiber-based Synchronized Programmable Laser system for Biomedical, industrial and defense applications, Alain Villeneuve, Genia Photonics, Canada will be presented in the SOMB2 time slot on Monday, 13 June at 11:00.

SOWB4, Reliability of Double-Clad Fiber Coatings for Fiber Lasers, K. Tanskala, J. Ambramczyk, D. Guertin, N. Jacobson and K. Farley, Nufern, USA. In this paper we describe work on the improved reliability of low index polymer coatings used in high power double-clad fiber lasers and amplifiers. This paper will be presented in the SOW4 on Wednesday, 15 June at 8:30.

Withdrawn Presentations
IMF7
STuC4
SOTuC1
SOWB2
SPWB4
Advanced Photonics Congress Update Sheet

Program Updates

Please note the title and abstract update for presentation SMC3, Performance Gains in an Interferometric Fiber optic Gyroscope Operated with a Single-Frequency Laser, Seth W. Lloyd, Michel J. F. Digonnet, and Shanhui Fan, Stanford University, Stanford, CA, USA. We present theoretical and experimental results demonstrating significant performance gains in interferometric fiber optic gyroscopes when the traditional gyroscope broadband source is replaced with a single-frequency laser.

Please note the abstract update for presentation SOMD2, Multi-Material Optical Fiber Fabrication and Applications, Ayman Abouraddy; Univ. of Central Florida, USA. I review our progress in the emerging area of multi-material fibers. Applications range from mid-infrared linear and nonlinear chalcogenide glass fibers and fiber tapers, to the scalable and scale-invariant fabrication of micro- and nano-scale structures.

Please note the title and author block update for presentation ATuA3, Overlapped Subcarrier Multiplexed WDM PONs Enabled by Burst-Mode Receivers, David V. Plant1, Ziad A. El-Saadi1, Jonathan M. Buset1, Bhavin J. Shastri1, 1McGill Univ., Canada.

Please note the title update for presentation ATuB1 Radio-over-Fiber Techniques and Applications for Multi-Gb/s In-Building Wireless Communication, Anthony Ng'oma, Corning Inc., USA.

Please note the corrected author name for presentation STuA1, Filamentation THz generation in air, S.L. Chin, Univ. Laval, Canada

Please note the update of following poster presentations:

JTuB25, Enhanced Detection of Vibrations using Fiber Fabry Perot Filters and Spectral Estimation Techniques, Balaji Srinivasan, Bibin Varghese, Harish Achar, IIT Madras, India. We report on high sensitivity detection of acoustic signals using Fiber Bragg grating-based Fabry-Perot filters. Our scheme is based on an APD-based receiver with bandpass filter, 16-bit ADC, and novel spectrum estimation techniques.

Please note the abstract update for presentation IWG1, Quantum Information Processing on Photonic Chips, Dirk Englund; Columbia Univ., USA. We describe a technique to deterministically couple a single, pre-selected nitrogen vacancy (NV) center to a high-quality factor photonic crystal nanocavity in a Gallium Phosphide membrane.

Please note the title and abstract update for presentation SOWA4, Reliability of Double-Clad Fiber Coatings for Fiber Lasers, K. Tanaka, J. Ambranczyk, D. Guertin, N. Jacobson and K. Farley, Nufem, USA. In this paper we describe work on the improved reliability of low index polymer coatings used in high power double-clad fiber lasers and amplifiers.

Presider Updates

* Francesco Poletti; Univ. of Southampton, UK will preside over SMD, Spectral and Biomedical Imaging.
Advanced Photonics Congress

Exhibit: 13-14 June 2011 ♦ Toronto, Canada

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