Optical Nanostructures for Photovoltaics (PV)

21-24 June 2010, Kongresszentrum (Conference Center), Karlsruhe, Germany

PV covers all aspects of optical nanostructures for photovoltaic applications, from textured surfaces and diffraction gratings through to emerging areas topics such as plasmonic enhancement, spectrally split multiple cells and spectral flux management in multijunction solar cells. Learn more.

Pre-Registration is now closed. You may still register on-site at the Kongresszentrum (Conference Center), Karlsruhe, Germany beginning Sunday, June 20.

Take advantage of all PV has to offer:

- 50 Years of Lasers Celebration - featuring two Nobel Laureate talks.
- Seven meetings for the price of one.
- Tabletop exhibits.
- 2010 Optics Visualized Contest - This contest will feature and award works that make the Optics branch of science more visible to the world in an appealing and accessible way. Click here to submit.
- Poster sessions providing one-on-one discussion time with presenters.
- Kongresszentrum (Conference Center)- Detailed information on the Conference Center and the City of Karlsruhe.

Conference Program

View the Agenda
Plan Your Conference **View the conference program and plan your itinerary for the conference**

- Browse speakers and the agenda of sessions
- Browse sessions by type or day.
- Use Advanced Search to search by author, title, OCIS code and more.
- Plan and print your personal itinerary before coming to the conference.
- Download your personal itinerary to your mobile device.
- Add your personal itinerary to your electronic calendar.
- Email your itinerary to a colleague who might be interested in attending.

Download pages from the Congress program book (includes all meetings in the Advanced Photonics and Renewable Energy Congresses)!

- Abstracts (pdf)
- Agenda of Sessions (pdf)
- Key to Authors and Presiders (pdf)
- Postdeadline Abstracts (pdf)
- Key to Postdeadline Authors and Presiders (pdf)

Special Opportunities- for Students and Young Professionals

Renewable Energy: OSA Optics & Photonics Congress

- Optical Nanostructures for Photovoltaics (PV)
- Solid-State and Organic Lighting (SOLED)

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

Special Events details

- 3 Joint Plenary sessions
- Nobel Laureate talks celebrating 50 years of lasers
- Welcome Reception
- Poster Sessions
- Conference Banquet
- Post Deadline Sessions

Sponsor:

Optical Nanostructures for Photovoltaics (PV)

21-24 June 2010, Kongresszentrum (Conference Center), Karlsruhe, Germany

Program

The program for Optical Nanostructures for Photovoltaics (PV) will be held Monday, 21 June 2010 through Thursday, 24 June 2010. No events are scheduled for Sunday, 20 June; however participants may register and pick up their materials on Sunday afternoon.

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!

- About the meeting topics
- Invited speakers
- Call for papers
- Special events

Online Conference Program

Searchable Conference Program Available Online!

- Browse speakers and the agenda of sessions.
- Browse sessions by type or day.
- Use Advanced Search to search the program by author, title, OCIS code and more.
- Plan and print your personal itinerary before coming to the conference.
- Download your personal itinerary to your mobile device.
- Add your personal itinerary to your electronic calendar.
- Email your itinerary to a colleague who might be interested in attending.

You may search the program without creating an account; however, you will not be able to create or save a personal itinerary without first creating an account. We strongly recommend that you create a user account first.

Download pages from the program book!

- Abstracts
- Agenda of Sessions
- Key to Authors and Presiders

About Optical Nanostructures for Photovoltaics (PV)

FPhotovoltaic solar electricity is one of the key technologies for reducing the world's reliance on fossil fuels for energy generation. Reduced costs and higher conversion efficiencies are essential for making photovoltaics economically competitive. Optical nanostructures have a major role to play in improving the efficiency of solar cells by increasing the absorption of incident light, especially for thin-film applications. Solar concentrator systems, organic solar cells and dye-sensitized cells also stand to benefit from nanophotonic engineering schemes.

This meeting aims to bring together experts from the fields of nanophotonics and photovoltaics to address the issues and opportunities for merging these two technologies. The scope of the meeting covers all aspects of optical nanostructures for photovoltaic applications, from textured surfaces and diffraction gratings through to emerging areas topics such as plasmonic enhancement, spectrally split multiple cells and spectral flux management in multijunction solar cells.

Papers were considered in the following topic categories:

- Antireflection coatings
- Gratings and diffractive optics
- Plasmonic enhancement
- Slow light and resonance enhancement of optical absorption
- Spectral splitting
- Spectral flux management
- Nanostructures for solar concentrators
- Nanostructures for dye-sensitized solar cells
- Nanostructures for thin-film organic solar cells
- Novel solar cell geometries

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Call for Papers

For more information on submitting a paper, click here.

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Special Events

For more information vist the Renewable Energy special events page.

Optical Nanostructures for Photovoltaics (PV)

21-24 June 2010, Kongresszentrum (Conference Center), Karlsruhe, Germany

Chairs & Committee Members

The Technical Program Chairs and Committee Members are integral to the success of the meeting. These volunteers dedicate countless hours to planning, including such critical activities as raising funds to support the event, securing invited speakers, reaching out to colleagues to encourage submissions, reviewing papers, and scheduling sessions. On behalf of OSA, its Board, and its entire staff, we extend enormous gratitude to the following members of the PV Technical Program Committee.

Program Committee

Information for Conference Chairs and Committee Members

Information for Session Chairs/Presiders

Program Committee

General Chair

Thomas Krauss, *Univ. of St. Andrews, UK*

Program Chairs

Mark Brongersma, *Stanford Univ., USA*
Shanhui Fan, *Stanford Univ., USA*
Frederik C. Krebs, *Technical Univ. of Denmark, Denmark*
Karl Leo, *Technische Univ. Dresden, Germany*
Shawn Lin, *Rensselaer Polytechnic Inst., USA*
Dennis Prather, *Univ. of Delaware, USA*
Ralph Wehrspohn, *Fraunhofer Inst. for Mechanics of Materials IWM, Germany*
Thomas P. White, *Univ. of St. Andrews, UK*

Committee Members

Diffractive Optics Committee
Thomas Krauss, *St Andrews Univ., UK*, **Chair**
Shanhui Fan, *Stanford Univ., USA*
Frederik Krebs, *Technical Univ. of Denmark, Denmark*
Karl Leo, *Inst. fur Angewandte Photophysik, Germany*
Dennis W. Prather, *Univ. of Delaware, USA*
Ralph Wehrspohn, *Fraunhofer-Inst.Halle, Germany*
Thomas White, *St Andrews Univ., UK*

Plasmonics Committee
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Mark Brongersma, *Stanford Univ., USA*
Karl Leo, *Inst. fur angewandte Photophysik, Germany*
Shawn Lin, *Rensselaer Polytechnic Inst., USA*
Thomas White, *St Andrews Univ., UK*

Flux Control Committee
Thomas Krauss, *St Andrews Univ., UK*, **Chair**

Shanhui Fan, *Stanford Univ., USA*
Shawn Lin, *Rensselaer Polytechnic Inst., USA*
Ralph Wehrspohn, *Fraunhofer-Inst. Halle, Germany*

If you are a member of the committee and have any questions or concerns at any point along the way, please refer to the information below or contact your program manager.

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Information for Conference Chairs and Committee Members

- View the Calendar of Deadlines for the Meeting
- View the Chairs' Manual
- View the Call for Papers
- View Fundraising Information
- View Exhibit and Sponsorship Information
- View Author/Presenter Information
- View Peer Review Instructions
- View Scheduling Instructions
- View Student Travel Grant Information
- View Registration Information
- View Housing Information

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Session Presider/Chair Information

The role of the session presider (or session chair) is an important one. In many ways, the success of the session and the presentations within it depends on the presider. First and foremost, OSA recognizes the significance of the role of the session presider, and we thank you for volunteering to serve in this critical role!

The information on this page is arranged in the following sections and is intended to assist you in managing a successful session:

- Arriving at Your Session Room
- Guidelines for Presiding over a Session
- Completing the Presider Check-in Sheet

Arriving at Your Session Room

Presiders are requested to identify themselves to the audiovisual personnel at least 20 minutes before the session begins for a quick review of equipment and procedures.

Guidelines for Presiding over a Session

Remember to introduce yourself as the presider and announce the session. The total amount of time allotted for each presentation is listed in the online program as well as in the conference program book, and start times for each presentation are listed on the presider check-in sheet at the podium. A 60-minute mechanical timer will be available for your use. We recommend that the timer is set two minutes prior to the end of the presentation time in order to provide a warning to wrap up the talk and start the discussion period. Notify the authors of this warning system. It is also important to remind the speaker to repeat the questions asked from the audience.

Maintaining the scheduled timing of papers is very important. In cases where the paper is withdrawn or the speaker does not show, use the time for an extended question period for authors of previously presented papers or call a break. PLEASE DO NOT START TALKS EARLIER THAN THEY ARE SCHEDULED. All requests to modify the program schedule should be directed to the program chair.

We will have presider check-in sheets in your session room to complete and return to management at the completion of your session. When monitoring the session we ask that you note any changes or no-shows on this sheet for our records.

IMPORTANT NOTICE: Due to licensing restrictions, the use of music in presentations, including video presentations, is prohibited. If a speaker uses music during his/her presentation, please inform Meeting Management immediately.

For additional tips on how to be a great presider, watch a video featuring Dr. Ben Eggleton (CUDOS, Univ. of Sydney, Australia), or read the notes detailing a few of Dr. Eggleton's most important points.

Completing the Presider Check-in Sheet

Once you arrive at your session room, you will find a folder marked "Presider Check-In" at the podium or on the table at the front of the room. This folder will contain a sheet for each session in that room. Please be sure to remove only the sheet that applies to the session you are chairing, and leave the others in the folder. The check-in sheet will list the talks within your session, the order in which they will be given, and the name of the author giving the presentation. Please complete the check-in form as follows:

- Estimate the number of attendees in the session at the start of the session, about halfway into the session, and at the end of the session; note these counts where indicated in the upper right corner.
- Check the box in the rightmost column to indicate which speakers presented during the session.
- Make note of any no-show speakers or replacement speakers.
- Leave the completed sheet in the folder in the pocket marked "Completed."
- Leave the folder on the podium or table for the next session presider. (If you are chairing the last session of the day, please leave the folder in the room for meeting management.)

The check-in form serves two purposes: 1) to assist you in running an effective session and 2) to help OSA ensure that the appropriate speakers' files are archived on OSA Optics InfoBase after the meeting. Only those authors who attend and present are included in the InfoBase, so it's important that you make note of any presenters who are absent.

View a sample check-in sheet.

Again, we appreciate your assistance in serving as a session presider!

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Renewable Energy

June 21-24, 2010, Kongresszentrum (Conference Center), Karlsruhe, Germany

Exhibit

OSA Congresses are unique, medium sized meetings where 300-500 industry experts and top researchers and developers share their latest research and collaborate on new and future applications within their specialized fields. The meetings focus on the most advanced developments within specific topical areas of the optics and photonics industry. Exhibiting at **The Renewable Energy Optics & Photonics Congress** offers you an extremely targeted opportunity to display your company's products that fall within these co-located topical meeting areas:

- Optical Nanostructures for Photovoltaics (PV)
- Solid State and Organic Lighting (SOLED)

Reserve Your Exhibit Space

Bonus: You will receive one free technical pass for every tabletop space or 10'x10' booth you purchase.

Exhibit Rates

Sponsorship Opportunities for OSA Optics and Photonics Congresses

Full List of OSA Exhibiting Opportunities

For More Information about Reserving Exhibit Space at OSA Meetings, please call +1 202.416.1474 or email exhibitsales@osa.org

Exhibitor Service Manual

Includes set-up times, registration instructions, checklist of deadlines and shipping instructions.

For additional questions about exhibit logistics, please call +1 202-416-1972 or topicalexhibits@osa.org.

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Als globaler Technologieführer entwickelt, fertigt und vertreibt Agilent Technologies Messtechnikprodukte und -systeme für die Bereiche Elektronik, Kommunikation, Chemische Analysentechnik und Life Sciences. Die rund 16.000 Mitarbeiter des Unternehmens unterstützen Kunden in mehr als 110 Ländern. Im Geschäftsjahr 2009 erzielte Agilent einen Umsatz von 4,5 Milliarden US-Dollar. Der Hauptsitz des Unternehmens befi ndet sich in Santa Clara, Kalifornien (USA). Agilent Technologies beschäftigt in Deutschland rund 1.200 Mitarbeiterinnen und Mitarbeiter, die meisten davon in Böblingen bei Stuttgart und in Waldbronn bei Karlsruhe.

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FBGS Technologies is a privately held company with the goal of being one of the industry leaders in the manufacturing of high reliable Fibre Bragg Grating sensors for different market segments like Aerospace, Wind energy, Civil engineering, Oil industry, Medical industry and Automotive industry. FBGS Technologies uses a high innovative full automatic production process, which allows writing Fibre Bragg Gratings during the drawing of the fibre (Draw Tower Grating, DTG®) to delivers customized gratings.

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Fluxim develops and provides design software for device simulation and optimization to the display, lighting, and photovoltaics industries. Our product SETFOS is designed to simulate light harvesting in mixed coherent-incoherent multilayer solar cells with rough interfaces, light emission from thin-film devices such as organic light-emitting diodes (OLEDs), as well as electronic and excitonic processes in organic semiconducting multilayer systems.

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Karlsruhe School of Optics and Photonics (KSOP)
Dipl.-Ing. Swen König
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76131 Karlsruhe, Germany
The Karlsruhe School of Optics & Photonics (KSOP), the first graduate school at the Karlsruhe Institute of Technology (KIT), was established in 2006 within the scope of the Excellence Initiative by the German Federal and State Governments. KSOP envisions a novel combined masters program and a Ph.D. program in the research areas: Photonic Materials & Devices, Advanced Spectroscopy, Biomedical Photonics and Optical Systems.

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Renewable Energy

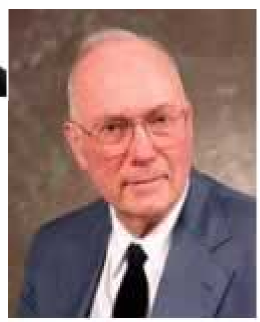
June 21-24, 2010, Kongresszentrum (Conference Center), Karlsruhe, Germany

Special Events

Nobel Laureate talks celebrating 50 years of lasers

Thursday, 24 June 2010
17.00 - 19.00
Brahms Conference Room, Karlsruhe Convention Center

Adventures in Laser Spectroscopy, Theodor W. Hänsch, Max Planck Inst. for Quantum Optics, Germany
Professor Theodor W. Hänsch received his Nobel Prize in Physics in 2005 for his work on precision laser spectroscopy including the laser frequency comb technique. Laser frequency comb synthesizers, as first demonstrated in 1995, permit extremely accurate measurements of optical frequencies. This allowed the accuracy of clocks to improve markedly from about one second per day in the year 1800 to about one picosecond per day in 2010.



The Laser - How New Things Happen, Charles H. Townes, Univ. of California at Berkley, USA
Prof. Townes received the Nobel Prize in Physics in 1964 for work on the maser that ultimately was instrumental in the development of the laser. Townes is not just known for his work on the maser and laser but also for work in the field of nonlinear optics, radio astronomy, and infrared astronomy. For instance, his work in astronomy has led to the detection of the first complex molecules in interstellar space and to the first measurement of the mass of the black hole at the center of this galaxy.

Plenary Sessions

Brahms Conference Room, Karlsruhe Convention Center

Three plenary sessions feature keynote talks representative of each topical area.

Monday, 21 June 2010
8.00 - 10.00

3-D Photonic Metamaterials Made by Direct Laser Writing, Martin Wegener; *Univ. of Karlsruhe, Germany*
Title to be Determined, Yaro Silberberg; *Weizmann Inst. of Science, Israel*

Monday, 21 June 2010
16.30 - 19.00

Laser Based Sensors for *In-Situ* and Standoff Detection of Explosives, Chemical Warfare Agents and Toxic Industrial Chemicals, C. Kumar N. Patel; *Pranalytica, Inc., USA*
SSL Innovation and Driver for Growth in the Lighting Market, Bernhard Stapp; *OSRAM, Germany*
The Influence of the 4n^2 Light Trapping Factor on Ultimate Solar Cell Efficiency, Eli Yablonovitch; *Univ. of California at Berkley, USA*

Tuesday, 22 June 2010
8.00 - 10.00

Next-Generation Optical Access Networks: Goals, Challenges and Research Opportunities, Leonid Kazovsky; *Stanford Univ., USA*
Digital Coherent Optical Communications Beyond 100 Gb/s, Kim Roberts; *Nortel Networks, Canada*

Welcome Reception

Monday, 21 June 2010
19.00 - 20.30
Kongresszentrum (Conference Center)

Start the Congress excitement early by joining us on Monday, June 21st, for the Welcome Reception. This reception is the perfect kick-off to this year's congress. Free to all Technical Conference Attendees. Meet with colleagues from around the world. Light hors d'oeuvres will be served. The reception is sponsored by the city of Karlsruhe.

Banquet

Tuesday, 22 June 2010
18.00 - 22.00
Center for Art and Media (ZKM)
Lorenzsträÿe 19
76135 Karlsruhe

As a cultural institution, the Center for Art and Media (ZKM) in Karlsruhe holds a unique position in the world. It responds to the rapid developments in information technology and today's changing social structures. Its work combines production and research, exhibitions and events, coordination and documentation. More information on ZKM.

The banquet tickets are not included with the conference registration. Tickets may be purchased for USD $100 per person.

Other Activites

Karlsruhe Institute of Technology (KIT) Lab Tour

The Karlsruhe Institute of Technology Lab Tour will be on Wednesday from 7 pm to 9 pm. Participants will meet at Registration Desk of the Conference Center.

Optics Visualized Contest 2010

This contest will feature and award works that make the Optics branch of science more visible to the world in an appealing and accessible way.

Postdeadline submission deadline 20 June, 2010. Click here to submit.

Attendee/Spouse Karlsruhe Tours

While the congress takes place, we are providing a cultural programs for spouses and attendees, starting each day between 10 a.m.-2 p.m. lasting between 2 and 2.5 hours.

No registration required
Meeting-Point: Congress-Center
Price: 10 Euro per person, payable in cash to the tour-guide.

Optical Nanostructures for Photovoltaics (PV)

21-24 June 2010, Kongresszentrum (Conference Center), Karlsruhe, Germany

Invited Speakers

Keynote Speakers

Nobel Laureate talks celebrating 50 years of lasers
Time: Thursday, June 24th, 5 to 7 pm,
Place: Brahms Conference Room, Karlsruhe Convention Center

Adventures in Laser Spectroscopy, Theodor W. Hänsch, Max Planck Inst. for Quantum Optics, Germany
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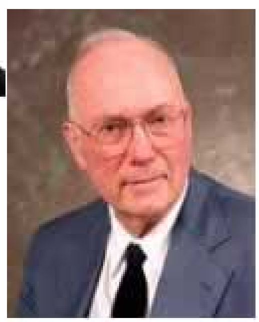

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Joint Plenary Speaker

The Influence of the 4n2 Light Trapping Factor on Ultimate Solar Cell Efficiency, Eli Yablonovitch; *Univ. of California at Berkley, USA*

Tutorial Speaker

How Solar Cells Work, Peter Wuerfel; *Univ. Karlsruhe, Germany*

Invited Speakers

Localized Surface Plasmons for High Efficiency Solar Cells, Kylie Catchpole; *Australian Natl. Univ., Canberra, Australia*
Efficient Nanocone Light Trapping for Photovoltaics, Yi Cui; *Stanford Univ., USA*

Photonic Crystal-Assisted High-Efficiency Photovoltaic Generation, Ihab F. El-Kady; *Sandia Natl. Labs, USA*
Implications of Nanophotonics for the Limit of Thin-Film Light Trapping and for the Single-Junction Shockely-Queisser Limit, Shanhui Fan; *Stanford Univ., USA*

Harvesting Solar Energy by Creating an Innovative Network of Nanostructures, Shawn Lin; *Rensselaer Polytechnic Inst., USA*

Light Incoupling and Optical Optimisation of Organic Solar Cells, **Jan Meiß**[1], Rico Schueppel[1], Ronny Timmreck[1], Mauro Furno[1], Christian Uhrich[2], Stefan Sonntag[2], Wolf-Michae&supl; Gnehr[2], Martin Pfeiffer[2], Karl Leo[1], Moritz Riede[1]; [1]*Inst. f&uum&supl;;r Angewandte Photophysik, Technische Univ. Dresden, Germany, 2Heliatek GmbH*, Germany.

Plasmonic Solar Cells, Albert Polman; *FOM- Inst. for Atomic and Molecular Physics, Netherlands*
Slow Light in Photonic Crystals for Photovoltaic Applications, Christian Seasalle; *Univ. of Lyon, France* **Photonics of Intermediate Reflectors in Tandem Solar Cells**, Ralf Wehrspohn; *Univ. of Halle, Germany*

We wish to thank the following for their contribution to the success of this conference: European Office of Aerospace Research and Development, Air Force Office of Scientific Research, United States Air Force Research Laboratory.

Agenda of Sessions — Sunday, 20 June

12.00–17.00	**Registration Open,** *Main Foyer*
17.30–19.00	**Networking Happy Hour,** *Novotel Hotel* **(BGPP/NP)**

Agenda of Sessions — Monday, 21 June

	Hebel	Thoma	Mombert	Scheffel	Clubraum	Room 2.05	Room 2.08
	BGPP	NP	Sensors	ANIC	SPPCom	SOLED	PV
7.45–8.00	**Opening Remarks,** *Thoma Conference Room*						
8.00–10.00	**JMA • BGPP/NP Joint Plenary Session,** *Thoma Conference Room*						
10.00–17.00	**Exhibits Open,** *Weinbrenner Conference Room*						
10.00–10.30	**Coffee Break/Exhibits,** *Weinbrenner Conference Room*						
10.30–12.30	**BMA • Advances in Fiber Grating Fabrication**	**NMA • Rogue Waves**	**NMB • All-Optical Processing**				
12.30–14.00	**Lunch Break** *(on your own)*						
14.00–16.00	**BMB • Waveguide Gratings and Volume Holograms**	**NMC • Pulse Propagation in Fiber**	**NMD • Spatial Effects and Solitons**				**PMA • Multijunction Cells and Flux Control** (starts at 13.30)
16.00–16.30	**Coffee Break/Exhibits,** *Weinbrenner Conference Room*						
16.30–19.00	**JMB • SENSORS/SOLED/PV Joint Plenary,** *Thoma Conference Room*						
19.00–20.30	**Welcome Reception/NP Poster Session,** *Weinbrenner Conference Room*						

Key to Conference Abbreviations

Advanced Photonics: OSA Optics & Photonics Congress

BGPP	Bragg Gratings, Photosensitivity and Poling in Glass Waveguides
NP	Nonlinear Photonics
Sensors	Optical Sensors
ANIC	Access Networks and In-house Communications
SPPCom	Signal Processing in Photonic Communications

Renewable Energy: OSA Optics & Photonics Congress

PV	Optical Nanostructures for Photovoltaics
SOLED	Solid-State and Organic Lighting

Agenda of Sessions — Tuesday, 22 June

	Hebel	Thoma	Mombert	Scheffel	Clubraum	Room 2.05	Room 2.08
	BGPP	NP	Sensors	ANIC	SPPCom	SOLED	PV
8.00–10.00	**JTuA • ANIC/SPPCom Joint Plenary,** *Thoma Conference Room*						
10.00–17.00	**Exhibits Open,** *Weinbrenner Conference Room*						
10.00–10.30	**Coffee Break/Exhibits,** *Weinbrenner Conference Room*						
10.30–12.30	**BTuA • Gratings in Pulse Generation and Active Fibers**	**NTuA • Modelocking in Fiber Lasers**	**STuA • Fibers and Sensors I**	**ATuA • Broadband Access Networks**	**SPTuA • Modulation Formats**	**SOTuA • Lighting Solutions I**	**PTuA • Thermophoto-voltaics**
12.30–13.30	**Lunch Break** *(on your own)*						
13.30–15.30	**BTuB • Grating Stability and Poling**	**NTuB • Silicon and Molecular Photonics** (ends at 15.00)	**STuB • Sensor Systems I**	**ATuB • WDM-PON Architectures and Technologies**	**SPTuB • Advanced Optical Signal Processing**	**SOTuB • LED Technology and Charac-terization I**	**PTuB • Diffractive Optics and Nanostruc-tures I**
15.30–16.00	**Coffee Break/Exhibits,** *Weinbrenner Conference Room*						
16.00–17.30	**BTuC • Novel Grating Structures** (ends at 17.45)		**STuC • Micro-structures in Sensing**	**ATuC • Monitoring and Supervision in Networks** (ends at 17.15)	**SPTuC • DSP Hardware and Real Time Processing**	**SOTuC • Modelling and Design** (ends at 17.40)	**PTuC • Diffractive Optics and Nanostruc-tures II**
16.00–17.30	**NTuC • NP Tuesday Poster Session,** *Weinbrenner Conference Room*						
18.00–22.00	**Museum for Media and Art (ZKM) Banquet** *(advanced purchase required)*						

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Renewable Energy: OSA Optics & Photonics Congress

PV Optical Nanostructures for Photovoltaics
SOLED Solid-State and Organic Lighting

Agenda of Sessions — Wednesday, 23 June

	Hebel	Thoma	Mombert	Scheffel	Clubraum	Room 2.05	Room 2.08
	BGPP	NP	Sensors	ANIC	SPPCom	SOLED	PV
8.30–10.00	**BWA • Femtosecond Laser Symposium I** (starts at 8.00)	**NWA • Temporal and Spatiotempo-ral Effects** (starts at 8.00)	**SWA • Bragg Gratings in Sensing**	**AWA • Next Generation Access Networks** (starts at 8.00)	**SPWA • Coherent Receivers I**	**SOWA • SOLED Plenary**	**PWA • Plasmonics I** (starts at 8.00)
10.00–17.00	**Exhibits Open,** *Weinbrenner Conference Room*						
10.00–10.30	**Coffee Break/Exhibits,** *Weinbrenner Conference Room*						
10.30–11.30	**PWB • PV Poster Session,** *Weinbrenner Conference Room*						
10.30–12.30	**BWB • Femtosecond Laser Symposium II**	**NWB • Computational Analysis and Modeling**	**SWB • Biophotonics and Fiber-Sensors**	**AWB • Home Network Technologies** (ends at 12.45)	**SPWB • Coherent Receivers II** (ends at 11.45)	**SOWB • LED Technology and Charac-terization II**	**PWC • Plasmonics II** (starts at 11.30)
12.30–13.30	**Lunch Break** *(on your own)*						
13.30–15.30	**BWC • Femtosecond Laser Symposium III**	**NWC • Harmonic Generation in Photonic Structures**	**SWC • Lasers for Sensors**	**AWC • Hybrid Access Networks**	**SPWC • Coherent Receivers II**	**SOWC • Lighting Solutions II**	**PWD • Novel Concepts and Materials**
15.30–16.00	**Coffee Break/Exhibits,** *Weinbrenner Conference Room*						
16.00–18.00	**BWD • Material Photosensi-tivity**	**NWD • Micro-structures and Parametric Devices**	**SWD • Sensor Systems II** (ends at 17.30)				
16.00–17.30	**JWA • ANIC/SOLED Joint Poster Session,** *Weinbrenner Conference Room*						

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Renewable Energy: OSA Optics & Photonics Congress

PV	Optical Nanostructures for Photovoltaics
SOLED	Solid-State and Organic Lighting

Agenda of Sessions — Thursday, 24 June

	Hebel	Thoma	Mombert	Scheffel	Clubraum	Room 2.05	Room 2.08
	BGPP	NP	Sensors	ANIC	SPPCom	SOLED	PV
8.00–10.00		**NThA • Materials and Devices for All-Optical Processing**		**AThA • Wireless Networks and Technologies**	**SPThA • Forward Error Correction** (starts at 8.30)	**SOThA • SOLED Postdeadline Session** (starts at 8.30)	
8.30–10.00	**JThA • BGPP/SENSORS Joint Poster Session,** *Main Foyer*						
10.30–12.30	**BThB • Sensor and Signal Processing Applications**	**NThB • Waveguides and Fabrication**	**SThB • Sensors Using Photonic Crystal Fibers**	**AThB • Advanced Optical Transmission Technologies**	**SPThB • Sensors Using Photonic Crystal Fibers** (ends at 12.15)	**SOThB • LED Technology and Characterization III**	
12.30–13.30	**Lunch Break** *(on your own)*						
13.30–15.30	**BThC • Grating Sensors and Device Properties**	**NThC • Wavelength Conversion**	**SThC • Fibers and Sensors II**	**AThC • Photonic Technologies for Next Generation Access Networks**	**SPThC • OFDM II** (ends at 15.00)	**SOThC • LED Technology and Characterization IV** (ends at 15.10)	
15.30–16.00	**Coffee Break,** *Main Foyer*						
15.45–16.45	**BThD • PDP Session**	**NThD • PDP Session**	**SThD • PDP Session**	**AThD • PDP Session**		**SOThD • PDP Session**	
15.45–16.45	**Optics Visualized Competition,** *Clubraum*						
17.00–19.00	**JThB • Nobel Laureate Session: 50 Years of Lasers,** *Brahms Conference Room*						

Key to Conference Abbreviations

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Renewable Energy: OSA Optics & Photonics Congress

PV	Optical Nanostructures for Photovoltaics
SOLED	Solid-State and Organic Lighting

Hebel	Thoma	Mombert
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Nonlinear Photonics

7.00–18.00 Registration Open, *Main Foyer*

8.00–10.00
JMA • BGPP/NP Joint Plenary Session

JMA1 • 8.00 Plenary
3-D Photonic Metamaterials Made by Direct Laser Writing, ***Martin Wegener****; Karlsruhe Inst. of Technology, Univ. of Karlsruhe, Germany.* We review our recent progress on fabrication and characterization of three-dimensional photonic metamaterials made by direct laser writing. Examples are gold-helix metamaterials that can serve as compact broadband circular polarizers and three-dimensional invisibility cloaks.

JMA2 • 9.00 Plenary
Title to Be Announced, ***Yaron Silberberg****; Weizmann Inst. of Science, Israel.* Light propagating in waveguide lattices shares many properties with the quantum physics of electrons in condensed matter. This talk reviews a decade of progress in the study of nonlinear and quantum properties of photonic lattices.

10.00–17.00 Exhibits Open, *Weinbrenner Conference Room*

10.00–10.30 Coffee Break/Exhibits, *Weinbrenner Conference Room*

10.30–12.30
BMA • Advances in Fiber Grating Fabrication
Periklis Petropoulos; Optoelectronics Res. Ctr., Univ. of Southampton, UK, Presider

BMA1 • 10.30 Invited
New Manufacturing of Ultra-Long FBG's (> 10 m) Whilst Maintaining High Performance Characteristics, ***Krister Fröjdh****; Proximion Fiber Systems AB, Sweden.* Fiber Bragg gratings of 10 m length are routinely manufactured by stitching of many short segments. The stitch quality is good enough for 40 Gbit/s systems dispersion compensation, and the method allows for customized compensation.

BMA2 • 11.00
Tunable Interferometers for Writing Bragg Gratings with Low Coherence Sources, ***Francois Ouellette****; Kromatech Inc., Canada.* Two tunable interferometers for writing Bragg gratings with low coherence sources are presented. Both use a combination of two phase masks. The grating period is tuned by either tilting the mirrors or the phase masks themselves.

BMA3 • 11.15
Femtosecond Laser Inscription of Fiber Bragg Gratings with Low Insertion Loss and Minor Polarization Dependence, ***Kyriacos Kalli***[1], *Tom Allsop*[2], *Charalambos Koutsides*[1], *Edd Davies*[2], *David Webb*[2], *Lin Zhang*[2]; [1]*Cyprus Univ. of Technology, Cyprus,* [2]*Aston Univ., UK.* The inscription of low insertion loss and negligibly polarization dependent fiber Bragg gratings inscribed using a femtosecond laser system is reported. Insertion losses were <0.4dB/20mm and polarization wavelength shift of <5pm, with transmission changes <0.1dB.

10.30–12.30
NMA • Rogue Waves
Jason Fleischer; Princeton Univ., USA, Presider

NMA1 • 10.30 Invited
Rogue Waves in Optics, ***Majid Taki****; Univ. de Lille 1, France.* Supercontinuum generation in photonic crystal fibers exhibits sharp, rare, and extremely high power pulses that share their main features with the devastating oceanic rogue waves. Modelling and formation of optical rogue waves are discussed.

NMA2 • 11.00
Collisions and Emergence of Optical Rogue Solitons, ***Goery Genty***[1], *Martijn de Sterke*[2], *Ole Bang*[3], *Frederic Dias*[4], *Nail Akhmediev*[5], *John M. Dudley*[6]; [1]*Tampere Univ. of Technology, Finland,* [2]*CUDOS ARC Ctr. of Excellence, School of Physics, Univ. of Sydney, Australia,* [3]*Technical Univ. of Denmark, Denmark,* [4]*Ctr. de Mathématique et de Leurs Applications (CMLA), ENS Cachan, France,* [5]*Australian Natl. Univ., Australia,* [6]*Univ. de Franche-Comté, France.* We discuss optical rogue soliton generation in terms of collision processes. Numerical simulations of picosecond pulse propagation in highly nonlinear optical fibers show rogue soliton generation from either third-order dispersion or Raman scattering independently.

NMA3 • 11.15
Rogue Dispersive Wave Generation Induced by Soliton Collision, *Miro Erkintalo*[1], ***Goery Genty***[1], *John M. Dudley*[2]; [1]*Tampere Univ. of Technology, Finland,* [2]*Univ. de Franche-Comté, France.* We show numerically in the context of supercontinuum generation in the long pulse regime that soliton collisions can lead to the generation of statistically rare, extreme-amplitude dispersive waves with enhanced spectral shift.

10.30–12.30
NMB • All-Optical Processing
Sergei K. Turitsyn; Aston Univ., UK, Presider

NMB1 • 10.30 Invited
Use of Semiconductor Optical Amplifiers in Signal Processing Applications, ***Robert J. Manning***[1], *R. P. Webb*[1], *J. M. Dailey*[1], *G. D. Maxwell*[1], *Robert J. Manning*[2], *A. J. Poustie*[2], *S. Lardenois*[2], *D. Cotter*[1]; [1]*Tyndall Natl. Inst. and Physics Dept., Univ. College Cork, Ireland,* [2]*CIP Technologies, UK.* We describe a 42.6 Gbit/s all-optical pattern recognition system which uses semiconductor optical amplifiers (SOAs). A circuit with three SOA-based logic gates is used to identify specific port numbers in an optical packet header.

NMB2 • 11.00
Gain and Phase Dynamics of an InAs/InGaAsP/InP Quantum-Dot Semiconductor Optical Amplifier at 1.55 µm, ***Karen Solis-Trapala***[1], *Yi An*[2], *Richard Notzel*[1], *Harm J. S. Dorren*[1], *Robert J. Manning*[2]; [1]*COBRA Res. Inst., Eindhoven Univ. of Technology, Netherlands,* [2]*Tyndall Natl. Inst. and Dept. of Physics, Univ. College Cork, Ireland.* Time-resolved gain and phase dynamics of an InAs/InGaAsP/InP quantum-dot semiconductor optical amplifier are investigated. The recovery is dominated by an ultrafast component (~1 ps), indicating strongly that the gain medium is genuinely dot-like in character.

NMB3 • 11.15
160 Gb/s Wavelength Conversion in a PPLN Waveguide at Room Temperature, ***Miguel V. Drummond***[1], *Jacklyn D. Reis*[1], *Rogério N. Nogueira*[1,2], *Paulo P. Monteiro*[1,2], *António L. Teixeira*[1,2], *Satoshi Shinada*[3], *Naoya Wada*[3], *Hiromasa Ito*[4,5]; [1]*Inst. de Telecomunicações, Univ. de Aveiro, Portugal,* [2]*Nokia Siemens Networks, Portugal,* [3]*NICT, Japan,* [4]*RIKEN, Japan,* [5]*Res. Inst. of Electrical Communication, Tohoku Univ., Japan.* Error-free 160 Gb/s wavelength conversion in a PPLN waveguide is experimentally demonstrated with a 2.1 dB power penalty at room temperature. Preliminary results at 320 Gb/s show that PPLN waveguides can reach such high bitrates.

Hebel

Bragg Gratings, Photosensitivity and Poling in Glass Waveguides

BMA • Advances in Fiber Grating Fabrication—Continued

BMA4 • 11.30
Bragg Grating Writing in Acoustically Excited Optical Fiber, ***Roberson A. Oliveira***[1,2], *Kevin Cook*[2], *John Canning*[2], *Alexandre A. P. Pohl*[1]; [1]*Federal Univ. of Technology, Brazil,* [2]*iPL – interdisciplinary Photonics Lab, Australia.* Acoustic excitation of a fibre during Bragg grating inscription is presented. It shows the potential for tuning and tailoring conventional uniform grating writing processes to generate complex profiles without any adjustment of the writing process.

BMA5 • 11.45
Microhole-Structured Long Period Fiber Grating, ***Dongning Wang***, *Ying Wang, Minwei Yang; Hong Kong Polytechnic Univ., Hong Kong.* Microhole-structured long period fiber grating is created by using femtosecond laser micromachining. Such a grating exhibits a more compact size and larger refractive index sensitivity when compared conventional long period fiber grating.

BMA6 • 12.00
LPG on Tapered Fiber Fabricated by Holographic Technique and 10.6μm Radiation, ***Aissa Harhira***[1], *Isabel C.S. Carvalho*[2], *Raman Kashyap*[1]; [1]*École Polytechnique de Montréal Canada,* [2]*Pontifícia Univ. Católica do Rio de Janeiro, Brazil.* LPG on tapered fiber are fabricated by use 10.6 μm radiation and a phase mask. A laser is incident normally on the phase mask and imprints a thermally induced periodic modulation into the tapered fiber.

BMA7 • 12.15
Microfluidic Water-Vacuum Periodic Structures in a Hollow Optical Fiber by Temperature-Dependent Self-Assembly, ***Sohee An***; *Yonsei Univ., Republic of Korea.* We report a self-assembled water-vacuum microfluidic periodic structures in a hollow optical fiber by one-way flame brushing technology. With this structure, we saw the detailed fabrication process and optical properties characteristics were discussed successfully.

Thoma

Nonlinear Photonics

NMA • Rogue Waves—Continued

NMA4 • 11.30
Validation of Input-Noise Model for Simulations of Supercontinuum Generation and Rogue Waves, ***Michael H. Frosz***; *DTU Fotonik, Dept. of Photonics Engineering, Technical Univ. of Denmark, Denmark.* A new model for pump noise in supercontinuum and rogue wave generation is presented. Simulations are compared with experiments and show that the new model provides significantly better agreement than the currently ubiquitously used model.

NMA5 • 11.45
Emergence of Rogue Waves from Optical Turbulence, ***Kamal Hammani***, *Bertrand Kibler, Christophe Finot, Antonio Picozzi; Lab Interdisciplinaire Carnot de Bourgogne, Univ. de Bourgogne, France.* We show the emergence of rogue wave events from optical turbulence. Depending on the amount of incoherence in the system, we identified different turbulent regimes that exhibit intermittent rogue events or sporadic bursts of light.

NMA6 • 12.00
Soliton Generation and Rogue-Wave Like Behavior through Fourth Order Modulation Instability, ***Kamal Hammani***, *Christophe Finot, Bertrand Kibler, Guy Millot; Lab Interdisciplinaire Carnot de Bourgogne, Univ. de Bourgogne, France.* We numerically study the dynamics of ultra-broadband wavelength converters based on fourth-order scalar modulation instability. We report the spontaneous emergence of solitons and trapped radiation waves as well as L-shaped associated statistical signatures.

NMA7 • 12.15
Rogue Waves in Presence of Higher Order Effects, ***Nail Akhmediev***[1], *Adrian Ankiewicz*[1], *Jose-Maria Soto-Crespo*[2]; [1]*Optical Sciences Group, Australian Natl. Univ., Australia,* [2]*Inst. de Optics, Spain.* The Hirota equation is a modified nonlinear Schroedinger equation that takes into account higher order dispersion and time-delay changes to the cubic nonlinearity. We present the two lowest order rational solutions that describe rogue waves.

Mombert

Nonlinear Photonics

NMB • All-Optical Processing—Continued

NMB4 • 11.30
All Optical Soliton-Based 2R Regeneration at 170 Gbps, *Julien Fatome*[1], ***Christophe Finot***[1], *Mathilde Gay*[2], *M. Costa e Silva*[2], *T. N. Nguyen*[2], *Laurent Bramerie*[2], *Thierry Chartier*[2], *Michel Joindot*[2], *Jean-Claude Simon*[2], *Jean-Louis Oudar*[3]; [1]*Lab Interdisciplinaire Carnot de Bourgogne, Univ. de Bourgogne, France,* [2]*CNRS Foton, ENSSAT, Univ. Rennes, France,* [3]*Lab Photonique et Nanostructures, France.* We report the numerical and experimental studies of a spectrally filtered-based all-optical 2R regenerator at 170 Gbps. The fiber device is combined with a fast saturable absorber. BER assessment exhibits a receiver sensitivity improvement.

NMB5 • 11.45
All-Optical Pulse Retiming Based on Quadratic Cascading in a Periodically Poled Lithium Niobate Waveguide, ***Kwang Jo Lee***[1], *Sheng Liu*[1], *Francesca Parmigiani*[1], *Periklis Petropoulos*[1], *David J. Richardson*[1], *Katia Gallo*[2]; [1]*Optoelectronics Res. Ctr., Univ. of Southampton, UK,* [2]*Royal Inst. of Technology (KTH), Sweden.* We demonstrate an all-optical technique for the elimination of timing jitter in short pulse transmission systems. The technique relies on pulse pre-shaping followed by optical switching in a periodically poled lithium niobate waveguide via cascaded second harmonic and difference frequency generation.

NMB6 • 12.00
46 nm Frequency Conversion with Chirp Grating PPLN Waveguide and Implementation of a 23 nm Tunable Programmable Laser Centered at 774 nm, ***Bryan Burgoyne***[1], *Youngjae Kim*[1], *Alain Villeneuve*[1], *Yoshiki Nishida*[2]; [1]*Genia Photonics Inc., Canada,* [2]*NEL America Inc., USA.* We present a programmable picosecond laser tunable over 23 nm around 777 nm from a dispersion-tuned mode-locked 1554 nm fiber laser converted through a wideband pigtailed chirped Periodically-Poled Lithium Niobate waveguide with 50% power efficiency.

NMB7 • 12.15
Micro Resonators Combined Linear and Nonlinear for Compact Ultrafast Switching, ***Kenzo Yamaguchi***[1], *Masamitsu Fujii*[2], *Masanobu Haraguchi*[3], *Toshihiro Okamoto*[3], *Masuo Fukui*[3]; [1]*Dept. of Electrical and Electronic Engineering, Toyohashi Univ. of Technology, Japan,* [2]*Dept. of Electronics and Mechanics, Toba Natl. College of Maritime Technology, Japan,* [3]*Dept. of Optical Science and Technology, Univ. of Tokushima, Japan.* We have coated a silica microsphere with J-aggregates and observed a nonlinear response of the Whispering Galley Mode of the sphere. Finally, we proposed a trimer microresonator combined linear and nonlinear microspheres with a femtosecond-order nonlinear response time.

12.30–14.00 Lunch Break *(on your own)*

Hebel

Bragg Gratings, Photosensitivity and Poling in Glass Waveguides

14.00–16.00
BMB • Waveguide Gratings and Volume Holograms
Presider to Be Announced

BMB1 • 14.00 Invited
Fabrication and Applications of Volume Bragg Gratings, *Leonid B. Glebov*; *CREOL, College of Optics and Photonics, Univ. of Central Florida, USA.* Basics and last results in laser beam control by volume Bragg gratings recorded in photo-thermo-refractive glass based on their high efficiency, narrow spectral selectivity and high tolerance to high power laser radiation are presented.

BMB2 • 14.30
Efficient VBG in Fused Silica Induced by Femtosecond Laser Pulses, *Christian Voigtländer*, *Daniel Richter, Jens Thomas, Stefan Nolte, Andreas Tünnermann; Inst. of Apllied Physics, Friedrich-Schiller-Univ. Jena, Germany.* We report on the realization of volume Bragg gratings (VBGs) by femtosecond laser inscription. The VBGs exhibit strong reflectivity even up to the 27th order.

Thoma

Nonlinear Photonics

14.00–16.00
NMC • Pulse Propagation in Fiber
Presider to Be Announced

NMC1 • 14.00
Testing Asymptotic Solutions of the Sine-Gordon Equation by SRS in Photonic Crystal Fibers, *Alexander Nazarkin*, *Amir Abdolvand, Alexey V. Chugreev, Philip St. J. Russell; Max-Planck-Inst. for the Science of Light, Germany.* The self-similar behaviour of non-solitonic solutions of the sine-Gordon equation is verified by studying transient stimulated Raman scattering in gas-filled hollow-core photonic crystal fiber, which offers unprecedentedly long nonlinear interaction lengths.

NMC2 • 14.15
Stable Soliton Pairs in the Presence of Raman Shift, *Alexander Hause*, *Fedor Mitschke; Univ. of Rostock, Germany.* We show analytically that fiber-optic solitons in the presence of Raman self-frequency shift can form qualitatively different types of soliton pairs. The predictions agree with numerical simulations.

NMC3 • 14.30
Guided Acoustic Wave Brillouin Scattering in a Nanostructure Core Fiber, *Jean-Charles Beugnot[1,2], **Michaël Delqué**[1], Birgit Stiller[1], Min Won Lee[1], Hervé Maillotte[1], Vincent Laude[1], Gilles Mélin[3], Thibaut Sylvestre[1]; [1]Inst. FEMTO-ST, Univ. de Franche-Comté, France, [2]Group for Fiber Optics, École Polytechnique Fédérale de Lausanne, Switzerland, [3]Draka, France.* We study guided acoustic wave Brillouin scattering in a nanostructure core fiber. Such design is shown, experimentally and numerically, to allow for the trapping of several acoustical modes overlapping efficiently with the optical one.

Mombert

Nonlinear Photonics

14.00–16.00
NMD • Spatial Effects and Solitons
Stefano Trillo; Univ. degli Studi di Ferrara, Italy, Presider

NMD1 • 14.00
Soliton Self-Deflection via Power-Dependent Walk-off, *Armando Piccardi, Alessandro Alberucci, **Gaetano Assanto**; Univ. of Rome, Italy.* We demonstrate and model power-dependent self-bending of spatial solitons in nematic liquid crystals. The deflection is explained by nonlinear changes in walk-off, as induced by the rotation of the optic axis via reorientation.

NMD2 • 14.15
Nematicon Routing in Liquid Crystal Light Valve, *Armando Piccardi*[1], *Alessandro Alberucci[1], Umberto Bortolozzo[2], Stefania Residori[2], Gaetano Assanto[1]; [1]NooEL, Univ. of Rome, Italy, [2]INLN-CNRS, Univ. Sophis Antipolis, France.* Using external beams on the photoconductive layer of a liquid crystal light valve we demonstrate all-optical control of soliton induced waveguides in nematics. Using this approach we implement a half-adder and a 3-bit demultiplexer.

NMD3 • 14.30
Interaction of Spatial Solitons in a High-Index Glass, *Elena D'Asaro*[1,2], *Alessia Pasquazi[1,3], Schirin Heidari-Bateni[1], Gaetano Assanto[1]; [1]Univ. of Rome, Italy, [2]DIEET, Univ. of Palermo, Italy, [3]INRS, Univ. du Quebec, Canada.* Using near-infrared picosecond pulses we investigate spatial solitons and their coherent interaction in a dissipative Kerr-like glass with multiphoton absorption. The results are modelled by a dissipative nonlinear Schrödinger equation.

Room 2.08

Optical Nanostructures for Photovoltaics

13.30–15.45
PMA • Multijunction Cells and Flux Control
Thomas Krauss; Univ. of St Andrews, UK, Presider

PMA1 • 13.30
Use of Holographic Optical Element as Dispersing Concentrating System for PV Power Generation, *Rajeev Ranjan*[1,2,3], *Abhijit Ghosh[1], Hira Lal Yadav[1], Asghar Khan[2], Nil Ratan Chakraborty[3]; [1]Natl. Inst. of Technology, India, [2]Karim City College, India, [3]Co-Operative College, India.* Optimization of processing parameters of thick phase transmission holographic lens presented in this paper reveals that entire useful solar spectrum for Photovoltaic power generation can be dispersed and focused with good diffraction efficiency.

PMA2 • 13.45
Novel Organic Solar Cell Design to Enhance the Efficiency Using an Optical Cavity Control, *Rafael A. Betancur Lopera*[1], *Xavier Elias[1], Luat T. Vuong[1], Jordi Martorell[1,2]; [1]ICFO –Inst. of Photonic Sciences, Spain, [2]Dept. de Fisica i Enginyeria Nuclear, Univ. Politècnica de Catalunya, Spain.* We fabricated an organic solar cell where the electrodes are metallic layers that form an optical cavity. To be able to optically enhance the efficiency, we used a high fluorescence quantum yield material as PPV.

PMA3 • 14.00 Tutorial
How Solar Cells Work, *Peter Würfel*; *Univ. Karlsruhe, Germany.* Solar cells are seen as heat engines. In a first step occurring in all semiconductors, chemical energy is produced by establishing 2 different Fermi-distributions. This step is limited by thermodynamics. In a second step, requiring the structure of a solar cell, chemical energy is transformed into electrical energy.

Hebel

Bragg Gratings, Photosensitivity and Poling in Glass Waveguides

BMB • Waveguide Gratings and Volume Holograms—Continued

BMB3 • 14.45
New Insights into Volume Grating Formed in Pr^{3+}-Doped Silicate Glasses Using FWM and X-Scan Techniques, *Abdullatif Y. Hamad*, *Esra Woody, Seongheon Kim; Southern Illinois Univ. at Edwardsville, USA.* The effective size of the grating region in Pr^{3+}-doped silicate glass was found to be smaller than the write-beams size. This was confirmed by the X-scan technique. FWM and X-scan result produced consistent Δn values.

BMB4 • 15.00
Chirped Gratings on Tapered SOI Rib Waveguides for Dispersion Compensation, *Ivano Giuntoni*[1], *David Stolarek[2], Andrzej Gajda[1], Jürgen Bruns[1], Bernd Tillack[2], Klaus Petermann[1], Lars Zimmermann[1,2]; [1]Technische Univ. Berlin, Germany, [2]IHP GmbH, Germany.* The fabrication and characterization of chirped Bragg gratings on tapered SOI rib waveguides is presented. A dispersion of 250 ps/nm over a bandwidth of 1 nm is demonstrated with 1 cm long gratings.

BMB5 • 15.15
High-Quality, Distributed Phase-Shift, Distributed Feedback Cavities in Al_2O_3 Waveguides, *Edward H. Bernhardi*[1], *Henk A. G. M. van Wolferen[2], Kerstin Wörhoff[1], Markus Pollnau[1], René M. de Ridder[1]; [1]Integrated Optical MicroSystems, MESA+ Inst. for Nanotechnology, Univ. of Twente, Netherlands, [2]Transducers Science and Technology Group, MESA+ Inst. for Nanotechnology, Univ. of Twente, Netherlands.* Distributed phase-shift holographically-written surface relief Bragg gratings have been integrated with Al_2O_3 waveguides via reactive ion etching of SiO_2 overlay films. The realized optical cavities are highly reflective and demonstrate Q-values as high as 125000.

BMB6 • 15.30
Fast Direct Fabrication of Waveguide Bragg Gratings, *Christopher Miese*, *Alex Fürbach, Michael J. Withford; CUDOS, Macquarie Univ., Australia.* We identified a narrow processing window to direct write waveguides incorporating Bragg gratings in a single process step. We utilised a 5.1 MHz femtosecond laser combined with a Pockels cell to modulate the pulse energy.

BMB7 • 15.45
Direct Laser Written Couplers with Shifted Bragg Gratings, *Sangwoo Ha*[1], *Martin Ams[2], Graham D. Marshall[2], Dragomir N. Neshev[1], Andrey A. Sukhorukov[1], Yuri S. Kivshar[1], Michael J. Withford[2]; [1]Nonlinear Physics Ctr., Australian Natl. Univ., Australia, [2]MQ Photonics Res. Ctr., Macquarie Univ., Australia.* We realize high-precision control over the lateral shift between Bragg gratings in directional waveguide couplers fabricated by direct-laser writing in glass and demonstrate the potential for spatiotemporal control of slow-light pulses at telecommunication wavelength.

Thoma

Nonlinear Photonics

NMC • Pulse Propagation in Fiber—Continued

NMC4 • 14.45
Cancellation of the Soliton Self-Frequency Shift near the Bandgap Edge of Solid-Core Photonic Bandgap Fibers, *Olivier Vanvincq*, *Alexandre Kudlinski, Aurélie Bétourné, Arnaud Mussot, Yves Quiquempois, Géraud Bouwmans; IRCICA - Univ. of Lille, France.* We report nonlinear propagation experiments and simulations performed in solid-core photonic bandgap fibers showing a soliton self-frequency shift cancellation near the bandgap edge. The different origins of this cancellation and their relative importance are discussed.

NMC5 • 15.00
Experimental Investigation of Slow Oscillations of Dispersion-Managed Solitons, *Haldor Hartwig*, *Fedor Mitschke; Univ. Rostock, Germany.* Slow oscillations of dispersion-managed solitons have been predicted in theory. We confirm their existence in the experiment by measuring spectral width variations. Results are compared to numerical simulations; detailed agreement is achieved.

NMC6 • 15.15
Broadband Phase-Matching of Nonlinear Optical Interaction Induced in a Dispersion-Compensated Optical Cavity, *Shin-ichi Zaitsu*[1,2], *Totaro Imasaka[1,3]; [1]Dept. of Applied Chemistry, Kyushu Univ., Japan, [2]PRESTO, Japan Science and Technology Agency, Japan, [3]Div. of Translational Res., Ctr. for Future Chemistry, Kyushu Univ., Japan.* We demonstrate the generation of continuous-wave miltifrequency emissions under the broadband phase-matching condition in intracavity four-wave mixing. This is achieved by the broadband control of the cavity dispersion.

NMC7 • 15.30
Impact of the Third-Order Dispersion on the Modulation Instability Gain of Pulsed Signals, *A. Mussot*, *A. Kudlinski, E. Louvergneaux, M. Kolobov, M. Taki; Univ. Lille 1, France.* We demonstrate that the modulation instability gain of pulsed signals strongly depends on the third-order dispersion, contrary to the well-known case of continuous wave signals. This surprising contribution of an odd dispersion term on this four photon mixing process is established analytically and numerically.

NMC8 • 15.45
Picosecond Visible Raman Lasers, *Eduardo Granados*, *Richard P. Mildren, Helen M. Pask, David J. Spence; Macquarie Univ., Australia.* We present a technique that enables the efficient generation of picosecond laser pulses across the spectrum based on Raman crystals. The results are supported by a model that is in perfect agreement with the experiments.

Mombert

Nonlinear Photonics

NMD • Spatial Effects and Solitons—Continued

NMD4 • 14.45
Transverse Instability of Bright Solitons in Hyperbolic Dispersive Media, *Simon-Pierre Gorza*[1], *Marc Haelterman[1], Philippe Emplit[1], Thomas Trogdon[2], Bernard Deconinck[2]; [1]Univ. Libre de Bruxelles, OPERA-Photonique, Belgium, [2]Dept. of Applied Mathematics, Univ. of Washington, USA.* The theoretically predicted transition between snake and oscillatory snake instabilities of spatial bright solitons propagating in normally dispersive media is experimentally demonstrated. The oscillatory neck instability as a noncollinear four wave mixing process is also identified.

NMD5 • 15.00
Condensation of Classical Optical Waves, *Can Sun*[1], *Shu Jia[1], Christopher Barsi[1], Antonio Picozzi[2], Sergio Rica[3], Jason W. Fleischer[1]; [1]Princeton Univ., USA, [2]CNRS-Univ. de Bourgogne, France, [3]École Normale Supérieure, France.* We demonstrate the nonlinear condensation of classical optical waves. The condensation is observed directly, as a function of nonlinearity and wave kinetic energy, in a self-defocusing photorefractive crystal.

NMD6 • 15.15
Observation of Discrete Reflectionless Potentials, *Alexander Szameit[1], Felix Dreisow[2], Matthias Heinrich[2], Robert Keil[2], Stefan Nolte[2],* ***Andrey A. Sukhorukov*[3]**; *[1]Technion - Israel Inst. of Technology, Israel, [2]Friedrich-Schiller-Univ. Jena, Germany, [3]Australian Natl. Univ., Australia.* We observe experimentally discrete reflectionless potentials, which fully transmit all incident waves. This is realized in optical waveguide arrays, where the coupling is locally modulated according to a special transformation of Ablowitz-Ladik soliton profiles.

NMD7 • 15.30
Control of Modulational Instability in Periodic Feedback Systems, *Andrey A. Sukhorukov*[1], *Nicolas Marsal[2], Aliaksandr E. Minovich[1], Delphine Wolfersberger[2], Marc Sciamanna[2], Germano Montemezzani[2], Dragomir N. Neshev[1], Yuri S. Kivshar[1]; [1]Nonlinear Physics Ctr., Res. School of Physical Sciences and Engineering, Australian Natl. Univ., Canberra, Australia, [2]LMOPS Lab, Supelec and Univ. Paul Verlaine de Metz, France.* We describe the effect of optical lattice on modulational instability in two-dimensional nonlinear feedback systems. We reveal a sharp transition between different instability regimes as the lattice strength is increased, providing explanation of recent experiments.

NMD8 • 15.45
Cavity Polariton Solitons with Imprinted Nano Pattern, *Oleg A. Egorov*[1], *Dmitry V. Skryabin[2], Falk Lederer[1]; [1]Inst. of Condensed Matter Theory and Optics, Friedrich-Schiller-Univ. Jena, Germany, [2]Ctr. for Photonics and Photonic Materials, Dept. of Physics, Univ. of Bath, UK.* We report on the existence of bright polariton solitons in semiconductor microresonators operating in the strong coupling regime. They can undergo modulational instability leading to formation of stable polariton solitons with an imprinted nano-sized pattern.

Room 2.08

Optical Nanostructures for Photovoltaics

PMA • Multijunction Cells and Flux Control—Continued

PMA4 • 15.00
Implementation of Photon Conversion Materials, *Arjen Boersma*, *Zeger Vroon, Irene Hovens; TNO Science and Industry, Netherlands.* The success of nanomaterials in PV applications depends for a large part on their availability and processability. Processes for large scale applications of these nanostructures are evaluated, with respect to antireflection and up/down conversion.

PMA5 • 15.15
Fabrication and Characterization of Si Nanocrystals in SiC Multilayer Film by Magnetron Sputtering for Third Generation Photovoltaics, *Arife Gencer Imer*, *Rasit Turan; Dept. of Physics, Middle East Technical Univ., Turkey.* SiC/Si:SiC multilayer films deposited by magnetron sputtering are studied for the purpose of quantum dot based solar cell applications. Structural properties and formation kinetics of Si nanocrystals in the SiC matrix are determined.

PMA6 • 15.30 Invited
Nanostructured Silicon Solar Cells, *Jon Heffernan*; *Sharp Labs of Europe Ltd., UK.* We have investigated the effect of 3-D nano-structures on the photovoltaic performance of silicon-based solar cells. Detailed electro-optic simulations show the strong effect of short carrier diffusion lengths and the potential for increased optical trapping.

16.00–16.30 Coffee Break/Exhibits, *Weinbrenner Conference Room*

Joint

Nonlinear Photonics

16.30–19.00
JMB • SENSORS/SOLED/PV
Joint Plenary
Norbert Linder; OSRAM GmbH, Germany, Presider
Thomas Krauss; Univ. of St Andrews, UK, Presider

JMB1 • 16.30 Plenary
Laser Based Sensors for *in situ* and Standoff Detection of Explosives, Chemical Warfare Agents and Toxic Industrial Chemicals, *C. Kumar N. Patel*; *Pranalytica Inc., USA.* Abstract not available.

JMB2 • 17.20 Plenary
SSL: Innovation and Driver for Growth in the Lighting Market, *Bernhard Stapp*; *OSRAM, Germany.* The future of Lighting is closely linked to and enabled by LEDs and Organic LEDs. Through the rapid technical advancements in the last decade, LEDs are now successfully migrating in all general illumination applications. The talk will review the associated challenges and give an outlook on OLEDs being the next frontier in SSL.

JMB3 • 18.10 Plenary
The Influence of the $4n^2$ Light Trapping Factor on Ultimate Solar Cell Efficiency, *Eli Yablonovitch*; *Electrical Engineering and Computer Sciences Dept., Univ. of California at Berkeley, USA.* The standard Shockley-Queisser approach to ideal ultimate solar cell efficiency makes a number of idealistic assumptions. Under even slightly non-ideal conditions, the $4n^2$ light trapping factor already has a major role controlling the ultimate efficiency.

19.00–20.30
Welcome Reception,
Weinbrenner Conference Room

19.00–20.30
NME • NP Monday Poster Session

NME1
Supermode Dispersion and Mode Transitions in Silicon-on-Insulator Waveguide Arrays, *Charles E. de Nobriga*[1], *Gareth D. Hobbs[1], Wei Ding[1], Andriy V. Gorbach[1], William J. Wadsworth[1], Jonathan C. Knight[1], Dmitry V. Skryabin[1], Antonio Samarelli[2], Marc Sorel[2], Richard M. De La Rue[2]; [1]Univ. of Bath, UK, [2]Univ. of Glasgow, UK.* We have measured and modeled the spectral group index of the supermodes of a two channel silicon photonic wire array. We observe the transition from two coupled waveguides to a single guided slot mode.

NME2
Reconstruction Imaging through Seeded Instabilities, *Dmitry V. Dylov*, *Jason W. Fleischer; Princeton Univ., USA.* We recover noise-hidden images by using spatial nonlinearity to seed instabilities. The result is new, dynamical type of stochastic resonance that is a physical, vs. digital, method of signal processing.

NME3
Continuous-Wave Backward Frequency Doubling in Periodically Poled Lithium Niobate, *Salvatore Stivala[1]*, ***Alessandro C. Busacca*[1]**, *Luciano Curcio[1], Roberto L. Oliveri[1], Gaetano Assanto[2]; [1]Univ. of Palermo, Italy, [2]Univ. of "Roma Tre", Italy.* We report on backward second-harmonic-generation in periodically poled lithium niobate with a 3.2µm QPM period. A tuneable continuous-wave Ti:Sapphire laser allowed us exciting two resonant orders. Experimental data compared well with standard theory.

NME4
Reduction of the Rayleigh-Backscattering Impact in Nonlinear Loop Mirrors by Dispersion Management, *Tobias Roethlingshoefer*[1,2,3], *Klaus Sponsel[1,2], Georgy Onishchukov[1,2,3], Bernhard Schmauss[3,4], Gerd Leuchs[1,2,3]; [1]Max-Planck-Inst. for the Science of Light, Germany, [2]Inst. for Optics Information and Photonics, Univ. Erlangen, Germany, [3]Erlangen Graduate School in Advanced Optical Technologies (SAOT), Germany, [4]Chair for Microwave Engineering, Univ. Erlangen, Germany.* It is shown that the performance limitations from Rayleigh backscattering in a nonlinear amplifying loop mirror can be minimized using additional dispersion imbalance. Phase-preserving amplitude regeneration of a 100Gbit/s 25%-RZ-DPSK signal has been investigated numerically.

NME5
Phase-Dependent Nonlinear Dynamics in Supercontinuum Generation with Feedback, *Nicoletta Brauckmann*, *Michael Kues, Petra Groß, Carsten Fallnich; Inst. of Applied Physics, Westfälische Wilhelms-Univ., Germany.* The nonlinear dynamical behavior of a supercontinuum generating system within a synchronously pumped ring cavity is presented. For the first time the phase dependence of these nonlinear dynamics is investigated experimentally and numerically.

NME6
Fiber-Laser-Pumped Cw Opo for Red, Green, Blue Laser Generation, *Yen-Chieh Huang*; *Natl. Tsinghua Univ., Taiwan.* We report a cw-RGB laser based on a fiber-laser-pumped OPO with cascaded intra- and extra-cavity wavelength converters. At 25-W pump power, the laser generated 3.9, 0.46, and 0.49-W at 633, 532, and 450 nm, respectively.

NME7
Femtosecond OPO Based on Lithium Triborate Pumped by a Fiber Laser-Amplifier System, *Carsten Cleff*, *Jörn Epping, Petra Gross, Carsten Fallnich; Inst. of Applied Physics, Univ. of Münster, Germany.* The first green-pumped femtosecond optical parametric oscillator based on lithium triborate is presented. Up to 350 mW at signal (775 to 940 nm) and 300 mW at idler wavelength (1190 to 1630 nm) are generated.

NME8
Bistability, Multistability and Nonreciprocal Light Propagation in Thue-Morse Multilayers, *Victor Grigoriev*, *Fabio Biancalana; Max-Planck-Inst. for the Science of Light, Germany.* The intrinsic asymmetry of Thue-Morse quasicrystals results in bistability thresholds sensitive to propagation direction. Along with resonances of perfect transmission, this allows to achieve strongly nonreciprocal propagation and to create an all-optical diode.

NME9
Azimuthons in Weakly Nonlinear Waveguides, *Yiqi Zhang*[1,2], *Stefan Skupin[1,3], Keqing Lu[2], Wieslaw Królikowski[4]; [1]Max-Planck-Inst. for the Physics of Complex Systems, Germany, [2]State Key Lab of Transient Optics and Photonics, Xi'an Inst. of Optics and Precision Mechanics, Chinese Acad. of Sciences, China, [3]Inst. of Condensed Matter Theory and Optics, Friedrich-Schiller-Univ., Germany, [4]Laser Physics Ctr., Res. School of Physics and Engineering, Australian Natl. Univ., Australia.* We show that a weakly guiding nonlinear waveguide supports propagation of stable rotating solitons, azimuthons. We calculate analytically the rotation frequency of these solitons and find it to be in agreement with numerical simulations.

NME10
Self-Similar Interaction of Slowly Oscillating Dispersion-Managed Solitons, *Alexander Hause*, *Haldor Hartwig, Fedor Mitschke; Univ. of Rostock, Germany.* A numerical and theoretical study of dispersion-managed soliton interaction is presented. A resonance between internal soliton oscillations and pulse pair oscillations produces self-similar interaction structures. Perturbation theory provides an explanation.

NME11
Extreme Statistics in Raman Fiber Amplifiers: Influence of Pump Depletion and Dispersion, *Kamal Hammani*, *Christophe Finot, Guy Millot; Lab Interdisciplinaire Carnot de Bourgogne, Univ. de Bourgogne, France.* We experimentally and theoretically investigate the influence of pump depletion effects on extreme statistics observed in fiber Raman amplifiers. We also report on the impact of the dispersion of the fiber.

NME12
Generation of Bullet Trains via Temporal Modulation Instability in Nonlocal Solitons, *Marco Peccianti*[1,2], *Ian. B. Burgess[1,3], Gaetano Assanto[4], Roberto Morandotti[1]; [1]INRS Énergie, Matériaux et Télécommunications, Canada, [2]IPCF-CNR Roma, Inst. for Chemical and Physical Processes, Italy, [3]School of Engineering and Applied Science, Harvard Univ., USA, [4]Nonlinear Optics and OptoElectronics Lab, Univ. "Roma Tre", Italy.* We introduce a feasible approach to obtain temporal trains of light-bullets in nonlocal media via the interplay between local and nonlocal nonlinearities as well as temporal modulation instability.

NME13
2-D Spatial Modulation Instability in Second Harmonic Generation Scheme, *Michaël Delqué*[1,2], *Gil Fanjoux[2], Fabrice Devaux[2], Hervé Maillotte[2], Simon-Pierre Gorza[1], Marc Haelterman[1]; [1]Service OPERA-Photonique, Univ. Libre de Bruxelles, Belgium, [2]Inst. FEMTO-ST, Univ. de Franche-Comté, France.* The spontaneous spatial break-up of laser beams in quadratic media is experimentally studied in second harmonic generation process. The spatial spectrum reveals two-dimensional modulation instability bands in agreement with numerical and theoretical analysis.

NME14
Broadband Second-Harmonic Generation via Random Quasi-Phase-Matching in PPLT, *Salvatore Stivala[1], Alessandro Busacca[1]*, ***Alessia Pasquazi*[2]**, *Luigi Olivieri[1], Roberto Morandotti[2], Gaetano Assanto[3]; [1]DIEET, Univ. of Palermo, Italy, [2]Ultrafast Optical Processing Group INRS-EMT, Canada, [3]Nonlinear Optics and OptoElectronics Lab, Univ. "Roma Tre", Italy.* We demonstrated broadband second-harmonic generation via random Quasi-Phase-Matching in periodically poled Lithium Tantalate.

NME15
Multiphoton Microscopy for Intravital Imaging Applications, *Ana M. de Paula*[1], *Jens V. Stein[2], Gustavo B. Menezes[3], Fernanda M. Coelho[3], Mauro M. Teixeira[3]; [1] Dept. Física, Univ. Federal de Minas Gerais, Brazil, [2]Theodor Kocher Inst., Univ. of Bern, Switzerland, [3] Dept. Bioquímica e Imunologia, Univ. Federal de Minas Gerais, Brazil.* Intravital microscopy provides a unique opportunity to study biological phenomena in living organisms. We show results for multiphoton microscopy by two-photon absorption and second harmonic generation processes applied to intravital imaging of immune cells migration.

NME16
Observation of Pure Cascaded Kerr-Lens Mode-Locking Dynamics in a Cw Nd:YLF/pp-KTP Ring Laser, *Jean-Jacques Zondy*[1,2], *Fabiola A. Camargo[3], Thomas Zanon-Willette[4], Valentin Petrov[5], Nicklaus U. Wetter[3]; [1]Conservatoire Natl. des Arts et Métiers, France, [2]Lab Natl. de Métrologie et d'Essais, France, [3]Inst. de Pesquisas Energéticas e Nucleares, Brazil, [4]Conservatoire Natl. des Arts et Métiers, France, [5]Max-Bom-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Germany.* Partial mode-locking dynamics attributed to pure second-order cascaded KLM processes were evidenced in a unidirectional intracavity-frequency doubled Nd:YLF ring laser. Under cw single-frequency regime, ~100% conversion efficiency from fundamental to second-harmonic emission could be extracted.

NME17
Widely Tunable Narrowband Soliton Source Generation in Tellurite Microstructured Fibers, *Guanshi Qin[1], Xin Yan[1], Chihiro Kito[1], Meisong Liao[1], Takenobu Suzuki[1], Atsushi Mori[2]*, ***Yasutake Ohishi*[1]**; *[1]Res. Ctr. for Advanced Photon Technology, Toyota Technological Inst., Japan, [2]NTT Photonics Labs, Japan.* We demonstrate widely tunable narrowband soliton and dispersive wave source generation (1150-2250 nm) in a highly nonlinear tellurite microstructured fiber pumped by a 1550 nm femtosecond fiber laser.

Weinbrenner Conference Room

Nonlinear Photonics

NME • NP Monday Poster Session—Continued

NME18

New Cross-Linkable Systems Using Huisgen Reaction for Non-Linear Optical Applications, ***Clement F. Cabanetos****; Univ. of Nantes, France.* A new approach to the design, synthesis and characterization of NLO polymers with large and stable second-order nonlinear susceptibilities was developped by freezing the chromophores orientation using the copper-free thermal Huisgen 1,3-dipolar reaction.

NME19

Phase-Locked Second Harmonic Generation in Gaas Nanocavities, ***Maria Antonietta Vincenti***[1]*, Domenico de Ceglia*[1]*, Milan C. Buncick*[1]*, Michael Scalora*[2]*, Mark J. Bloemer*[2]*;* [1]*AEgis Technologies Group Inc., USA,* [2]*Charles M. Bowden Res. Ctr., USA.* We theoretically study light propagation through sub-wavelength apertures on a silver substrate filled with GaAs, in the enhanced transmission regime. We predict enhanced conversion efficiencies even under high absorption conditions.

NME20

Twofold Phase Matching for Low-Noise Polarization Frequency Conversion in Nonlinear Waveguides, ***Alessandro Tonello***[1]*, Laurent Delage*[1]*, Ludovic Grossard*[1]*, Vincent Couderc*[1]*, Daniele Modotto*[2]*;* [1]*XLIM Univ. de Limoges, UMR CNRS 6172, France,* [2]*Dept. di Ingegneria dell'Informazione, Univ. di Brescia, Italy.* We study the analytic solution to match in phase a particular type of low-noise vector four-wave frequency conversion in birefringent nonlinear waveguides. We confirm our predictions with a series of numerical simulations.

NME21

100 ns Quasi-Light-Storage of 8 Bit Data Sequences at 1Gbps, ***Kambiz Jamshidi****, Stefan Preußler, Andrzej Wiaterk, Ronny Henker, Jens Klinger, Thomas Schneider; Hochschule für Telekommunikation Leipzig, Germany.* We propose a new approach for the storage of 8bit optical data bursts based on quasi-light-storage method. We achieved storage time of 100ns using conventional telecommunication components with the ability of fine and coarse tuning.

NME22

Soliton Breathing and Activation of Resonant Radiation in Photonic Nanowires, ***Truong Tran****, Fabio Biancalana; Max-Planck-Inst. for the Science of Light, Germany.* In sub-micron glass waveguides, the spectral and temporal breathings of high-order solitons "activate" resonant radiation frequencies in a step-like fashion by means of energy bursts in the early stages of supercontinuum generation.

NME23

Angle-Independent Bistability in an All-Photonic-Crystal Fabry-Pérot Resonator, ***Rumen Iliew***[1]*, Falk Lederer*[1]*, Christoph Etrich*[2]*, Thomas Pertsch*[2]*, Kestutis Staliunas*[3]*;* [1]*Inst. of Condensed Matter Theory and Solid State Optics, Friedrich-Schiller-Univ. Jena, Germany,* [2]*Inst. of Applied Physics and Ultra Optics, Friedrich-Schiller-Univ. Jena, Germany,* [3]*Dept. de Fisica i Enginyeria Nuclear, Univ. Politècnica de Catalunya, Spain.* We find an almost angle-independent bistability of the cavity field in dependence on the pump for an all-photonic crystal Fabry-Pérot resonator operating in the subdiffractive regime. Finite-difference time-domain calculations are used to obtain the hysteresis.

NME24

Transient and Sustained Oscillations of Spatial Dissipative Solitons in VCSELs with Frequency Selective Feedback, *Neal Radwell, Craig McIntyre,* ***Gian-Luca Oppo****, William J. Firth, Andrew J. Scroggie, Thorsten Ackemann; Univ. of Strathclyde, UK.* The dynamics of spatial dissipative solitons in VCSELs with frequency selective feedback is investigated experimentally and theoretically. Time-frequency analysis demonstrates that transient and sustained oscillations of spatial solitons cover many modes of the external cavity.

NME25

Efficient Frequency up-Conversion of Broad Area Laser Diode, ***Knud P. Sørensen****, Peter Tidemand-Lichtenberg, Christian Pedersen; DTU Fotonik, Technical Univ. of Denmark, Denmark.* Direct frequency up-conversion of an 808 nm BAL with build-in grating feedback for spectral narrowing is experimentally demonstrated. The BAL to blue light efficiency exceeds 10 % when mixed with a 1064 nm laser.

NME26

Flipping Phase Dissipative Soliton Molecules in Mode-Locked Fiber Lasers, ***Alexandr Zaviyalov****, Rumen Iliew, Oleg Egorov, Falk Lederer; Inst. of Condensed Matter Theory and Solid State Optics, Friedrich-Schiller-Univ. Jena, Germany.* We numerically obtain novel two-soliton molecules with flipping phase in mode-locked fiber lasers. They represent oscillating solutions with alternating phase difference between zero and π. For smaller peak-to-peak separation the phase difference can evolve independently.

NME27

Quadratic Solitons that Balance Self-Steepening and Dispersion, ***Andy Chong****, William H. Renninger, Frank W. Wise; Cornell Univ., USA.* We present a theoretical study of solitons of the Chen-Lee-Liu equation (CLLE) in a realistic quadratic crystal. These solitons balance dispersion and self-steepening.

NME28

Tunable Optical Delay Using Parametric Amplification in Highly-Birefringent Optical Fibers, ***Nour Nasser****, Gil Fanjoux, Eric Lantz, Thibaut Sylvestre; Inst. FEMTO-ST, Univ. Franche-Comté, France.* We theoretically study parametric amplification or cross-phase modulation instability in highly-birefringent optical fibers and demonstrate tunable picosecond pulse optical delay or advancement via slow and fast light propagation.

NME29

Thermal-Waveguide Optical Parametric Oscillator, *Shou-Tai Lin, Yen-Yin Lin,* ***Yen-Chieh Huang****; Natl. Tsinghua Univ., Taiwan.* We report a mid-infrared, CW singly resonant OPO with a thermal-induced waveguide in its gain crystal. The waveguide, with a NA of 0.0062, doubles the parametric efficiency and makes the OPO insensitive to alignment.

NME30

Three-Wave Mixing in Nonlinear Media with Disordered Ferroelectric Domains, ***Jörg Imbrock****, Fabian Sibbers, Markus Paßlick, Mousa Ayoub, Cornelia Denz; Inst. for Applied Physics, Westfälische Wilhelms-Univ., Germany.* Sum-frequency generation with femtosecond laser pulses is investigated in strontium barium niobate crystals with quasi-disordered ferroelectric domains. The random domain structure allows for broadband quasi-phase matching of wavelengths over the whole visible spectrum.

NME31

Second-Harmonic Generation in Disordered Quadratic Media: Role of a Ferroelectric Domain Structure, ***Vito Roppo***[1,2]*, Ksawery Kalinowski*[2]*, Wenjie Wang*[2]*, Crina M. Cojocaru*[1]*, Jose F. Trull*[1]*, Ramon Vilaseca*[1]*, Michael Scalora*[3]*, Wieslaw Krolikowski*[2]*, Yuri Kivshar*[2]*;* [1]*Univ. Politècnica de Catalunya, Spain,* [2]*Australian Natl. Univ., Australia,* [3]*Charles M. Bowden Res. Facility, USA.* We study theoretically the SHG in a nonlinear quadratic crystal with random distribution of ferroelectric domains. We show that the specific features of disordered domain structure greatly affect the emission pattern of the generated harmonics.

NME32

Nano-Channeling of Light via Phase-Locked Second Harmonic Generation, ***Domenico de Ceglia***[1]*, Maria Antonietta Vincenti*[1]*, Neset Akozbek*[1]*, Milan Buncick*[1]*, Vito Roppo*[2]*, Mark J. Bloemer*[3]*, Michael Scalora*[3]*;* [1]*AEgis Technologies Group Inc., USA,* [2]*Dept. de Fisica i Enginyeria Nuclear, Spain,* [3]*Charles M. Bowden Res. Ctr., USA.* The phase-locked second harmonic generation process has been investigated for extremely thin, sub-wavelength channels. The possibility to circumvent resolution exploiting the trapping and dragging mechanisms between the fundamental and the phase-locked SH pulse is discussed.

NME33

Effect of the Easy Axis Gliding on the Pitch in Dyed Chiral Nematic Photonic Crystals, ***David Statman****, Barbara Dunlap; Allegheny College, USA.* Two azo dyes are compared for their impact on photo-induced surface gliding of the easy axis of nematic liquid crystals. These results allow for potential control of the photonic bandgap of chiral nematic materials.

NME34

All-Optical Inverter with a Vertical-Cavity Semiconductor Optical Amplifier, ***Antonio Hurtado***[1]*, Veronica Gauss*[2]*, Doug Jorgesen*[2]*, Sadik Esener*[2]*, Michael J. Adams*[1]*;* [1]*Univ. of Essex, UK,* [2]*Univ. of California at San Diego, USA.* Experimental and theoretical analysis of an 850 nm-VCSOA all-optical inverter is reported. The performance of the inverter shows low switching power requirements, high extinction ratio and fast speed operation in the order of several Gbits/sec.

NME35

Information Rates of PSK-Signal Transmission in a System Including Phase-Preserving Amplitude Limiters, ***Masayuki Matsumoto****, Yusuke Yahata; Osaka Univ., Japan.* Information rate (IR) for RZ-QPSK-signal transmission in a system where all-optical amplitude limiters are periodically inserted is evaluated. High IR is retained even when pulses are temporally overlapped at the limiter if channel memory is suitably considered.

NME36

Photorefractive Silicon Waveguides: A Theoretical Investigation, ***Montasir Qasymeh****, Sergey Ponomarenko, Michael Cada; Dalhousie Univ., Canada.* We show theoretically that the photorefractive effect (PR) is realizable in silicon waveguides, providing a proper external electrical field is applied. Moreover, we propose, analyze and discus a novel silicon-based PR ring oscillator modality.

NME37

All-Optical Steering of Light via Spatial Bloch Oscillations in a Gas of Three-Level Atoms, ***Chao Hang***[1,2]*, V. V. Konotop*[1]*;* [1]*Univ. de Lisboa, Portugal,* [2]*East China Normal Univ., China.* We provide a scheme of all-optical steering of light via spatial Bloch oscillations in a three-level atomic medium with a standing-wave control field. The steering can be achieved without appreciable diffraction at weak light intensity.

NME38

Vapor Deposited Small Molecule Materials for Integrated Nonlinear Optics, *Michelle L. Scimeca*[1]*, Benjamin Breiten*[2]*, François Diederich*[2]*,* ***Ivan Biaggio***[1]*;* [1]*Lehigh Univ., USA,* [2]*ETH Zürich, Switzerland.* Small conjugated molecules with donor-acceptor substitution have record breaking third-order polarizabilities and form homogenous organic films with high optical quality that are ideal for integrated nonlinear optics and for incorporating with nanostructured substrates.

NME39

Kaleidoscope Lasers—Complexity in Simple Optical Systems, ***James M. Christian***[1]*, Graham S. McDonald*[1]*, Jungang G. Huang*[2]*;* [1]*Materials and Physics Res. Ctr., Univ. of Salford, UK,* [2]*School of Engineering and Mathematical Sciences, City Univ. London, UK.* We present the first detailed account of modelling kaleidoscope laser modes where the equivalent Fresnel number N_{eq} and magnification M may assume arbitrary values. The convergence toward circularity is also investigated through extensive numerical computations.

NME40

Self-Focusing Contribution to Supercontinuum Generation in Fibers, ***Francesco Poletti****, Peter Horak; Univ. of Southampton, UK.* Using a modal decomposition approach we investigate the wave-guided propagation of ultra-short pulses with MW peak power. Self-focusing can affect significantly the supercontinuum generating nonlinear dynamics and ultimately lead to simultaneous spatial and temporal singularities.

NME41

Phase Locked Second Harmonic Efficiency in Opaque Cavity Environment, ***Vito Roppo***[1,2]*, Crina M. Cojocaru*[1]*, Jose F. Trull*[1]*, Ramon Vilaseca*[1]*, Michael Scalora*[2]*;* [1]*Univ. Politècnica de Catalunya, Spain,* [2]*Charles M. Bowden Res. Facility, USA.* We study how the phase-locked SH component is localized and enhanced inside a highly absorbing cavity. We report that the efficiency can be proportional to the square of the quality factor.

NME42

Dissipative Light-Bullets and the Collapse and Filamentation Dynamics of Ultrashort Pulses, ***Miguel A. Porras****; Univ. Politécnica de Madrid, Spain.* Many aspects of the filamentation of femtosecond pulses in dissipative media with anomalous dispersion are explained from the existence of a dissipative light-bullet attractor which is neither a soliton nor a conical wave.

NME • NP Monday Poster Session—Continued

NME43
Dynamics of Drifting Patterns in a Tilted Feedback System, ***Nicolas Marsal****, Delphine Wolfersberger, Marc Sciamanna, Germano Montemezzani; LMOPS Lab, Supelec and Univ. Paul Verlaine de Metz, France.* Patterns dynamics emerging from a photorefractive system, where tilted single feedback mirror gives rise to an advection-like effect, is studied experimentally. Nonlocal coupling between counterpropagating beams and nonlocal medium response introduce various interesting effects.

NME44
Mode-Locking of Light-Bullets in Planar Waveguide Arrays, *Matthew Williams,* ***J. Nathan Kutz****; Dept. of Applied Mathematics, Univ. of Washington, USA.* A theoretical proposal is presented for the generation of light-bullets in planar waveguide arrays. The light-bullets form from noise, persist for a range of gains, and can easily be routed by sloping the gain profile.

NME45
Bloch Vector Analysis in Nonlinear, Finite, Dissipative Systems: An Experimental Study, ***Giuseppe D'Aguanno***[1,2]*, Maria Cristina Larciprete*[3]*, Nadia Mattiucci*[1,2]*, Alessandro Belardini*[3]*, Mark Bloemer*[1]*, Eugenio Fazio*[3]*, Oleg Buganov*[4]*, Marco Centini*[3]*, Concita Sibilia*[3]*;* [1]*Dept. of the Army, Charles M. Bowden Res. Facility, USA,* [2]*AEgis Tech., USA,* [3]*Sapienza Univ. di Roma, Italy,* [4]*Inst. of Molecular and Atomic Physics, Natl. Acad. of Sciences of Belarus, Belarus.* We have investigated and experimentally demonstrated the applicability of the Bloch vector for one-dimensional, nonlinear, finite, dissipative systems. The case studied is the second harmonic generation from metallo-dielectric Ag/Ta_2O_5 thin film multilayer filters.

NME46
Measuring of Broadband Similariton Chirp, ***Aram Zeytunyan***[1]*, Anush Muradyan*[1]*, Garegin Yesayan*[1]*, Levon Mouradian*[1]*, Frédéric Louradour*[2]*, Alain Barthélémy*[2]*;* [1]*Yerevan State Univ., Armenia,* [2]*XLIM Inst. de Recherche, Univ. de Limoges, France.* We generate a broadband (of ~100 nm bandwidth) nonlinear-dispersive similariton in a passive fiber, and characterize it through the chirp measurement, applying frequency tuning and spectral compression in the sum-frequency generation process.

NME47
MHz Repetition Rate, Pico-Second Mid-Infrared Generation Pumped by a Nd-Doped Vanadate Bounce Laser, *Koichi Masaki, Syuto Ujita, Yuichi Maeda,* ***Katsuhiko Miyamoto****, Takashige Omatsu; Chiba Univ., Japan.* We demonstrated MHz-repetitive mid-infrared generation from a PPSLT-OPG pumped by a picosecond $Nd:YVO_4$ bounce laser system. Average power of 640mW was obtained in a frequency range of 1.58-1.63µm, corresponding to a slope efficiency of 18.2%.

NME48
Length Dependence of Forward and Backward THz DFG in a Strongly Absorptive Material, ***Yen-Chieh Huang****, Yen-Hou Lin, Ching-Han Lee, Yen-Yin Lin, Tsong-Dong Wang, Fan-Yi Lin; Natl. Tsinghua Univ., Taiwan.* Some believe that the useful length of THz DFG in a highly absorptive material is the absorption length of the THz wave. We show in theory and experiment it is not the case.

NME49
Enhanced Field of View via Nonlinear Digital Holography, ***Christopher Barsi****, Jason W. Fleischer; Princeton Univ., USA.* All imaging systems have limitations to their field of view. Here, we introduce a nonlinear element into the optical path and experimentally demonstrate that wave mixing due to spatial nonlinearity enables wider views.

NME50
Orbital Angular Momentum of off-Axis Vortex Beams in a Quadratic Nonlinear Interaction, ***Matteo Braccini****; Sapienza Univ. di Roma, Italy.* A study on the evolution of optical on-axis and off-axis vortices generated by spiral phase plates is presented, emphasizing the properties of orbital angular momentum in the linear and nonlinear cases.

NME51
Demonstration of Coherent Destruction of Tunneling in Tunable Three-Dimensional Photonic Lattices, ***Peng Zhang***[1]*, Nikolaos K. Efremidis*[2]*, Alexandra Miller*[1]*, Yi Hu*[3]*, Zhigang Chen*[1]*;* [1]*San Francisco State Univ., USA,* [2]*Univ. of Crete, Greece,* [3]*Nankai Univ., China.* We report on the first experimental demonstration of coherent destruction of tunneling in optically induced three-dimensional photonic lattices. Oscillation of diffraction and inhibited light tunneling with variation of the lattice potential is also observed.

NME52
Withdrawn

NME53
Transmission Resonances in Sub-Wavelength Metallic Gratings for Applications to All-Optical Switching, ***Giuseppe D'Aguanno***[1,2]*, Nadia Mattiucci*[1,2]*, Mark Bloemer*[1]*;* [1]*Dept. of the Army, Charles M. Bowden Res. Facility, USA,* [2]*AEgis Tech., USA.* We study the plasmonic transmission resonances of a metallic grating with subwavelength period and extremely narrow slits. We point out their possible use for a low-power all-optical switch.

NME54
Nonlinear Birefringence in Sub-Wavelength Optical Waveguides, ***Wen Qi Zhang****, Tanya Monro, Shahraam Afshar V.; Inst. for Photonics and Advanced Sensing, Univ. of Adelaide, Australia.* We investigate the nonlinear birefringence of optical waveguides with high index contrast materials and subwavelength structures using a new full-vectorial model and show new and significantly different behaviors not reported before.

NME55
Simulation of Anisotropic Nonlinear $X^{(2)}$ Material with FDTD, ***Jens Niegemann****, Kurt Busch; Karlsruhe Inst. of Technology, Germany.* A fully three-dimensional finite-difference time-domain (FDTD) algorithm for the simulation of anisotropic $X^{(2)}$-nonlinearities is presented. This technique is then employed to study the nonlinear response of metallic nanoparticles on a GaAs-substrate.

NME56
Dynamic Stability Analysis of Passively-Phased Ring-Geometry Fiber Laser Array, ***Erik J. Bochove***[1]*, Alejandro B. Aceves*[2]*, Ralf Deiterding*[3]*, Lily Crabtree*[3]*, Yehuda Braiman*[3,4]*, Adrian Jacobo*[5]*, Pere Colet*[5]*;* [1]*AFRL/RDLAF, USA,* [2]*Dept. of Mathematics, Southern Methodist Univ., USA,* [3]*Computer Science and Mathematics Div., Oak Ridge Natl. Lab, USA,* [4]*Univ. of Tennessee, USA,* [5]*IFISC (SCIC-UIB) Inst. de Fisica Interdisciplinar e Sistemas Complejos, Campus Univ. Ilhes Balears, Spain.* Based on stability analysis of passive phasing in an externally coupled, ring-geometry fiber laser array, we predict a dynamicaly stable operating state of a 2-element array at wavelengths of relative maxima in output power.

NME57
Nonlinear Spectral Broadening and Pulse-Narrowing in Ultrashort-Pulse Mode-Locked Laser by Intracavity Highly-Nonlinear Media, *Hiroyuki Hitotsuya*[1]*, Shinichi Matsubara*[2]*, Tatsuya Yamaguchi*[3]*, Kensuke Hirata*[3]*, Masaki Takama*[1]*, Masahiro Inoue*[1]*, Yuzo Ishida*[4]*,* ***Sakae Kawato***[5,6,7]*;* [1]*Fiber Amenity Engineering, Graduate School of Engineering, Univ. of Fukui, Japan,* [2]*Japan Synchrotron Radiation Res. Inst., Japan,* [3]*Faculty of Engineering, Univ. of Fukui, Japan,* [4]*Inst. of Physical and Chemical Res., Riken Wako Inst., Japan,* [5]*Graduate School of Engineering, Univ. of Fukui, Japan,* [6]*Res. and Education Program for Life Science, Univ. of Fukui, Japan,* [7]*Inst. of Physical and Chemical Res., RIKEN, Japan.* Exceeding the fluorescence spectrum limit of the laser gain material, broadband ultrashort pulse generation was obtained directly from mode-locked solid state laser oscillator with intracavity nonlinear medium.

NME58
Turning Bistable Nonlinear Optical Cavities into Four-Phase Multistable Systems via Rocking, *Stanis Kolpakov*[1]*, Fernando Silva*[1]*, Eugenio Roldan*[1]*, Kestutis Staliunas*[2]*,* ***German J. de Valcarcel***[1]*;* [1]*Univ. de Valencia, Spain,* [2]*ICREA and Univ. Politècnica de Catalunya, Spain.* Rocking of phase-bistable nonlinear optical cavities is shown, analytically and numerically, to turn them into four-phase multistable devices allowing for four-phase patterns. Experiments in a degenerate four-wave mixing oscillator show the precursors of these phenomena.

NME59
Cherenkov Radiation and Remote Control of Bloch Cavity Solitons, ***Oleg A. Egorov***[1]*, Kestutis Staliunas*[2]*, Falk Lederer*[1]*;* [1]*Inst. of Condensed Matter Theory and Optics, Friedrich-Schiller-Univ. Jena, Germany,* [2]*ICREA, Dept. de Física i Enginyeria Nuclear, Univ. Politècnica de Catalunya, Spain.* We report on an effective control of location and velocity of Bloch Cavity Solitons in nonlinear cavities with a periodic photonic structure by means of the excitation of dispersive waves which are resonant with solitons.

NME60
Enhancement of Third Harmonic Generation in Nonlocal Solitons, ***Marco Peccianti***[1,2]*, Alessia Pasquazi*[1]*, Gaetano Assanto*[3]*, Roberto Morandotti*[1]*;* [1]*INRS Énergie, Matériaux et Télécommunications, Canada,* [2]*IPCF-CNR Roma, Inst. for Chemical and Physical Processes, Italy,* [3]*Nonlinear Optics and OptoElectronics Lab, Univ. "Roma Tre", Italy.* We report on the observation of type I third harmonic generation enhanced by tight localization of fs laser light in nonlocal spatial solitons excited in nematic liquid crystals.

NME61
Pyroelectric Surface-Wave Soliton, ***Jassem Safioui***[1]*, Eugenio Fazio*[2]*, Fabrice Devaux*[1]*, Mathieu Chauvet*[1]*;* [1]*Dept. d'Optique, Inst. FEMTO-ST, France,* [2]*Ultrafast Photonics Lab, Dept. di Energetica and CNISM, Sapienza Univ. Roma, Italy.* Pyroelectric surface-wave solitons are formed at the interface between a nonlinear photorefractive medium and a low index medium. Surface-wave soliton arises from light attraction to the surface and trapping by an asymmetric self-focusing index change.

NME62
Measurement of n_2 and β by Collinear Four-Wave Mixing and Heterodyne Detection, ***Anatoly Sherman****, Erik Benkler, Harald R. Telle; Physikalisch-Technische Bundesanstalt, Germany.* We demonstrate a method for simultaneous measurement of nonlinear refractive index and two-photon absorption coefficient without knowledge of laser parameters. Phase-sensitive heterodyne detection is combined with FWM to measure nonlinearities in a crystalline silicon plate.

NME63
Efficient Wavelength Conversion and Net Parametric Gain via FWM in a High Index Doped Silica Waveguide, ***Alessia Pasquazi***[1]*, Yongwoo Park*[1]*, Josè Azaña*[1]*, François Légaré*[1]*, Brent E. Little*[2]*, Sai T. Chu*[2]*, Roberto Morandotti*[1]*, David J. Moss*[1,3]*;* [1]*Ultrafast Optical Processing Group INRS-EMT, Canada,* [2]*Infinera Corp., USA,* [3]*CUDOS, School of Physics, Univ. of Sydney, Australia.* We demonstrate C-band subpicosecond wavelength conversion over > 100nm, exploiting four wave mixing in a high index doped silica waveguide spiral of 45cm, showing a +16.5dB net gain for a 40W peak pump power.

NME64
Logical Operations Using Excitable Cavity Solitons, *Damia Gomila,* ***Adrian Jacobo****, Manuel A. Matias, Pere Colet; IFISC (CSIC-UIB), Spain.* We show theoretically that dissipative solitons arising in the transverse plane of Kerr cavities show an excitable regime that can be used to perform all-optical logical operations.

NME65
Nonlinear Optical Properties of Au and Ag Nanoparticles Dispersed in Ionic Liquids, ***Marcio A. R. Alencar***[1]*, Cassio E. A. Santos*[1]*, Luciane F. Oliveira*[1]*, Carla W. Scheeren*[2]*, Jairton Dupont*[2]*, Jandir M. Hickmann*[1]*;* [1]*Univ. Federal de Alagoas, Brazil,* [2]*Univ. Federal do Rio Grande do Sul,* Brazil. Hybrid organic-metallic colloids consisting of Au and Ag nanoparticles dispersed in two different ionic liquids were synthesized. Our results indicate that these systems are promising candidates to the development of nonlinear optical applications.

7.00–17.30 **Registration Open,** *Main Foyer*

Thoma

8.00–10.00
JTuA • ANIC/SPPCom Joint Plenary

JTuA1 • 8.00 Plenary
Digital Coherent Optical Communications beyond 100 Gb/s, ***Kim Roberts***; *Ciena, Canada.* Abstract not available.

JTuA2 • 9.00 Plenary
Next-Generation Optical Access Networks: Goals, Challenges and Research Opportunities, ***Leonid Kazovsky***[1]**,** *Shing-Wa Wong*[1]*, She-Hwa Yen*[1]*, Vinesh Gudla*[1]*, Pegah Afshar*[1]*, David Larrabeiti*[2]*;* [1]*Stanford Univ., USA,* [2]*Univ. Carlos III de Madrid, Spain.* The latest advances in optical technologies bring new possibilities to the design of next generation optical access networks. This paper outlines the main goals faced and the challenges to be addressed by researchers in this area.

10.00–17.00 **Exhibits Open,** *Weinbrenner Conference Room*

10.00–10.30 **Coffee Break/Exhibits,** *Weinbrenner Conference Room*

Hebel	Thoma	Mombert	Scheffel
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Access Networks and In-house Communications

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

Tuesday 22 June

10.30–12.30
BTuA • Gratings in Pulse Generation and Active Fibers
Yves Painchaud; TeraXion Inc., Canada, Presider

BTuA1 • 10.30
Nonlinear Coupled Mode Equations with Very Broadband Nonlinear Pulses, ***Tristan Kremp****, Paul S. Westbrook; OFS Labs, USA.* We solve the nonlinear coupled mode equations for an input pulse whose bandwidth exceeds the grating bandgap. Our results validate useful regimes for two faster, approximate methods that have previously been applied to this problem.

BTuA2 • 10.45
All-Optical Differentiation of Ultrashort Pulses Based on π-Phase-Shifted Integrated Bragg Gratings, ***Katarzyna A. Rutkowska***[1,2]*, David Duchesne*[1]*, Michael J. Strain*[3]*, Jose Azaña*[1]*, Roberto Morandotti*[1]*, Marc Sorel*[3]*;* [1]*INRS-EMT, Canada,* [2]*Faculty of Physics, Warsaw Univ. of Technology, Poland,* [3]*Dept. of Electronics and Electrical Engineering, Univ. of Glasgow, UK.* We report the first realization of an on-chip high-order photonic differentiator using silicon-on-insulator phase-shifted Bragg gratings. Moreover, our differentiators offer a ~35-fold improvement in processing speed over previously reported first-order integrated devices.

BTuA3 • 11.00
Fiber Bragg Gratings for Wideband Temporal Hilbert Transform, ***Jianping Yao****, Ming Li; Univ. of Ottawa, Canada.* Fiber Bragg gratings (FBGs) for wideband temporal Hilbert transform are investigated. Two FBGs with bandwidths of 50 and 100 GHz to perform the Hilbert transform of a 13.6 GHz Gaussian-like optical pulse are experimentally evaluated.

10.30–12.30
NTuA • Modelocking in Fiber Lasers
Sergei K. Turitsyn; Aston Univ., UK, Presider

NTuA1 • 10.30
Pulse Formation Dynamics in Giant Chirp Oscillators, ***J. C. Travers****; Femtosecond Optics Group, Imperial College London, UK.* We use numerical simulations to probe the pulse dynamics of mode-locked fiber lasers with extreme normal dispersion (as large as 21.5 ps^2). Pulse formation and the support of dark solitons is described.

NTuA2 • 10.45
Dissipative Solitons in an All-Normal Erbium Fiber Laser, ***Nikolai Chichkov***[1]*, Katharina Hausmann*[1]*, Dieter Wandt*[1]*, Uwe Morgner*[2]*, Jörg Neumann*[1]*, Dietmar Kracht*[1]*;* [1]*Laser Zentrum Hannover e.V., Germany,* [2]*Inst. für Quantenoptik, Leibniz Univ. Hannover, Germany.* Dissipative solitons at 1550 nm are generated in an erbium fiber laser containing only positive dispersive fibers. The output pulses have an energy of 20 nJ at a repetition rate of 3.5 MHz.

NTuA3 • 11.00
Scaling of Dissipative Soliton Lasers to Megawatt Peak Powers, *Simon Lefrancois*[1]*, Khanh Kieu*[1]*,* ***Frank W. Wise***[1]*, Yujun Deng*[2]*, James D. Kafka*[2]*;* [1]*Cornell Univ., USA,* [2]*Spectra-Physics Inc., USA.* Dissipative solitons can be stable despite huge nonlinear phase shifts. We exploit this property and scaling at constant nonlinear phase to demonstrate a femtosecond fiber laser with peak power 4 times greater than prior lasers.

10.30–12.30
STuA • Fibers and Sensors I
Ishwar Aggarwal; NRL, USA, Presider

STuA1 • 10.30 Tutorial
Photonic Crystal Fibres in Sensing and Metrology, ***Philip Russell****; Max-Planck-Inst. for the Science of Light, Germany.* Photonic crystal fibres permit low-loss guidance of light in both glass and air. Improved control of light-matter interactions is creating many opportunities for environmental and (bio)chemical sensors as well as in frequency metrology.

10.30–12.30
ATuA • Broadband Access Networks
Thomas Pfeiffer; Alcatel-Lucent, Germany, Presider

ATuA1 • 10.30 Invited
Bandwidth Drivers in Access, ***Ingrid van de Voorde****; Bell Labs, Alcatel-Lucent, Belgium.* The key driver for bandwidth today, and in the coming years will clearly be video. During the talk, advances in video technology and a myriad of new emerging video applications will be presented.

ATuA2 • 11.00 Invited
Progress of FTTH Standards, ***Frank J. Effenberger****; Huawei Technologies, USA.* FTTH standardization is accelerating, and looks to keep this pace for the next few years. This paper reviews the main results achieved in the standards for Gigabit and Ten Gigabit PONs, and the following systems.

Sessions continue on page 24.

Clubraum	Room 2.05	Room 2.08
Signal Processing in Photonic Communications	Solid-State and Organic Lighting	Optical Nanostructures for Photovoltaics

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

10.30–12.30
SPTuA • Modulation Formats
Robert Killey; Univ. College London, UK, Presider

SPTuA1 • 10.30 Invited
The Capacity Crunch Challenge: How to Design the Next Generation of Ultra-High Capacity Transmission Systems, *Dirk van den Borne*[1], *Mohammad S. Alfiad*[2], *Sander L. Jansen*[1]; [1]*Nokia Siemens Networks, Germany*, [2]*Eindhoven Univ. of Technology, Netherlands.* Next-generation optical transmission systems are edging closer and closer to forecasted capacity limits. In this paper we sketch a number of technologies that could potentially help to delay the ultimate truth of Shannon's capacity limit.

SPTuA2 • 11.00 Invited
High Spectral Efficiency Phase and Quadrature Amplitude Modulation for Optical Fiber Transmission, *Ronald Freund*, *Jonas Hilt, Markus Nölle, Lutz Molle, Matthias Seimetz, Johannes Karl Fischer, Reinhold Ludwig, Carsten Schmidt-Langhorst, Colja Schubert; Fraunhofer-Inst. for Telecommunications, Heinrich-Hertz-Inst., Germany.* Worldwide, higher-order modulation formats are intensively investigated to further increase spectral efficiency for building next generation optical transport systems. This talk reviews current research on application of these modulation formats with the focus on HHI's latest achievements in component development, system design and real-time FPGA-based signal processing.

10.30–12.30
SOTuA • Lighting Solutions I
Presider to Be Announced

SOTuA1 • 10.30 Invited
White LEDs for General Lighting Applications, *Paul Hartmann*, *Peter Pachler, Hans Hoschopf, Istvan Bakk, Friedrich Wagner, Martin Werkovits, Karl Koeberl, Stefan Tasch; LEDON Lighting Jennersdorf GmbH, Austria.* A range of high-performance LED modules for General Lighting has been designed to meet requirements of LED lamps. The Red-white approach using efficiency-optimized phosphor-converted and red LEDs delivers warm-white emission of highest quality and efficacy.

10.30–12.30
PTuA • Thermophotovoltaics
Ralf B. Wehrspohn; Fraunhofer Inst. for Mechanics of Materials, Germany, Presider

PTuA1 • 10.30 Invited
Harvesting Solar Energy by Creating an Innovative Network of Nanostructures, *Shawn Lin*; *Rensselaer Polytechnic Inst., USA.* I will describe a non-periodic and random assembly of nanostructure. I will share with you two distinct-examples: (I) the darkest manmade material made by a network of carbon-nanotube array (II) a nearly all-angle antireflection-coating using a non-periodic design.

PTuA2 • 11.00 Invited
Photonic Crystal-Assisted High-Efficiency Photovoltaic Generation: Harvesting the Ultra-Long and Ultra-Short Wavelength Photons, *Ihab F. El-Kady*; *Sandia Natl. Labs, USA.* We propose a Photonic-Crystal, Rectenna and Quantum-dot hybrid paradigm to augment the state-of-the-art Solar-photovoltaic (PV) conversion efficiency by an additional 15-25% via harvesting the ultra-long (IR) as well as the ultra-short (UV) wavelength photons.

Sessions continue on page 25.

Hebel	Thoma	Mombert	Scheffel
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Access Networks and In-house Communications

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

Tuesday 22 June

BTuA • Gratings in Pulse Generation and Active Fibers—Continued

BTuA4 • 11.15
All Fibre Femtosecond Pulse Generation Using an Intracavity 45º-Tilted Fibre Grating, ***Chengbo Mou***[1,2], *Hua Wang*[2], *Brandon Bale*[1], *Kaiming Zhou*[1], *Lin Zhang*[1], *Sergei Turitsyn*[1], *Ian Bennion*[1]; [1]*Photonics Res. Group, School of Engineering and Applied Science, Aston Univ., UK,* [2]*Inst. of Physics, Nankai Univ., China.* We demonstrate an all-fibre erbium doped fibre laser mode-locked by using an intracavity 45º-Tilted Fibre Grating as a polarization element. The laser produces soliton-like pulses with ~600fs pulse duration and ~1nJ output energy at a repetition rate of 10.34MHz.

BTuA5 • 11.30
Simple and Efficient UWB Pulse Generator, *M. Dastmalchi, M. Abtahi, D. Lemus, L. A. Rusch,* ***S. LaRochelle****; COPL, Univ. Laval, Canada.* We present a low cost, low power consumption technique for accurate ultra-wideband (UWB) pulse shaping. Improvements are obtained by using a balanced detection configuration with two thermally apodized gratings and a gain switched laser diode.

BTuA6 • 11.45
Bragg Gratings in Yb^{3+}- Doped Solid Photonic Bandgap Fibre, ***Kevin Cook***[1], *Sébastien Février*[2], *John Canning*[1]; [1]*Univ. of Sydney, Australia,* [2]*Univ. of Limoges, France.* We demonstrate the inscription of Bragg gratings in a large-mode-area, ytterbium-doped photonic-bandgap fibre with 3 concentric germanium-doped cladding rings in the cladding. The gratings are inscribed in these doped rings that can support several modes.

BTuA7 • 12.00
2nd Order Bragg Rasonance Generated in a 45º Tilted Fiber Grating and Its Application in a Fiber Laser, ***Chengbo Mou****, Rui Suo, Kaiming Zhou, Lin Zhang, Ian Bennion; Photonics Res. Group, School of Engineering and Applied Science, Aston Univ., UK.* We report the generation of a 13dB 2nd order Bragg resonance in a conventionally UV-inscribed 45º tilted fiber grating, showing strong polarization dependency and its application for singe polarization output of a fiber laser.

BTuA8 • 12.15
Optically Pumped Chirped Grating for Tunable Chromatic Dispersion Compensation, ***Xuewen Shu****, Kate Sugden, Ian Bennion; Aston Univ., UK.* We demonstrate a novel optically tunable dispersion compensator based on pumping a chirped grating made in Er/Yb co-doped fiber. The dispersion was tuned from 900 to 1900ps/nm and also from -600 to -950ps/nm in the experiment.

NTuA • Modelocking in Fiber Lasers—Continued

NTuA4 • 11.15
Intra-Cavity Dynamics in High Power Mode-Locked Fiber Lasers, ***Brandon G. Bale***[1], *Sonia Boscolo*[1], *J. Nathan Kutz*[2], *Sergei K. Turitsyn*[1]; [1]*Photonics Res. Group, School of Engineering and Applied Science, Aston Univ., UK,* [2]*Dept. of Applied Mathematics, Univ. of Washington, USA.* A theoretical model allows for the characterization and optimization of the intra-cavity pulse evolutions in high-power fiber lasers. Multi-parameter analysis of laser performance can be made at a fraction of the computational cost.

NTuA5 • 11.30
Generation of Soliton Molecules with Independently Evolving Phase in a Mode-Locked Fiber Laser, *Bülend Ortaç*[1], ***Alexandr Zaviyalov***[2], *Carsten K. Nielsen*[3], *Oleg Egorov*[2], *Rumen Iliew*[2], *Jens Limpert*[4], *Falk Lederer*[2], *Andreas Tünnermann*[5]; [1]*UNAM-Inst. of Materials Science and Nanotechnology, Bilkent Univ., Turkey,* [2]*Inst. of Condensed Matter Theory and Solid State Optics, Friedrich-Schiller-Univ. Jena, Germany,* [3]*Univ. of Aarhus, Denmark,* [4]*Inst. of Applied Physics, Friedrich-Schiller-Univ. Jena, Germany,* [5]*Fraunhofer Inst. for Applied Optics and Precision Engineering IOF, Germany.* We report the experimental generation of two-soliton molecules in an ytterbium-doped fiber laser. These molecules exhibit an independently evolving phase and are characterized by a regular spectral modulation pattern with a modulation depth of 80%.

NTuA6 • 11.45
Amplifier Similariton in a Fiber Laser, ***William H. Renninger****, Andy Chong, Frank W. Wise; Cornell Univ., USA.* Parabolic self-similar pulses in an amplifier are realized theoretically and experimentally in a fiber oscillator. Ultrashort, high-energy, parabolic pulses from a simple all-normal dispersion source will have use in applications.

NTuA7 • 12.00
Dissipative Soliton Lasers, ***Nail Akhmediev***[1], *Adrian Ankiewicz*[1], *Frank Wise*[2]; [1]*Optical Sciences Group, Australian Natl. Univ., Australia,* [2]*Dept. of Applied Physics, Cornell Univ., USA.* We present a simple analytic model for pulses generated by dissipative soliton lasers based on a master equation approach. The resulting spectra are similar to those observed in experiments.

NTuA8 • 12.15
Lumped vs. Averaged Models for Fiber Lasers, ***Alexandr Zaviyalov****, Rumen Iliew, Oleg Egorov, Falk Lederer; Inst. of Condensed Matter Theory and Solid State Optics, Friedrich-Schiller-Univ. Jena, Germany.* From a lumped laser model we derive an averaged one which finally results in the cubic-quintic Ginzburg-Landau equation (CQGLE). Numerical comparison shows that lumped and averaged models agree well but results from CQGLE significantly deviate.

STuA • Fibers and Sensors I—Continued

STuA2 • 11.15 Invited
Gemini Fiber for Sensing, ***W. Margulis****, P. Rugeland, E. Zetterlund, A. Loriette, A. Sudirman, C. Sterner, M. Eriksson, H. Eriksson-Quist; ACREO AB, Sweden.* Gemini fibers drawn from neighboring preforms into a two-branch fiber that provides easy access to input and output are exploited for sensing. Some characteristics of the fiber are investigated, including FBGs and interferometers.

STuA3 • 11.45
In situ **Monitoring of the Deposition of Nanometer-Scale Gold and Silver Films on Optical Fibers,** ***Alexander Beliaev****, Graham Galway, Anatoli Ianoul, Jacques Albert; Carleton Univ., Canada.* Tilted fiber Bragg Gratings sensors allow the monitoring of the formation of gold and silver films on fibers with thicknesses ranging from 10 to 50 nm during electroless plating with gold nanoparticles precursors.

STuA4 • 12.00
Characterization of a Fiber Optic Sensor Based on LSPR and Specular Reflection, *Paula M. P. Gouvêa*[1], ***Isabel C. S. Carvalho***[1], *Hoon Jang*[2], *Marco Cremona*[1], *Arthur M. B. Braga*[1], *Michael Fokine*[2]; [1]*Pontifícia Univ. Católica do Rio de Janeiro, Brazil,* [2]*Royal Inst. of Technology, Sweden.* A fiber optic sensor based on Localized Surface Plasmon Resonance (LSPR) and specular reflection has been characterized as a function of refractive índex. The sensitivity has been obtained for the range from n=1.0 to n=2.0.

STuA5 • 12.15
Inline Remote Acid Sensing Using an Optical Fibre Porphyrin Micro-Cell Reactor, *George Huyang, John Canning,* ***Mattias Aslund****, Danial Stocks, Tony Khoury, Maxwell J. Crossley; Univ. of Sydney, Australia.* An effective porphyrin acid sensor utilising liquid-core micro-cell reactor optical fibre technology is designed and tested; changes in the spectral signature upon acidification are used for acid detection.

ATuA • Broadband Access Networks—Continued

ATuA3 • 11.30 Invited
Withdrawn

ATuA4 • 12.00 Invited
New FTTH Architectures for NG-PON-2, ***Josep Prat***[1], *Jose A. Lázaro*[1], *Konstantinos Kanonakis*[2], *Ioannis Tomkos*[2]; [1]*Univ. Politècnica de Catalunya, Spain,* [2]*Res. and Education Lab in Information Technologies, Athens Information Technology, Greece.* Three new relevant architectures for the Second Next Generation Passive Optical Networks (NGPON2), based on hybrid topologies, OFDM and UD-WDM, are discussed, as a step forward in PON performances and functionalities.

12.30–13.30 Lunch Break *(on your own)*

Clubraum	Room 2.05	Room 2.08
Signal Processing in Photonic Communications	Solid-State and Organic Lighting	Optical Nanostructures for Photovoltaics

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

SPTuA • Modulation Formats—Continued

SPTuA3 • 11.30
Minimization of the Receiver Sensitivity of Cost Efficient Multilevel ASK Modulation Formats for Metro Networks by Filter Optimization, ***Annika Dochhan****, Werner Rosenkranz; Univ. of Kiel, Germany.* Receiver sensitivity of multilevel unipolar and bipolar ASK modulation formats is minimized by optimizing the filter bandwidth of optical and electrical filters. Comparisons attest bipolar ASK formats a superior sensitivity performance compared to unipolar ASK.

SPTuA4 • 11.45 Invited
Digital Non-Coherent Receivers for Advanced Modulation Formats, ***Yuichi Takushima****, Hyeon Y. Choi, Hyeok G. Choi, Yun C. Chung; KAIST, Republic of Korea.* We discuss the digital signal-processing techniques for phase-adjustment-free operation of a non-coherent receiver with the enhanced receiver sensitivity. The detection of multi-level DPSK and 16ADPSK signals is demonstrated with near quantum-limited sensitivity.

SPTuA5 • 12.15
Dual-Rate Linear Optical Sampling for Remote Monitoring of Complex Modulation Formats, ***Tasshi Dennis****, Paul A. Williams; Optoelectronics Div., NIST, USA.* We demonstrate linear optical sampling using simultaneous pulsed and CW local oscillators to enable phase tracking of a data modulated carrier. The technique enables the direct measurement of remotely received signals with low phase noise.

SOTuA • Lighting Solutions I—Continued

SOTuA2 • 11.10 Invited
LED Retrofits, ***Moritz Engl****; OSRAM, Germany.* Retrofits are entering the market driven by law and increasing brightness of the semiconductors itself. Furthermore retrofits could have the possibility to increase the efficiency further in the next years while standard technology as incandescent, halogen and fluorescent lamps are close the technical limits.

SOTuA3 • 11.50 Invited
OLED Applications in the Lighting Market, ***Dietrich Bertram****; Philips, Netherlands.* Abstract not available.

PTuA • Thermophotovoltaics—Continued

PTuA3 • 11.30 Invited
Efficient Nanocone Light Trapping for Photovoltaics, ***Yi Cui****; Stanford Univ., USA.* Abstract not available.

PTuA4 • 12.00 Invited
Implications of Nanophotonics for the Limit of Thin-Film Light Trapping and for the Single-Junction Shockley-Queisser Limit, ***Shanhui Fan****; Stanford Univ., USA.* Abstract not available.

12.30–13.30 Lunch Break *(on your own)*

Hebel	Thoma	Mombert	Scheffel
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Access Networks and In-house Communications

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

13.30–15.30
BTuB • Grating Stability and Poling
John Canning; Univ. of Sydney, Australia, Presider

BTuB1 • 13.30
Photo-Thermal Growth of Unsaturated and Saturated Bragg Gratings in Phosphate Glass Fibers, ***Lingyun Xiong***[1]*, Peter Hofmann*[2,3]*, Axel Schülzgen*[2,3]*, Nasser Peyghambarian*[3]*, Jacques Albert*[1]*;* [1]*Carleton Univ., Canada,* [2]*Univ. of Central Florida, USA,* [3]*Univ. of Arizona, USA.* We demonstrate that the strong thermal growth of fiber Bragg gratings in phosphate glass fibers at temperatures between 100 - 250 °C requires seed gratings written using 193 nm light to be overexposed beyond saturation.

BTuB2 • 13.45
Influence of Humidity and Temperature on Polymer Optical Fiber Bragg Gratings, *Gérard N. Harbach,* ***Hans G. Limberger****, René P. Salathé; École Polytechnique Fédérale de Lausanne, Switzerland.* Water sorption of 100% changes the POFBG peak wavelength by 8.1 nm (at 1.54 micron). The temperature sensitivity depends on water content and is -10, -34, and -138 pm/K in dry, wet, and ambient conditions.

BTuB3 • 14.00
Thermal Regenerated Fiber Bragg Gratings in Non-Hydrogen Loaded Photosensitive Fibers, ***Eric Lindner***[1]*, Christoph Chojetzki*[2]*, Sven Brückner*[1]*, Martin Becker*[1]*, Manfred Rothhardt*[1]*, Hartmut Bartelt*[1]*;* [1]*Inst. of Photonic Technology, Germany,* [2]*FBGS Technologies GmbH, Germany.* We report about a thermal regeneration of fiber Bragg gratings in photosensitive fibers without hydrogen loading. We observe a complex regenerative process which indicates a secondary grating growth in an optical fiber by thermal activation.

BTuB4 • 14.15
Predicting the Decay of Fiber Bragg Gratings from Their Growth, *Vishnuprasad V. J.*[1]*, Palas Biswas*[2]*, Somnath Bandyopadhyay*[2]*, Nirmal K. Viswanathan*[3]*,* ***Balaji Srinivasan***[1]*;* [1]*Indian Inst. of Technology Madras, India,* [2]*Central Glass and Ceramic Res. Inst., India,* [3]*Univ. of Hyderabad, India.* We report the development of a model that predicts the decay of fiber Bragg gratings based on growth data and validate the same using experimental data obtained from accelerated aging studies.

BTuB5 • 14.30
H_2 Loaded Type-I Fibre Bragg Gratings Thermally Stabilised for Operation up to 600°C, ***Mattias Aslund****, John Canning, Michael Stevenson, Kevin Cook; Univ. of Sydney, Australia.* The thermal stability of type 1 gratings is increased by post thermal tuning of the grating, leading to gratings that can withstand temperatures up to 600 °C, lifetime predictions suggests <3dB reduction after 25 years at 400 °C.

13.30–15.00
NTuB • Silicon and Molecular Photonics
Presider to Be Announced

NTuB1 • 13.30 Invited
Applications of Four-Wave Mixing in Silicon Nanostructures, ***Alexander Gaeta****; Cornell Univ., USA.* Abstract not available.

NTuB2 • 14.00
A Nonlinear Liquid Crystal Optical Waveguide on Silicon, ***Marco Trotta***[1]*, Rita Asquini*[1]*, Romeo Beccherelli*[2]*, Antonio d'Alessandro*[1]*;* [1]*Sapienza Univ., Italy,* [2] *Inst. per la Microelettronica e Microsistemi, Consiglio Nazionale delle Ricerche, Italy.* The optical nonlinear transmission of a channel waveguide with E7 liquid crystal core infiltrated in a SiO_2/Si V-groove is experimentally and theoretically investigated. Low input power excites optical nonlinearity due to optically induced re-orientational effect.

NTuB3 • 14.15 Invited
Ultra-Low V_π Slot Waveguide Based Interferometers with χ_2 Nonlinear Polymers, *Jeremy Witzens, Thomas Baehr-Jones, Ran Ding, Yang Liu, Rick Bojko,* ***Michael Hochberg****; Univ. of Washington, USA.* Slot waveguides allow joint confinement of the RF electrical and optical-fields in a narrow slot and enable ultra-low driving-voltage polymer-based modulators. We show recent progress with transmission line driven devices and application to analog-optical links.

13.30–15.30
STuB • Sensor Systems I
Jan C. Petersen; Danish Fundamental Metrology Ltd., Denmark, Presider

STuB1 • 13.30 Invited
Precision Length Metrology Using Fiber-Based Frequency Combs, ***Kaoru Minoshima****, Hajime Inaba; AIST, Japan.* We developed a distance measurement technique with sub-wavelength accuracy using 821st-harmonic of the intermode-beats of a fiber-based frequency comb. The developed method can provide a coherent link to an integrated laser interferometer for absolute-long-distance measurements.

STuB2 • 14.00 Invited
Sensing in Fibers Aided by Localized Four Photon Mixing, ***Evgeny Myslivets****, Stojan Radic; Univ. of California at San Diego, USA.* We describe new technique for selective localization of four-photon mixing (FPM) recently developed to retrieve geometrical, dispersive, stress, and birefringent properties of distributed fiber devices. The technique relies on counter-colliding pulse power transfer and is capable of resolving physical fluctuations comparable to a silica molecular diameter.

STuB3 • 14.30
Raman Spectroscopy Based Sensor System for Fast Analysis of Natural and Biogas Composition, ***Thomas Seeger***[1]*, Johannes Kiefer*[2]*, Simone Eichmann*[1]*, Alfred Leipertz*[1]*;* [1]*Lehrstuhl für Technische Thermodynamik, Germany,* [2]*Univ. of Aberdeen, UK.* A sensor system based on Raman scattering is described, characterized and tested. Virtually all components of technically relevant fuel gas mixtures such as natural gas and biogas can be determined within short signal evaluation times.

13.30–15.30
ATuB • WDM-PON Architectures and Technologies
Presider to Be Announced

ATuB1 • 13.30 Invited
Progresses toward Next-Generation WDM PON, *K. Y. Cho, S. P. Jung, E. H. Hong, Y. Takushima,* ***Yun Chung****; KAIST, Republic of Korea.* We report on the recent progresses toward the next-generation wavelength-division-multiplexed passive optical network (WDM PON) including the high-speed (>10 Gbps) and long-reach (>100 km) operations.

ATuB2 • 14.00 Invited
NG DWDM Access Industry Perspective, ***Harald Rohde****; Nokia Siemens Networks, Germany.* DWDM long reach, high splitting factor, high data rate optical access networks are not only a fascinating research topic but, under the right preconditions, also a highly feasible solution for real product developments and deployments.

ATuB3 • 14.30 Invited
Remote Amplified Modulators, Key Components for 10Gb/s Colourless WDM PON, ***Christophe Kazmierski****; Alcatel-Thales III-V Lab, France.* Amplified electro-absorption modulators provide a realistic solution for colorless 10 Gb/s uncooled ONUs. Being compatible with current packaging technologies they will bring the required cost reduction. Still, an increased power budget capability has to be demonstrated.

Sessions continue on page 28.

Clubraum	Room 2.05	Room 2.08
Signal Processing in Photonic Communications	Solid-State and Organic Lighting	Optical Nanostructures for Photovoltaics

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

13.30–15.30
SPTuB • Advanced Optical Signal Processing
Tasshi Dennis; NIST, USA, Presider

SPTuB1 • 13.30 Invited
Signal Processing for Polarization Multiplexed Coherent WDM Transmission, *Guifang Li*; *Univ. of Central Florida, USA*. Abstract not available.

SPTuB2 • 14.00
All-Optical Demultiplexing of 1.28 Tb/s to 10 Gb/s Using a Chalcogenide Photonic Chip, *Trung D. Vo*[1], *Hao Hu[2], Michael Galili[2], Evarist Palushani[2], Jing Xu[2], Leif K. Oxenløwe[2], Stephen Madden[1], Duk Y. Choi[1], Douglas Bulla[1], Barry Luther-Davies[1], Mark D. Pelusi[1], Jochen Schroeder[1], Benjamin J. Eggleton[1]; [1]CUDOS, Univ. of Sydney, Australia, [2]DTU Fotonik, Technical Univ. of Denmark, Denmark.* We report the first demonstration of all-optical Tbaud switching on a compact photonic chip. A 1.28 Tbaud return-to-zero signal was demultiplexed via four-wave mixing in a highly nonlinear, dispersion-engineered 7-cm Chalcogenide planar waveguide.

SPTuB3 • 14.15
Optical Vector Signal Analyzer Based on Differential Detection with Inphase and Quadrature Phase Control, *Jingshi Li*[1], *Kai Worms[1], Andrej Marculescu[1], David Hillerkuss[1], Shalva Ben-Ezra[2], Wolfgang Freude[1], Juerg Leuthold[1]; [1]Karlsruhe Inst. of Technology, Germany, [2]Finisar Corp., Israel.* An optical vector signal analyzer is presented based on two differential delay interferometer detectors. Orthogonality of inphase and quadrature phase is guaranteed by a monitoring scheme. The time delay can be adjusted to the bit-rate.

SPTuB4 • 14.30
Experimental Investigation of Multi-Wavelength Clock Recovery Based on a Quantum-Dot SOA at 40 Gb/s, *Maria Spyropoulou*[1], *René Bonk[2], David Hillerkuss[2], Nikos Pleros[1], Thomas Vallaitis[2], Wolfgang Freude[2], Ioannis Tomkos[3], Juerg Leuthold[2]; [1]Computer Architecture and Communications Lab, Dept. of Informatics, Aristotle Univ. of Thessaloniki, Greece, [2]Inst. of Photonics and Quantum Electronics, Karlsruhe Inst. of Technology, Germany, [3]High Speed Networks and Optical Communications, Athens Information Technology, Greece.* We study single and multi-wavelength clock recovery functionality based on a fabry-pérot filter followed by a quantum-dot SOA at 40 Gb/s and we demonstrate its performance for various pseudo-random binary sequences and operating power levels.

13.30–15.30
SOTuB • LED Technology and Characterization I
Presider to Be Announced

SOTuB1 • 13.30 Invited
Phosphor Converted LEDs with Saturated Emission, *Helmut Bechtel*; *Philips Technologie GmbH Forschunglaboratorien, Germany.* With the Lumiramic™ phosphor technology high power pcLEDs with saturated emission in the green to red spectral region have been produced, outperforming direct emitting LEDs with peak emission wavelength between 520 and 610 nm.

SOTuB2 • 14.10
Methods for Increasing the Efficiency of Organic Light Emitting Diodes, *Boris Riedel*[1], *Julian Hauss[1], Ulf Geyer[2], Uli Lemmer[1], Martina Gerken[2]; [1]Light Technology Inst., Karlsruhe Inst. of Technology, Germany, [2]Inst. of Electrical and Information Engineering, Christian-Albrechts-Univ. zu Kiel, Germany.* For ITO-free OLEDs with a high-index layer the outcoupling efficiency was increased by 300% using periodic nanostructuring. Incorporating nanoparticles between the emission layer and the cathode increased the internal quantum efficiency of ITO-OLEDs by 310%.

SOTuB3 • 14.30
Efficiency Droop Effect Reduction in a Light-Emitting Diode with Surface Plasmon Coupling, *Chih-Feng Lu, Che-Hao Liao, Chih-Yen Chen, Chieh Hsieh, **C. C. Yang**; Natl. Taiwan Univ., Taiwan.* The efficiency droop effect of a light-emitting diode is significantly reduced through the coherent coupling of its emitting quantum wells with the surface plasmons generated on the fabricated Ag structure on the device top surface.

13.30–15.30
PTuB • Diffractive Optics and Nanostructures I
Thomas Krauss; Univ. of St Andrews, UK, Presider

PTuB1 • 13.30 Invited
Efficiency Enhancement in Thin-Film Silicon Solar Cells with a Photonic Pattern, *Simone Zanotto[1,2], Marco Liscidini[1], **Lucio Andreani**[1]; [1]Univ. of Pavia, Italy, [2]Scuola Normale Superiore and NEST, Italy.* We theoretically demonstrate an increase of the short-circuit current up to 36.5% in a thin-film silicon solar cell through the use of a periodic patterning together with an antireflection coating.

PTuB2 • 14.00
A Method to Increase the Transmission of Glass Surface through Chemical Means, *Subrata Dutta*; *Moserbaer India Ltd., India.* Average transmission of tempered glass, used in PV modules, is increased by 2.1% through chemical treatment. Annealing stabilizes the optical response of glass from damp cyclic heat stress. pH and treatment time appears critical to overall process.

PTuB3 • 14.15
Light Scattering Simulation for Thin Film Silicon Solar Cells, *Thomas Lanz*[1], *Nils A. Reinke[1], Benjamin Perucco[2], Daniele Rezzonico[2], Beat Ruhstaller[1]; [1]Inst. of Computational Physics, Zürich Univ. of Applied Sciences, Switzerland, [2]Fluxim AG, Switzerland.* An extended net-radiation method for the optical simulation of thin film solar cells is presented that accounts for both scattering effects at rough layer interfaces as well as interference effects caused by thin layers.

PTuB4 • 14.30
Analysis of Optical Nanostructures of Thin-Film Solar Cells Using High Performance Simulations, *Christoph Pflaum*[1], *Christine Jandl[1], Kai Hertel[1], Helmut Stiebig[2]; [1]Univ. Erlangen-Nürnberg, Germany, [2]Malibu GmbH & Co. KG, Germany.* Short-circuit current density and the quantum efficiency of thin-film solar cells are calculated by simulating Maxwell's equations to improve light-management in these solar cells. Complete solar cell structures, based on AFM-scans, are simulated with high performance computing.

Tuesday 22 June

Sessions continue on page 29.

Hebel	Thoma	Mombert	Scheffel
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Access Networks and In-house Communications

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

BTuB • Grating Stability and Poling—Continued

BTuB6 • 14.45
Enhanced Second-Order Nonlinearities in Multilayers of Nanoscale Doped Silica Thin Films, ***Ksenia Yadav***[1], *Christopher W. Smelser*[2], *Sarkis Jacob*[2], *Chantal Blanchetiere*[2], *Claire L. Callender*[2], *Jacques Albert*[1]; [1]*Carleton Univ., Canada,* [2]*Communications Res. Ctr., Canada.* Corona poling of a 1.2 micrometer-thick stack of phosphorus-doped and undoped silica glass layers on silica leads to a 14-fold enhancement of the SHG relative to poling of the substrate alone.

BTuB7 • 15.00
Leaky-Modes Excitation in Thermally Poled Nanocomposite Glass and Their Exploitation for Saturable Absorption, ***Costantino Corbari***[1], *Martynas Beresna*[1], *Olivier Deparis*[2], *Peter G. Kazansky*[1]; [1]*Optoelectronics Res. Ctr., Univ. of Southampton, UK,* [2]*Res. Ctr. in Physics of Matter and Radiation, Univ. of Namur, Belgium.* Thermal poling is used to create a reduced index layer in a soda-lime/nanocomposite film. Leaky-modes have been exploited to enhance interaction of light with Au-nanoparticles and demonstrate saturable absorption characteristics in line with state-of-the-art technology.

BTuB8 • 15.15
Multi-Wavelength Interrogation (MWI) of Thermally Poled Twin-Hole Silica Optical Fibres, ***Andrew M. Michie***[1,2], *Alexander Argyros*[1], *Simon Fleming*[1], *Honglin An*[1], *John Haywood*[3], *Mamdouh Matar*[3]; [1]*Inst. of Photonics and Optical Science, School of Physics, Univ. of Sydney, Australia,* [2]*Interdisciplinary Photonics Labs, School of Chemistry, Univ. of Sydney, Australia,* [3]*Smart Digital Optics PTY Ltd., Australia.* The linear electro-optic co-efficient of a thermally poled twin-hole silica fibre is characterised over a broad wavelength range using a novel all fibre multi wavelength interferometer. By changing the wavelength we effectively change the spatial resolution of the optical probe.

NTuB • Silicon and Molecular Photonics—Continued

NTuB4 • 14.45
Organic Electro-Optic Crystalline Materials for Highly Integrated Photonic Circuits, ***Mojca Jazbinsek***, *Seong-Ji Kwon, Harry Figi, Christoph Hunziker, Peter Gunter; ETH Zürich, Switzerland.* We developed novel organic electro-optic single crystalline thin films, waveguides, and microring resonators suitable for highly efficient electro-optic modulation and hybrid integration with glass or silicon-on-insulator.

NTuB5
Withdrawn

STuB • Sensor Systems I—Continued

STuB4 • 14.45
Low-Coherence Interferometry Optical Sensor for the Characterization of Deposited Thin Film, ***Silvia Fabiani***, *Marco Farina, Andrea Di Donato, Agnese Lucesoli, Tullio Rozzi; Univ. Politecnica delle Marche, Italy.* Non-destructive sensor for the measurement of thickness and refractive index of polymeric layers deposit on glass bases. The sensor is oriented to the manufacture of polymers for O-PCB interconnects. Michelson FOLCI configuration has been applied.

STuB5 • 15.00
A Novel Technique for Quasi-Distributed and Dynamic Length Change Measurement in Optical Fibers, ***Sascha Liehr***, *Katerina Krebber; BAM Federal Inst. for Materials Res. and Testing, Germany.* We present a novel technique to measure length changes between multiple reflection points in optical fibers. The technique allows for dynamic measurement up to 1kHz and a resolution better than 1µm.

STuB6 • 15.15
An Efficient Optical Sensor for Ionizing Radiation: Nanocrystalline BaFCl:Sm^{3+}, ***Hans A. Riesen***, *Marion Stevens-Kalceff, Zhiqiang Liu, Kate Badek, Tracy Massil; Univ. of New South Wales, Australia.* Exposing nanocrystalline BaFCl:Sm^{3+} to ionizing radiation yields Sm^{2+} ions whose *f-f* luminescence at λ>600 nm can be excited by the intense $4f^6 \to 4f^5d^1$ transitions at 415 nm. The nanocrystals can be used with optical-fibres for remote-sensing.

ATuB • WDM-PON Architectures and Technologies—Continued

ATuB4 • 15.00
Multi-Operability in WDM-PONs with Electrically Reconfigurable RSOA-Based Optical Network Units, ***Bernhard Schrenk***, *Jose A. Lazaro, Victor Polo, Josep Prat; Univ. Politècnica de Catalunya, Spain.* An approach to integrate multi-operability for WDM-PONs is demonstrated with a symmetrical RSOA-based design for the customer premises equipment and red/blue waveband operation, allowing electrical reconfiguration of its detection and remodulation branch.

ATuB5 • 15.15
Impact of Nonlinear Effects Distortion on Hybrid Ultra-Dense WDM Based Networks, ***Jacklyn D. Reis***[1], *António L. Teixeira*[1,2]; [1]*Inst. de Telecomunicações, Univ. de Aveiro, Portugal,* [2]*Nokia Siemens Networks Portugal S.A, Portugal.* In this paper, the impact of fiber nonlinear crosstalk is investigated on hybrid ultra-dense WDM-PON systems. The transmission performance is analyzed through vector analysis considering XPM and FWM effects for 32x1Gbaud at 3GHz grid network.

15.30–16.00 Coffee Break/Exhibits, *Weinbrenner Conference Room*

Clubraum

Signal Processing in Photonic Communications

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

SPTuB • Advanced Optical Signal Processing—Continued

SPTuB5 • 14.45

Nonlinear Phase Shift Compensation with a NOLM-Based Regenerator in DPSK Transmission Systems, *Christian Stephan[1,2,3], Klaus Sponsel[1,2],* ***Georgy Onishchukov**[1,3], Gerd Leuchs[1,2,3], Bernhard Schmauss[3,4]; [1]Max-Planck-Inst. for the Science of Light, Germany, [2]Inst. of Optics, Information and Photonics, Univ. of Erlangen-Nuremberg, Germany, [3]Erlangen Graduate School in Advanced Optical Technologies, Germany, [4]Chair for Microwave Engineering, Univ. of Erlangen-Nuremberg, Germany.* Experimental investigations of nonlinear phase noise compensation in a DPSK transmission system using a NOLM-based nonlinear phase shift compensator are presented. A significant improvement in the BER of the received signal has been obtained.

SPTuB6 • 15.00 Invited

Optical OFDM for Next-Generation PON, ***Neda Cvijetic**; NEC Labs America, Inc., USA.* Key principles, benefits, and advanced DSP technology requirements of Orthogonal Frequency Division Multiplexing (OFDM)-based passive optical networks (PON) are overviewed, revealing OFDM to be a strong next-generation candidate technology for this application domain.

Room 2.05

Solid-State and Organic Lighting

SOTuB • LED Technology and Characterization I—Continued

SOTuB4 • 14.50

Enhanced Emission from Polymeric Light-Emitting Diodes Utilizing Poly(9,9-dioctylfluorene) Derivatives, ***Yutaka Ohmori**, Ryotaro Takata, Daisuke Kasama, Hirotake Kajii; Osaka Univ., Japan.* Emission properties of polymeric light-emitting diodes (PLEDs) utilizing poly(9,9-dioctyl fluorene) (PFO) in β phase and in amorphous have been investigated. The PFO in β phase exhibited enhanced emission and high speed transient response compared with that in amorphous phase. Emission properties of PFO derivatives were also investigated.

SOTuB5 • 15.10

On the Effect of Light Scattering in Phosphor Converted White Light-Emitting Diodes, *Christian Sommer[1],* ***Franz P. Wenzl**[1], Frank Reil[1], Joachim R. Krenn[1], Paul Hartmann[2], Peter Pachler[2], Stefan Tasch[2]; [1]Joanneum Res. Forschungsgesellschaft, Austria, [2]LEDON Lighting Jennersdorf GmbH, Austria.* We give, based on optical ray-tracing, a comprehensive survey on the parameters that effect color conversion and light scattering within the color conversion elements of phosphor converted white LED light sources.

Room 2.08

Optical Nanostructures for Photovoltaics

PTuB • Diffractive Optics and Nanostructures I—Continued

PTuB5 • 14.45

A New Approach to Light Scattering from Nanotextured Interfaces for Silicon Thin-Film Solar Cells, ***Corsin Battaglia**, Didier Dominé, Franz-Josef Haug, Christophe Ballif; École Polytechnique Fédérale de Lausanne, Switzerland.* A new approach is presented to determine the angular and spectral characteristics of light diffusely scattered from nanotextured front electrodes into the absorbing silicon layer of thin-film silicon solar cell devices.

PTuB6 • 15.00 Invited

Photocurrent Increase in Thin Film Solar Cells by Guided Mode Excitation, ***Karin Söderström**, Jordi Palou Escarré, Oscar Cubero, Franz-Josef Haug, Christophe Ballif; École Polytechnique Fédérale de Lausanne, Switzerland.* Angle resolved measurements of the external quantum efficiency of a-Si solar cells deposited on a grating show strong absorption phenomena which are well explained with the guided mode structure in an equivalent flat multilayer system.

15.30–16.00 Coffee Break/Exhibits, *Weinbrenner Conference Room*

Hebel	Thoma	Mombert	Scheffel
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Access Networks and In-house Communications

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

16.00—17.45
BTuC • Novel Grating Structures
Kyunghwan Oh; Yonsei Univ., Republic of Korea, Presider

BTuC1 • 16.00 Invited
Progress in Photosensitive Polymer Optical Fibres and Gratings, *Gang-Ding Peng*; *Univ. of New South Wales, Australia.* Polymer optical fibre Bragg gratings are useful for strain sensor applications for large dynamic range. We report recent progress in developing polymer optical fibres with higher photosensitivity and fabricating POF gratings at alternative wavelength.

BTuC2 • 16.30
Spectral Tuning of a Microstructured Fibre Bragg Grating Utilizing an Infiltrated Ferrofluidic Defect, *Alessandro Candiani[1], Maria Konstantaki[1], Walter Margulis[2], **Stavros Pissadakis**[1]; [1] Foundation for Res. and Technology-Hellas, Inst. of Electronic Structure and Laser, Greece, [2]ACREO AB, Sweden.* A ferrofluidic defect infiltrated in a microstructured fibre Bragg grating, covering 8% of the grating length, is translated along the fibre grating length, controllably reducing the reflected light at specific wavelengths by more than 70%.

BTuC3 • 16.45
Ultra-Narrowband Notch Filtering with Highly Resonant Fiber Bragg Gratings, *Yves Painchaud*, *Maryse Aubé, Guillaume Brochu, Marie-Josée Picard; TeraXion Inc., Canada.* Fiber Bragg gratings having a central π-shift and providing transmission notches as narrow as 9 MHz are reported. A central grating-free region is proposed to decrease the sensitivity of these resonant filters to optical power.

BTuC4 • 17.00
Tunable Microwave Photonic Filter Based on Cladding-Mode Coupling with Long-Period Fiber Gratings, *Zhu Wang*, *Kin S. Chiang, Qing Liu; City Univ. of Hong Kong, Hong Kong.* We demonstrate experimentally a Mach-Zehnder type microwave photonic filter, which employs a cladding-mode coupler formed with a pair of long-period fiber gratings to provide continuous and precise tuning of the free spectral range.

16.00–17.30
NTuC • NP Tuesday Poster Session

See page XX for NP Poster Session abstracts.

16.00–17.30
STuC • Microstructures in Sensing
Presider to Be Announced

STuC1 • 16.00 Invited
Design of Microstructured Waveguide Devices for Applications in Optical Sensing, *Graham E. Town*[1], *Ravi McCosker[1], Wu Yuan[2], Ole Bang[2]; [1]Macquarie Univ., Australia, [2]Danish Technical Univ., Denmark.* Microstructured waveguides provide a versatile platform for controlling interactions between light and their environment. We show how microstructured waveguides may be designed to improve the performance of optical sensors, and discuss their practical implementation.

STuC2 • 16.30 Invited
Technology and Applications of Smart Technical Textiles Based on Fibre Optic Sensors, *Katerina Krebber*; *BAM Federal Inst. for Materials Res. and Testing, Germany.* Technical textiles with embedded fibre optic sensors have been developed for the purposes of the structural health monitoring in geotechnical and civil engineering as well as for healthcare monitoring in the medical sector. The paper shows selected examples of using such sensor-based smart textiles for different applications.

STuC3 • 17.00
Porphyrin-Assisted Fabrication of Silica Mesostructured Nanoparticle Hosts for Potential Diagnostic and Sensing Applications, *John Canning*, *Masood Naqshbandi, Danijel Boskovic, Hank de Bruyn, Mattias Åslund, Max Crossley; Univ. of Sydney, Australia.* Mesostructured silica spheres up to 500 nm in diameter are fabricated using porphyrin materials to prevent fusing and aggregation of silica nanoparticles. In contrast to previous work using surfactant template sol-gel and other surfactant template techniques, porphyrins offer the potential of greater chemical flexibility for the integration of added functionality. Potentially greater biocompatibility is possible given the presence of porphyrins in blood.

16.00–17.15
ATuC • Monitoring and Supervision in Networks
Presider to Be Announced

ATuC1 • 16.00 Invited
Advanced Monitoring of PONs, *Joerg Hehmann*; *Alcatel Lucent, Germany.* New integrated monitoring concepts for physical layer supervision of optical access networks are presented. Simple remotely controlled integrated measurement systems will help network operators to improve network quality and reliability and to save operational costs.

ATuC2 • 16.30 Invited
Energy-Autarkic Monitor for FTT*x* Networks, *Wolfgang Freude*[1], *Moritz Roeger[1], Joerg Hehmann[2], Thomas Pfeiffer[2], Michael Huebner[1], Juergen Becker[1], Christian Koos[1], Juerg Leuthold[1]; [1]Karlsruhe Inst. of Technology, Germany, [2]Alcatel Lucent, Germany.* FTT*x* monitors with sophisticated hardware need 0.7µW of electrical power when controlled through a special protocol. This power can be delivered by a 5dBm optical source at a dedicated wavelength to up to 64 monitors.

ATuC3 • 17.00
Cost Effective Embedded Ubiquitous Fiber Optic Intrusion Sensors, *Khanh C. Tran*, *Christopher Horne, Chung Yu; North Carolina A&T State Univ., USA.* Embedded optical fibers deployed in fiber optic low coherence reflectometry [1] (FOLCR) have been successfully used for intrusion sensing. The high sensitivity and resolution of FOLCR implemented as fiber-is-the-sensor renders such systems ubiquitous and low cost.

Sessions continue on page 32.

Clubraum

Signal Processing in Photonic Communications

Room 2.05

Solid-State and Organic Lighting

Room 2.08

Optical Nanostructures for Photovoltaics

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

16.00–17.30
SPTuC • DSP Hardware and Real Time Processing
Presider to Be Announced

SPTuC1 • 16.00 Invited
Digital Signal Processing for the Realisation of 40 and 100G CP-QPSK Transponders, *Chris Fludger*[1], *J. C. Geyer[2], T. Duthel[1], C. Schulien[1]; [1]CoreOptics GmbH, Germany, [2]Univ. of Erlangen-Nuremberg, Germany.* We show the measurement results from a 43Gb/s CP-QPSK transponder, and discuss the challenges in the realisation of efficient designs for 112Gb/s transmission.

SPTuC2 • 16.30 Invited
CMOS ADC Developments for 100G Networks, *Bernd Germann*, *Ian Dedic; Fujitsu Microelectronics Europe GmbH, UK.* A 100G coherent receiver needs 4 56Gs/s ADCs and a tera-OPs DSP which dissipate only tens of watts. This paper discusses the forces pushing towards a single-chip CMOS solution, and the challenges in realising this.

SPTuC3 • 17.00
On a Real-Time 12.1 Gb/s OFDM Transmitter Architecture, *Fred Buchali*[1], *Roman Dischler[1], Axel Klekamp[1], Michael Bernhard[2]; [1]Alcatel-Lucent, Germany, [2]INUE, Stuttgart Univ., Germany.* A real-time OFDM transmitter architecture for 12.1 Gb/s bitrate has been optimized for optimum performance at lowest DSP complexity. We achieved 22.3 dB in Q-factor for 7 bit IFFTs twiddle factors and 6 bit resolution of DAC.

16.00–17.40
SOTuC • Modelling and Design
Ulrich T. Schwarz; Univ. of Regensburg, Germany, Presider

SOTuC1 • 16.00 Invited
Optical Design for LED-Street Lamps, *Andreas Timinger*; *OEC AG, Germany.* Optics design plays a key role for the development of competitive products. Optical efficiency has strong influence on the lifetime cost of an LED street lamp and hence its marketability.

SOTuC2 • 16.40
Three-Dimensional Full-Wave Optical Simulation of Leds, *Martin Loeser*, *Beat Ruhstaller; Zürich Univ. of Applied Sciences, Switzerland.* A novel Finite-Element based formalism, the Ultra-Weak Variational Formulation, is demonstrated to be a valuable and most efficient tool to model light propagation inside optically large structures such as LEDs.

SOTuC3 • 17.00
Rigorous S-Matrix Based Modeling of OLEDs, *Alexey Shcherbakov*[1,2], *Alexandre Tishchenko[1,2]; [1]Univ. Jean Monnet, France, [2]Moscow Inst. of Physics and Technology, Russian Federation.* The simulation of OLED optical properties based on a plane wave field expansion is resumed by an S-matrix approach. Exact general formulae are given that provide the optical characteristics inclusive of the losses in layers.

16.00–17.30
PTuC • Diffractive Optics and Nanostructures II
Thomas Krauss; Univ. of St Andrews, UK, Presider

PTuC1 • 16.00 Invited
Slow Light in Photonic Crystals for Photovoltaic Applications, *Christian Seassal*, *Guillaume Gomard, Ounsi El Daif, Xianqin Meng, Emmanuel Drouard, Anne Kaminski, Alain Fave, Mustapha Lemiti; Lyon Inst. of Nanotechnololgy, Univ. of Lyon, France.* The potential of slow light resonances in planar photonic crystals to control sun light absorption in very thin absorbing layers will be presented. Optical simulation, absorption measurements and full solar cell designs will be discussed.

PTuC2 • 16.30
Omnidirectional Broadband Scattering in Metal-Dielectric Colloidal Photonic Hetero-Crystals, *Sergei G. Romanov*[1], *Boyang Ding[2], Maria Bardosova[2], Martyn E. Pemble[2], Ulf Peschel[1]; [1]Inst. of Optics, Information and Photonics, Univ. of Erlangen-Nuremberg, Germany, [2]Tyndall Natl. Inst., Univ. College Cork, Ireland.* Colloidal photonic heterocrystals combined with corrugated metal films were suggested as light traps, where broadband scattering is provided by mode mismatch between photonic crystals of different symmetries and lossy surface plasmon polaritons.

PTuC3 • 16.45
An RCWA Analysis of Solar Cell Back Reflectors: Comparison between Modelling and Experiment, *Ali Naqavi*[1,2], *Vincent Paeder[1], Toralf Scharf[1], Karin Söderström[2], Franz-Josef Haug[2], Christophe Ballif[2], Hans Peter Herzig[1]; [1]Optics and Photonics Technology Lab, Inst. de Microtechnique, École Polytechnique Fédérale de Lausanne, Switzerland, [2]Photovoltaics and Thin Film Electronics Lab, Inst. de Microtechnique, École Polytechnique Fédérale de Lausanne, Switzerland.* We present a comparison between spectrally-resolved reflection measurements of gratings and theoretical predictions from RCWA approach. Diffraction intensities vary significantly with polarization, and surface plasmon absorption is observed around the onset of the diffraction orders.

PTuC4 • 17.00 Invited
Photonics of Intermediate Reflectors in Tandem Solar Cells, *Ralf B. Wehrspohn*; *Fraunhofer Inst. for Mechanics of Materials and Inst. of Physics, Univ. of Halle, Germany.* 3-D photonic intermediate reflectors for textured a-Si:H/μc-Si:H tandem solar cells have been investigated. One challenge of optimizing the tandem solar cells is to generate a current matching between the amorphous top cell and the microcrystalline bottom cell. Since the cells are connected in series, the total current is limited by the lower a-Si:H cell's current. For an ideal photon management between top and bottom cell, a spectrally selective intermediate reflective layer (IRL) is necessary. We present a 3-D inverted opal intermediate reflector incorporated in a state-of-the-art textured micromorph tandem solar cell and its optical and electro-optical properties.

Sessions continue on page 33.

Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Access Networks and In-house Communications

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

BTuC • Novel Grating Structures—Continued

BTuC5 • 17.15
Tunable Optical Notch Filter Based on the Acousto-Optic Effect in a FBG, ***Carlos Alberto Ferreira Marques***[1], *Roberson Assis Oliveira*[2], *Alexandre Pohl*[2], *John Canning*[3], *Rogério Nunes Nogueira*[1]; [1]*Inst. de Telecomunicações, Portugal,* [2]*Federal Univ. of Technology, Brazil,* [3]*Interdisciplinary Photonics Labs, Univ. of Sydney, Australia.* A tunable optical notch filter based on the accousto-optic effect in a phase shifted fiber Bragg grating is presented. Depending on the acoustic wave properties, such as frequency and intensity, different parameters can be modified.

BTuC6 • 17.30
Refractive Index Sensing Characteristics of Alternate Au-Ag Surface Gratings on Optical Waveguides, ***Saurabh Mani Tripathi***[1], *Arun Kumar*[1], *Emmanuel Marin*[2], *Jean-Pierre Meunier*[2]; [1]*Indian Inst. of Technology Delhi, India,* [2]*Univ. de Lyon, CNRS UMR 5516, France.* We present the ambient refractive index sensing characteristics of highly sensitive Au-Ag surface gratings written on a planar waveguide. An exact coupled-mode-theory has been used to study the power coupling from guided mode to Surface-Plasmon-Polariton.

NTuC • NP Tuesday Poster Session—Continued

See below for NP Poster Session abstracts.

STuC • Microstructures in Sensing—Continued

STuC4 • 17.15
Morphology Characterization of Bacterial Colonies for Predicting Forward Scattering Patterns, *Nan Bai, Euiwon Bae, Arun K. Bhunia, J. Paul Robinson,* ***E. Daniel Hirleman****; Purdue Univ., USA.* In this paper we report quantitative measurements of bacterial colony morphologies that are subsequently used to predict forward scattering patterns with scalar diffraction theory. Predicted patterns for *EcoliDH5α* and *ListeriaF4244* show distinguishable differences.

Weinbrenner Conference Room

Nonlinear Photonics

16.00–17.30
NTuC • NP Tuesday Poster Session

NTuC1
Characterization of PP-cLT Waveguides for Second-Harmonic-Generation and Wavelength-Conversion in the C + L Band of Optical Communications, *Salvatore Stivala*[1], ***Alessandro C. Busacca***[1], *Luciano Curcio*[1], *Roberto L. Oliveri*[1], *Paolo Minzioni*[2], *Giovanni Nava*[2], *Ilaria Cristiani*[2]; [1]*Univ. of Palermo, Italy,* [2]*Univ. of Pavia, Italy.* We report the characterization of single-mode optical waveguides at telecom wavelength, realized in congruent lithium-tantalate. We demonstrate that waveguides realized by proton-exchange show a nonlinear coefficient matching that expected in a bulk crystal.

NTuC2
Optical Induction of Complex Two-Dimensional Photonic Lattices Based on Families of Nondiffracting Beams, ***Patrick Rose****, Martin Boguslawski, Cornelia Denz; Inst. für Angewandte Physik and Ctr. for Nonlinear Science, Westfälische Wilhelms-Univ. Münster, Germany.* Based on different families of nondiffracting beams, we demonstrate a novel approach for optical induction of complex photonic structures. This new method allows for the generation of optically induced Bessel, Mathieu, and parabolic photonic lattices.

NTuC3
Tuning Both the Pulse Walk-off and the Frequency Chirp in Raman Slow Light Media, ***Gil Fanjoux****, Thibaut Sylvestre; Inst. FEMTO-ST, Dept. d'Optique P. M. Duffieux, Univ. de Franche-Comté,* We theoretically demonstrate in a Raman slow light medium enabling picosecond optical delay that both the dispersion-induced pulse walk-off and the cross-phase modulation-induced frequency chirp can be fully controlled by slow light.

NTuC4
Combined Frequency Conversion and Pulse Compression in Nonlinear Tapered Waveguides, ***Alexander S. Solntsev****, Andrey A. Sukhorukov; Australian Natl. Univ., Australia.* We suggest an application of four-wave mixing process in tapered waveguides for generation of ultrashort pulses with tunable central frequency. Effcient conversion is demonstrated for strongly chirped pump pulses, which experience reduced nonlinear absorption.

NTuC5
Second-Harmonic on Hole Array Generated in a Long-Lived Resonance, *Peter van der Walle*[1,2], ***Ting Lee Chen***[2], *Frans Segerink*[2], *L. (Kobus) Kuipers*[1,2], *Jennifer L. Herek*[2]; [1]*FOM Inst. for Atomic and Molecular Physics, Netherlands,* [2]*Univ. of Twente, Netherlands.* The mechanism behind second-harmonic generation from hole arrays was studied by illumination with phase shaped pulses. The measurements show that the SHG is generated in a long-lived resonance with a lifetime of 55 fs.

NTuC6
Transformation Properties of Electromagnetically-Induced Transparency and Absorption Resonances in Hanle Configuration under Counterpropagating Waves, ***Denis V. Brazhnikov***[1,2], *Alexey V. Taichenachev*[1,2], *Anatoliy M. Tumaikin*[1], *Valeriy I. Yudin*[1,2]; [1]*Inst. of Laser Physics SB, Russian Acad. of Sciences, Russian Federation,* [2]*Novosibirsk State Univ., Russian Federation.* The polarization method for controlling a sign of narrow nonlinear resonances of electromagnetically-induced absorption and transparency is proposed (in Hanle configuration). The result may be found useful in the fields of metrology and nonlinear optics.

NTuC7
Dynamic Phase Gratings via Nonlinear Index Change in Er and Yb-Doped Fibers, ***Serguei Stepanov***[1], *Marcos Plata Sanchez*[1], *Daniel Garcia Casillas*[1,2], *Andrei Fotiadi*[2], *Patrice Mégret*[2]; [1]*CICESE, Mexico,* [2]*Univ. de Mons, Belgium.* Amplitudes of dynamic phase gratings in rare-earth (Er, Yb) doped fibers are compared with spatially uniform photo-induced refractive index change and are found to demonstrate similar disagreement with theoretical estimate as the amplitude population gratings.

NTuC8
Effect of Random Local Dispersion in Ultra-High Speed Optical Link Employing Periodical Dispersion-Compensation, ***Joji Maeda****, Satoshi Ebisawa; Tokyo Univ. of Science, Japan.* Effects of randomness of local dispersion in periodically dispersion-compensated fiber links are numerically studied. A modest randomness of dispersion is revealed to provide robustness to the pulse distortion due to self-phase modulation.

Clubraum	Room 2.05	Room 2.08
Signal Processing in Photonic Communications	Solid-State and Organic Lighting	Optical Nanostructures for Photovoltaics

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

SPTuC • DSP Hardware and Real Time Processing—Continued

SPTuC4 • 17.15
Software-Defined Multi-Format Transmitter with Real-Time Signal Processing for up to 160 Gbit/s, *David Hillerkuss*[1], *René Schmogrow[1], Michael Hübner[1], Marcus Winter[1], Bernd Nebendahl[2], Jürgen Becker[1], Wolfgang Freude[1], Juerg Leuthold[1]; [1]Karlsruhe Inst. of Technology, Germany, [2] Digital and Photonic Test, Agilent Technologies, Germany.* A software-defined multi-format transmitter is presented. Online signal generation with data rates up to 160 Gbit/s is demonstrated. The transmitter allows encoding of any modulation format ranging from OOK to 16-QAM at 30 GBd.

SOTuC • Modelling and Design—Continued

SOTuC4 • 17.20
Impedance Analysis of Organic Light-Emitting Devices with Disorder, *Evelyne Knapp*[1], *Beat Ruhstaller[1,2]; [1] Inst. of Computational Physics, Zürich Univ. of Applied Sciences, Switzerland, [2]Fluxim AG, Switzerland.* A numerical small-signal analysis is conducted for organic light-emitting devices with novel model ingredients as the generalized Einstein relation and the Extended Gaussian Disorder Model.

Weinbrenner Conference Room

Nonlinear Photonics

16.00–17.30
NTuC • NP Tuesday Poster Session

NTuC9
Diffraction-Induced Splitting of Spatially Confined Laser Pulse in Photonic Crystal, *Vladimir Bushuev,* ***Boris Mantsyzov****, Aleksandr Skorynin; Dept. of Physics, Moscow State Univ., Russian Federation.* It is shown theoretically, that effect of diffraction-induced optical pulse splitting in a photonic crystal under condition of the Laue transmission geometric scheme of the Bragg diffraction can be realized for spatially confined laser pulse in hundred-periods multilayer structure.

NTuC10
Light Dynamics in Gain/Loss Modulated Materials, *Kestutis Staliunas*[1], *Ramon Herrero[2], Muriel Botey[2], Ramon Vilaseca[2]; [1]ICREA, Spain, [2]Univ. Politécnica de Catalunya, Spain.* We predict and demonstrate that (at least 2-D) periodical modulation of gain/loss profile on the wavelength scale can lead to interesting beam propagation effects, similar to self-collimation, but also to spatial beam filtering.

NTuC11
Influence of Variations of the GVD on Wavelength Conversion at Second Gain Region of a Parametric Process, *Lars S. Rishøj*, *Karsten Rottwitt; DTU Fotonik, Technical Univ. of Denmark, Denmark.* Impact on the second gain region in a parametric process, caused by random variations of the group velocity dispersion along the fiber is demonstrated. The model includes both pump depletion and fiber loss.

NTuC12
Real-Time Holography in Ruthenium Doped Bismuth Sillenite Crystals at Near-Infrared Spectral Range, *Vera Marinova*[1,2], *Shiuan Lin[3], Ken Hsu[2]; [1]Central Lab of Optical Storage and Processing of Information, Bulgarian Acad. of Sciences, Bulgaria, [2]Photonics Dept., Natl. Chiao Tung Univ., Taiwan, Taiwan, [3]Electrophysics Dept., Natl. Chiao Tung Univ., Taiwan.* Improvement of the response time during real-time holographic recoding is demonstrated in Ru-doped bismuth sillenite crystal at 1064 nm after green light pre-exposure. By using gating light significant operation speed of 80 ms is achieved.

NTuC13
Fast Nonlinear Optical Materials Based on Ionic Liquid Crystals and Glasses of Metal Alkanoates, *Svitlana Bugaychuk*[1], *Gertruda Klimusheva[1], Yuriy Garbovskiy[1], Tatyana Mirnaya[2]; [1]Inst. of Physics, Natl. Acad. of Sciences of Ukraine, Ukraine, [2]Inst. of General and Inorganic Chemistry, Natl. Acad. of Sciences of Ukraine, Ukraine.* Novel materials are formed by introducing different photosensitive centers (both organic and inorganic types) into an ionic smectric matrixes of metal alkanoates. They exhibit fast and large nonlinear optical response with negligible small heating.

NTuC14
New Cross-Linkable Systems Using Huisgen Reaction for Non-Linear Optical Applications, *Clement F. Cabanetos*; *Univ. of Nantes, France.* A new approach to the design, synthesis and characterization of NLO polymers with large and stable second-order nonlinear susceptibilities was developped by freezing the chromophores orientation using the copper-free thermal Huisgen 1,3-dipolar reaction.

NTuC15
Operating Regimes and Performance Optimization in Mode-Locked Fiber Lasers, *Edwin Ding,* ***J. Nathan Kutz****; Dept. of Applied Mathematics, Univ. of Washington, USA.* We develop an averaging method that explicitly formulates the mode-locking dynamics in terms of the cavity waveplate and polarizer settings, thus characterizing the stability and operating regimes of a physically realizable laser cavity.

NTuC16
Ultra-Wideband Noise Communication Based on Amplified Spontaneous Emission of Broadened Brillouin Scattering, *Yair Peled[1], Moshe Tur[1],* ***Avi Zadok***[2]; *[1]Tel Aviv Univ., Israel, [2]Bar-Ilan Univ., Israel.* Ultra-wideband noise waveforms are generated based on the amplified spontaneous emission of a Brillouin scattering process. GHz wide spectra are obtained through synthesized, direct pump modulation. Both incoherent and transmit-reference noise based communication are demonstrated.

NTuC17
Multicolor Soliton and Cascaded Raman Generation in a Nonlinear Planar Waveguide, *Jérémy Michaud,* ***Gil Fanjoux****, Hervé Maillotte, Thibaut Sylvestre; Inst. FEMTO-ST, Dépt. d'Optique P. M. Duffieux, Univ. de Franche-Comté.* We study the formation of multicolor spatial soliton in a nonlinear planar waveguide by cascaded Raman generation and show how slow light prevents collapse and limits the cascading process by delaying the soliton components.

NTuC • NP Tuesday Poster Session—Continued

NTuC18
Applications of Cavity Solitons in VCSELs with Optical Injection, ***Craig McIntyre***[1], *Franco Prati*[2], *Giovanna Tissoni*[2], *Gian-Luca Oppo*[1]; [1]*Univ. of Strathclyde, UK,* [2]*Univ. dell' Insubria, Italy.* Tuning the injected frequency increases up to five times the performance of an all-optical delay line based on cavity solitons. Merging of cavity solitons helps to combine input signals and to manipulate two-dimensional optical memories.

NTuC19
Nonlinear Breaking of PT Symmetry in Coupled Waveguides with Balanced Gain and Loss, ***Andrey A. Sukhorukov***, *Zhiyong Xu, Yuri S. Kivshar; Australian Natl. Univ., Australia.* We predict that in coupled waveguides with balanced gain and loss, featuring stationary PT-symmetric modes in the linear regime, nonlinearity results in symmetry breaking above a critical power threshold, leading to sharp beam switching.

NTuC20
Plasmonic Second Harmonic Generation (SHG) from Metallo-Dielectric Multilayered Structures, *Nadia Mattiucci*[1,2], ***Giuseppe D'Aguanno***[1,2], *Mark Bloemer*[1]; [1]*Dept. of the Army, Charles M. Bowden Res. Facility, USA,* [2]*AEgis Tech., USA.* We study SHG from metallo-dielectric multilayered structures with particular attention to the role played in the strong enhancement of generation process by the geometry of the elementary cell and by the excitation of short-range/long-range plasmons.

NTuC21
Pump-Detuned Double-Pass CSFG/DFG-Based Wavelength Converters in Lossy PPLN Waveguides, ***Amirhossein Tehranchi***, *Raman Kashyap; École Polytechnique de Montréal , Canada.* Designing wavelength converters based on double-pass cascaded sum- and difference-frequency generation with pump detuning, unlike ones with fixed pumps, we can achieve efficient wideband responses when pumps are set 75-nm or even much farther apart.

NTuC22
Helmhotz Dark Solitons at Nonlinear Defocusing Interfaces, ***Julio Sánchez-Curto***[1], *Pedro Chamorro-Posada*[1], *Graham S. McDonald*[2]; [1]*Dept. de Teoría de la Señal, Comunicaciones e Ingeniería Telemática, Univ. de Valladolid, Spain,* [2]*Joule Physics Lab, School of Computing, Science and Engnieering, Univ. of Salford, UK.* Dark Kerr soliton refraction at planar boundaries is analysed and simulated for the first time. A universal law of Kerr spatial soliton refraction is derived. Strong parameter sensitivity of gray soliton refraction is also uncovered.

NTuC23
Iterferometric Measurement of Nonlinear Refractive Index of Inert Gases at Various Pressures, *Adam Borzsonyi*[1], *Zsuzsanna Heiner*[2], *Attila P. Kovács*[1], *Mikhail Kalashnikov*[3], ***Karoly Osvay***[1]; [1]*Dept. Optics, Univ. of Szeged, Hungary,* [2]*BRC, Hungarian Acad. of Sciences, Hungary,* [3]*Max-Born-Inst., Germany.* Nonlinear refractive index of Ar, N_2, Ne, Xe, and air has been measured from the nonlinear spectral phase of weak femtosecond pulses propagating 9m in a tube at pressures between 1bar and 0.05mbar.

NTuC24
Linear and Nonlinear Properties of Gain-Loss Balanced Waveguides, *Eduard N. Tsoy*[1], *Sagdulla Sh. Tadjimuratov*[1], ***Fatkhulla Kh. Abdullaev***[1,2]; [1]*Physical-Technical Inst. of the Scientific Association, Uzbek Acad. of Sciences, Uzbekistan,* [2]*CFTC, Univ. de Lisboa, Portugal.* Linear and nonlinear localized modes of a waveguide with gain and loss are studied. The structure is an optical analog of parity-time symmetric potentials in quantum mechanics. Bend loss in such waveguides is analyzed.

NTuC25
Observation of Surface Solitons in VCSELs, ***Jisha Chandroth Pannian***[1], *YuanYao Lin*[1], *Tsin-Dong Lee*[2], *Ray-Kuang Lee*[1]; [1]*Inst. of Photonics Technologies, Natl. Tsing-Hua Univ., Taiwan,* [2]*Industrial Technology Res. Inst., Taiwan.* We propose and demonstrate a direct method to observe surface solitons in vertical cavity surface emitting lasers (VCSELs) at room temperature. By modeling the interface between a saturable Kerr-type medium and a parabolic lossy waveguide, the formation and the existence of surface solitons are shown numerically.

NTuC26
Fluid-Inspired Interface Instabilities in Nonlinear Optics, ***Shu Jia***[1], *Laura I. Huntley*[2], *Jason W. Fleischer*[1]; [1]*Princeton Univ., USA,* [2]*Stanford Univ., USA.* We introduce a new class of interface instabilities in optics. Inspired by fluids, we demonstrate all-optical Rayleigh-Taylor and Richtmyer-Meshkov instabilities, in which an intensity interface is perturbed by a constant and an impulsive force, respectively.

NTuC27
Polarization Instabilities Assisted Coherence and Anticoherence Resonance in Erbium Doped Fiber Laser, ***Sergey Sergeyev***, *Kieran O'Mahoney; Waterford Inst. of Technology, Ireland.* We demonstrate experimentally and theoretically that fluctuations caused by polarization instabilities play role of the external noise for low frequency relaxation oscillations in erbium doped fiber laser and lead to deterministic coherence and anticoherence resonance.

NTuC28
Time-Domain Simulations of Semiclassical Radiation Dynamics in Photonic Nanostructures, ***Paolo Longo***, *Jens Niegemann, Kurt Busch; Inst. für Theoretische Festkörperphysik, Karlsruhe Inst. of Technology, Germany.* Within the framework of the Discontinuous Galerkin Time-Domain Method (DGTD), we investigate the (non-Markovian) radiation dynamics in nano-photonic systems by simultaneously evolving Maxwell's equations and quantum mechanical equations of motion in time.

NTuC29
Interaction of Oscillatory Cavity Solitons, ***Adrian Jacobo***, *Damià Gomila, Pere Colet, Manuel A. Matias; IFISC (CSIC-UIB), Spain.* In this work we explore the interaction of oscillatory cavity solitons (CS). CS are non-punctual oscillators, i.e., they have an internal structure that may couple with the oscillating modes leading to rich dynamical behavior.

NTuC30
Optimal Control of the Ballistic Trajectory of Airy Beams, ***Yi Hu***[1,2], *Peng Zhang*[2], *Cibo Lou*[1], *Weiyu Huang*[2], *Jingjun Xu*[1], *Zhigang Chen*[1,2]; [1]*Nankai Univ., China,* [2]*San Francisco State Univ., USA.* We show how truncated Airy beams can be set into projectile motion in a general ballistic trajectory. The trajectory range and height along with the location of peak beam intensity can be controlled at ease.

NTuC31
Tuning Frequency and Velocity of Optical Pulses Due to Their Collision in Nonlinear Dispersive Medium, ***Anatoly P. Sukhorukov***[1], *Valery E. Lobanov*[1,2]; [1]*Faculty of Physics, M.V. Lomonosov Moscow State Univ., Russian Federation,* [2]*ICFO-Inst. de Ciencies Fotoniques and Univ. Politècnica de Catalunya, Spain.* The effects of frequency tuning and time delay due to collision of two optical pulses in cubic and quadratic nonlinear dispersive media are presented. We analyzed pulse trajectories and found critical GVM for total reflection.

NTuC32
Designs of the Frequency Converter for Shengguangii Laser Upgrade, ***Ji Lailin***[1,2], *Zhan Tingyu*[2], *Zhu Baoqiang*[2], *Zhu Jian*[1], *Ma Weixin*[1]; [1]*Shanghai Inst. of Laser and Plasma, China,* [2]*Shanghai Inst. of Optics and Fine Mechanics, China.* We have designed a frequency converter for the Sheng Guang II upgrade laser with type I doubler and the type II tripler, it can convert 5000J fundamental laser to 3000J the third harmonics with 31cm×31cm aperture and 3ns pulse.

NTuC33
Helmholtz Pulse Propagation and Spatially-Dispersive Light, ***James M. Christian***[1], *Timothy F. Hodgkinson*[1], *Graham S. McDonald*[1], *Pedro Chamorro-Posada*[2]; [1]*Materials and Physics Res. Ctr., Univ. of Salford, UK,* [2]*ETSI Telecomunicación, Univ. de Valladolid, Spain.* We present the first detailed account of modelling pulses in Helmholtz-type nonlinear systems with both temporal and spatial dispersion. Exact analytical solitons will be reported, and their stability examined through mathematical analysis and computer simulations.

NTuC34
PCF-Based Tunable Source of Femtosecond Pulses in the Visible Region, *Andres A. Rieznik*[1,2], *Victor A. Bettachini*[1], *Pablo G. König*[1], ***Diego F. Grosz***[1,2], *Martin E. Masip*[2,3], *Martin Caldarola*[3], *Andrea V. Bragas*[2,3]; [1]*Inst. Tecnológico de Buenos Aires, Argentina,* [2]*Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina,* [3]*Lab de Electrónica Cuántica, Univ. de Buenos Aires, Argentina.* Blue-shifting dispersive waves and soliton trapping in a PCF pumped with a Ti:Sa laser are shown to produce tunable femtosecond pulses in the visible region, with a central wavelength depending upon the input pump power.

NTuC35
Strongly Nonlinearity Managed Discrete Solitons, ***Fatkhulla Abdullaev***[1], *Mario Salerno*[2]; [1]*Centro de Fisica Teorica e Computacional, Univ. de Lisboa, Portugal,* [2]*CNISM, Univ. a di Salerno, Italy.* Discrete spatial solitons of the discrete nonlinear Schrödinger equation are investigated in presence of strong nonlinearity management. We show that in this case it is possible to stabilize localized modes which would be otherwise unstable in absence or even in presence of a weak nonlinearity management.

NTuC36
Surface Gap Solitons in Kerr Nonlinear Photonic Crystals with a Nonlinearity Interface, ***Elisabeth Blank***, *Tomas Dohnal; Inst. für Wissenschaftliches Rechnen und Mathematische Modellbildung, Karlsruhe Inst. of Technology, Germany.* We investigate stationary localized solutions of the Periodic Nonlinear Schroedinger Equation at a Kerr- nonlinearity interface, so-called Surface Gap Solitons. We present results about continuation and stability of families of SGS using the Evans function.

NTuC37
Photorefractive Nonlinear Propagation of Single Beams in Undoped $LiNbO_3$: Self-Defocusing and Beam Break-up, ***Javier E. Villarroel***[1,2], *Bruno Ramiro*[2], *Angel Alcazar*[2], *Angel Garcia-Cabañes*[1], *Jose M. Cabrera*[1], *Mercedes Carrascosa*[1]; [1]*Univ. Autonoma de Madrid, Spain,* [2]*Univ. Politécnica de Madrid, Spain.* Beam propagation in photorefractive $LiNbO_3$ planar waveguides has been studied at different beam intensities and propagation lengths. Self-defocusing and beam break-up have been observed and explained using BPM simulations under a 2-centre band transport model.

NTuC38
Solitons and Nonlinear Periodic Waves in Nonlinear Schrödinger Equation with Complex Potentials, ***Fatkhulla Abdullaev***[1], *Vladimir Konotop*[1], *Alexey Yulin*[1], *Mario Salerno*[2]; [1]*Ctr. de Fisica Teorica e Computacional, Univ. de Lisboa, Portugal,* [2]*CNISM, Univ. a di Salerno, Italy.* We found localized and periodic solutions for localized and periodic modulations in space of complex potential and nonlinearity coefficient in the extended nonlinear Schrödinger equation.

NTuC39
Optical Adder Based on Discrete Solitons, ***Gregorio Mendoza***[1], *Erwin Marti*[1], *Angel Vergara*[1], *Luz del Carmen Gomez*[2]; [1]*Facultad de Ciencias Fisico-Matematicas, Benemérita Univ. Autónoma de Puebla, Mexico,* [2]*Facultad de Ciencias de la Electronica, Benemérita Univ. Autónoma de Puebla, Mexico.* From the discrete solitons interactions in one dimensional of optical fiber arrays, is studied the application of optical gates to the design of a complete adder of two input with carrier bits.

NTuC40
Phase Matching and Phase Locking in Cascaded Optical Parametric Oscillator, ***Diana A. Antonosyan***[1,2], *Tigran V. Gevorgyan*[2], *Gagik Yu Kryuchkyan*[1,2]; [1]*Yerevan State Univ., Armenia,* [2]*Inst. for Physical Res., Natl. Acad. of Sciences of Armenia, Armenia.* We consider cascaded optical parametric oscillator based on phase matched photonic processes in $X^{(2)}$ superlattices. Formation of phase locked light states on the framework of Wigner functions and production of three-photon states are analyzed.

NTuC • NP Tuesday Poster Session—Continued

NTuC41
Coalescence Rate of Strongly DM Interacting Solitons under Third Order Dispersion, ***Francisco J. Diaz-Otero***[1], *Pedro Chamorro-Posada*[2]; [1]*Univ. of Vigo, Spain,* [2]*Univ. of Valladolid, Spain.* The enhancement of the collapse distance of time-division multiplexed dispersion-managed solitons under strong management conditions due to third-order dispersion effects is analyzed in terms of a newly defined coalescence rate obtained using a variational model.

NTuC42
Nd:YVO_4 Amplifier System with Long Picosecond Pulses and Beam Shaping by Second Harmonic Generation, ***Markus Lührmann***, *Christian Theobald, Richard Wallenstein, Johannes A. L'huillier; Photonik-Zentrum Kaiserslautern e.V., Germany.* We report on a Nd:YVO_4 amplifier system with 58.7W output-power at a repetition-rate of 20kHz and hundreds of picoseconds pulse duration. The beam-profile was improved by second harmonic generation with up to 81% conversion efficiency.

NTuC43
Soliton Emission by Active Clusters in Nonlinear Waveguides, ***Alexey Yulin***, *Vladimir Konotop; Ctr. de Fisica Teorica e Computacional, Univ. de Lisboa, Portugal.* Formation, stability and dynamics of solitons are considered in optical systems with focusing nonlinearity and active clusters. It is shown that stochastic generation of solitons is possible in these systems.

NTuC44
Absorption of Light in Nonpolar Molecules Due to Stimulated Raman Scattering of Nonresonant Femtosecond Laser Pulse, *Yuri N. Ponomarev,* ***Serge R. Uogintas****; Inst. of Atmospheric Optics, Siberian Div., Russian Acad. of Sciences, Russian Federation.* Within the density matrix approach, we calculate the energy absorbed by nonpolar molecular species as a result of stimulated Raman scattering of a femtosecond laser pulse.

NTuC45
Stimulated Raman Scattering as Function of Coupled Mode in Standard Optical Fiber, ***Livia Ribeiro***[1], *Antônio de Toledo*[2]; [1]*Inst. Nacional de Pesquisas Espaciais (INPE), Brazil,* [2]*Inst. de Estudos Avançados (IEAv), Brazil.* The Stimulated Raman scattering spectrum in optical fiber shows up to eight Stokes wavelengths. It was verified that spectra wavelengths intensities depend on the electromagnetic energy distribution of the mode coupled in standard optical fiber.

NTuC46
Gap Solitons in Weakly Nonlocal Nonlinear Media, ***Fatkhulla Abdullaev***[1,2], *Abdulaziz Abdumalikov*[3], *Ravil Galimzyanov*[1]; [1]*Physical Technical Inst., Univ. of Uzbekistan, Uzbekistan,* [2]*CFTC, Complexo Interdisciplinar, Univ. Lisboa, Portugal,* [3]*Physics Dept., Natl. Univ. of Uzbekistan, Uzbekistan.* Exact solutions for gap solitons on shallow optical lattices in nonlocal nonlinear media are found. The weak nonlocality case is considered. The regions of stability are found. The collisions of gap solitons are investigated.

NTuC47
Analytical First Order Comparison of Amplitude and Phase Noise in Single and Dual Mach-Zehnder Interferometer Detection Schemes for DQPSK Transmission Systems, ***M. Eberhard***[1], *A. Maruta*[2], *M. Faisal*[2]; [1]*Aston Univ., UK,* [2]*Osaka Univ., Japan.* An analytical first order calculation of the impact of Gaussian white noise on a novel single Mach-Zehnder Interferometer demodulation scheme for DQPSK reveals a constant Q factor ratio to the conventional scheme.

NTuC48
Rocking Bidirectional Lasers, *Manuel Martinez-Quesada*[1], ***German J. de Valcarcel***[1], *Eugenio Roldan*[1], *Kestutis Staliunas*[2]; [1]*Univ. de Valencia, Spain,* [2]*Univ. Politècnica de Catalunya, Spain.* We study the effect of amplitude modulated injecting signals (rocking fields) on the emission properties of class-A bidirectional lasers. We find that stable cw bidirectional emission is possible and predict new types of cavity solitons.

NTuC49
Beam Dynamics in Nonlinear Cubic-Quintic Media with Weak Nonlocality, ***Eduard N. Tsoy****; Physical Technical Inst. of the Scientific Association, Uzbekistan Acad. of Sciences, Uzbekistan.* Bright and dark spatial solitons in weakly nonlocal nonlinear media are studied. Based on the exact solutions found, the soliton properties and stability are analyzed. Numerical simulations shows that instability results in soliton collapse.

NTuC50
Dispersion Properties of Nonlinear Surface Waves in Photonic Crystal with Self-Focusing LHM Cap Layer, ***Zahra Eyni***, *Habib Tajalli, Abdolrahman Namdar, Samad Roshan Entezar; Tabriz Univ., Islamic Republic of Iran.* We analyze surface waves (SWs) in one-dimensional photonic crystal with kerr-like self-focusing metamaterial cap-layer. It is shown that the direction of total energy flow of SWs depend on their intensity at the interface.

NTuC51
Stability Analysis of Nonlinear Localized Modes at the Phase-Slip Defect in One Dimensional Waveguide Array, ***Igor Ilic***[1], *Petra Belicev*[1], *Milutin Stepic*[1], *Ljupco Hadzievski*[1], *Yang Tan*[2], *Feng Chen*[2]; [1]*Inst. of Nuclear Sciences Vinca, Serbia,* [2]*School of Physics, Shandong Univ., China.* We investigate the existence of nonlinear localized modes in one-dimensional waveguide array with the defect placed inside using the variational approximation. Adequate stability analysis is carried out.

NTuC52
Pattern Formation, Dissipative Localised Structures and Spectral Narrowing of Amplified Surface Plasmons near the Lasing Threshold, ***Dmitry Skryabin***, *A. Gorbach, A. Marini; Univ. of Bath, UK.* We propose a selfconsistent approach to derivation of the amplitude equation for surface plasmon polaritons in presence of gain, loss and dissipative and Kerr nonlinearities. Our approach predicts pattern formation and localised structures of plasmons.

NTuC53
Linear Localized Modes at Phase-Slip Defects in One-Dimensional Waveguide Arrays, ***Petra P. Beličev***[1], *Igor Ilić*[1], *Milutin Stepić*[1], *Yang Tan*[2], *Feng Chen*[2]; [1]*Vinča Inst. of Nuclear Sciences, Serbia,* [2]*School of Physics, Shandong Univ., China.* We investigate light propagation in one-dimensional defocusing waveguide array with a coupling defect at one site. Stable propagation of linear optical modes is observed both numerically and theoretically.

NTuC54
Space-Charge Electric Field Enhancement in the Presence of Magnetic Field, ***Sunayana Mahajan****; Ajay Kumar Garg Engineering College, India.* Large enhancement in the value of photorefractive space-charge electric-field is obtained near the resonance condition when the two pico-second light pulses couple inside the GaAs:EL2 crystal at 77K under Voigt-configuration in the presence of magnetic-field.

NTuC55
Spontaneous and Stimulated Brillouin Scattering in Single Mode Optical Fiber., *Sandro F. Quirino*[1], ***Antonio O. T. Toledo***[2]; [1]*Inst. Nacional de Pesquisas Espaciais, Brazil,* [2]*Inst. de Estudos Avançados, Brazil.*We present the dependence of the Brillouin shift, the linewidth, power of the Brillouin scattering, generated acoustics modes and evolution of the DC signal versus the pumping power. All measurements were in the backward direction.

NTuC56
Nonlinear Refractive Index of Some Anthraquinone Dyes Doped in 1294-1b Liquid Crystal, ***Karim Milanchian,*** *Habib Tajjali, Sohrab Ahmadi Kandjani, Eghbal Abdi, Mohamadsadeg Zakerhamidi; Univ. of Tabriz, Islamic Republic of Iran.* The nonlinear optical properties of three anthraquinone dyes, i.e. solvent blue59, solvent blue35 and solvent green3 doped in 1294-1b liquid crystal were studied by z-scan technique using He-Ne laser at 632.8 nm.

NTuC57
Ultra-Slow and Ultra-Weak Discrete Solitons in Optical Lattice via Electromagnetically Induced Transparency, ***Yongyao Li***[1], *Wei Pang*[2], *Jianying Zhou*[1]; [1]*State Key Lab of Optoelectronic Materials and Technologies, Sun Yat-sen Univ., China,* [2]*Dept. of Experiment, Guangdong Univ. of Technology, China.* A theoretical scheme to produce optical discrete solitons via electromagnetically induced transparency and optical induction. The power density can be tuned to a ultraweak level and the soliton can propagate with ultraslow group velocity.

NTuC58
Self-Focusing of Cosh-Gaussian Laser Beam in a Kerr Medium with Linear Absorption, ***Jaspal S. Gill****; Guru Nanak Dev Univ., India.* Self-focusing and self-phase modulation of cosh-Gaussian laser beam in a Kerr medium with linear absorption is studied. The field distribution in the medium is expressed in terms of beam width, decentered parameter and absorption coefficient. Numerical analysis shows that these parameters play vital role on propagation characteristics.

NTuC59
Impact of Higher-Order Effects on Pulsating, Erupting and Creeping Solitons, *Sofia C. V. Latas, Margarida V. Facão,* ***Mário F. Ferreira****; Univ. of Aveiro, Portugal* We investigate numerically the dynamics of pulsating, erupting and creeping soliton solutions of the complex Ginzburg-Landau equation and show the dramatic impact of some higher-order effects, namely the third-order dispersion, intrapulse Raman scattering and self-steepening.

NTuC60
Offset Frequency and THz Generation Soliton Solutions, ***Lyubomir M. Kovachev***, *Kamen Kovachev; Inst. of Electronics, Bulgarian Acad. of Sciences, Bulgaria.* The offset frequency transforms the nonlinear third harmonic term to THz ones. As result, the long (ps) pulses and the short (fs) ones admit different kind of nonlinearity and soliton solutions.

NTuC61
Theory of Raman Bound Solitons in PCFs, ***Fabio Biancalana***, *Truong X. Tran; Max-Planck-Inst. for the Science of Light, Germany.* We provide a theoretical explanation of recent observations of metastable bound solitons generation in PCFs. We derive simple equations for the magic amplitude ratio and input power around which the phenomenon can be observed.

NTuC62
Experimental and Numerical Investigation of the Impact of Pulse Duration on Supercontinuum Generation in a Photonic Crystal Fiber, ***Marco Andreana***[1], *Anthony Bertrand*[2], *Yves Hernandez*[2], *Philippe Leproux*[1], *Vincent Couderc*[1], *Stéphane Hilaire*[3], *Guillaume Huss*[3], *Domenico Giannone*[2], *Alessandro Tonello*[1], *Alexis Labruyère*[1]; [1]*Univ. de Limoges, France,* [2]*Multitel asbl, Belgium,* [3]*Leukos, France.* We present an experimental and numerical study of supercontinuum (SC) generation in a photonic-crystal fiber pumped by optical pulses with constant peak power and adjustable duration, in the range from 185 ps to 1.81 ns.

NTuC63
Photorefractive Effect in InP:Fe under Gaussian Illumination at Telecommunication Wavelengths, ***D'havh Gidas Boumba Sitou***[1], *Nicolas Fressengeas*[1], *Hervé Leblond*[2]; [1]*Lab Matériaux Optiques, Photonique et Systèmes (LMOPS), France,* [2]*Lab de Photonique d'Angers, France.* We solve the photorefractive set of equations by finite difference methods to determine photorefractive quantities. In a second stage, a multi-scale expansion is used to obtain a simple model able to reproduce photorefractive phenomena.

Hebel	Thoma	Mombert	Scheffel
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Access Networks and In-house Communications

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

7.00–17.30 Registration Open, *Main Foyer*

8.00–10.00
BWA • Femtosecond Laser Symposium I
Réal Vallée; Univ. Laval, Canada, Presider

BWA1 • 8.00 Invited
Femtosecond Laser Induced Bragg Gratings in Silica and Exotic Optical Fibers Applications, ***Dan Grobnic****, Stephen J. Mihailov, Christopher W. Smelser, Robert B. Walker, Huimin Ding; Communications Res. Ctr., Canada.* IR-femtosecond radiation can inscribe Bragg gratings in a large variety of optical fibers that are glassy or crystalline in nature. The inscription method, fiber properties and applications are presented.

BWA2 • 8.30 Invited
Femtosecond Laser Induced Bragg Gratings - Status and Prospects, ***Stefan Nolte***[1]*, Andreas Tuennermann*[2]*;* [1]*Inst. of Applied Physics, Friedrich-Schiller-Univ. Jena, Germany,* [2]*Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany.* We review recent developments in the inscription of fiber Bragg gratings into non-photosensitive fibers using femtosecond laser pulses. The possibility to induce defined localized modifications within the fiber opens new pathways for high-power fiber lasers.

BWA3 • 9.00 Invited
Femtosecond Laser Written Bragg Gratings, ***Graham D. Marshall***[1]*, Alexander Jesacher*[2,3]*, Martin Ams*[1]*, Peter Dekker*[1]*, Douglas J. Little*[1]*, Christopher Miese*[1]*, Alexander Fürbach*[1]*, Martin J. Booth*[2]*, Tony Wilson*[2]*, Michael J. Withford*[1]*;* [1]*Macquarie Univ., Australia,* [2]*Univ. of Oxford, UK,* [3]*Innsbruck Medical Univ., Austria.* We report a new technique for adaptive optical laser writing in a wide range of media, a new model for waveguide-Bragg grating erasure and a 3-D imaging technique that reveals exquisite details of photonic devices.

8.00–10.00
NWA • Temporal and Spatiotemporal Effects
Frank Wise; Cornell Univ., USA, Presider

NWA1 • 8.00 Invited
Quantum Aspects of Ultrashort Laser Pulse Filamentation - Hawking Radiation and the Dynamical Casimir Effect, ***Daniele Faccio***[1]*, Sergio Cacciatori*[1]*, Francesco Belgiorno*[2]*, Giovanni Ortenzi*[3]*, Vera Giulia Sala*[1]*, Vittorio Gorini*[1]*; Univ. of Insubria, Italy,* [2]*Univ. di Milano, Itlay,* [3]*Univ. degli Studi diMilano Bicocca, Italy.* Ultrashort laser pulse filamentation induces a refractive index perturbation which is described in terms of a curved space-time metric. We outline the details of this idea and we give a progress report on experimental measurements.

NWA2 • 8.30
Supercontinuum Channeling in Silica Glass Nanoweb, ***Christine Kreuzer***[1]*, Alexander Podlipensky*[1]*, Miroslav Kolesik*[2]*, Philip St.J. Russell*[1]*;* [1]*Max-Planck-Inst. for the Science of Light, Germany,* [2]*Arizona Ctr. for Mathematical Sciences, Univ. of Arizona, USA.* By means of spatially resolved spectra and SH-FROG measurements, it is shown that supercontinuum generated in a freely suspended silica glass nanoweb is guided within a nonlinear channel formed by the 800 nm pump pulses.

NWA3 • 8.45
Rare Absences of Redshifted Energy in Supercontinuum Generation, ***Daniel R. Solli***[1]*, Claus Ropers*[2]*, Bahram Jalali*[1]*;* [1]*Univ. of California at Los Angeles, USA,* [2]*Univ. of Göttingen, Germany.* We report the observation of rare events following left-skewed heavy-tailed statistics in supercontinuum generation. These rogue events, pulses of unusually small bandwidth, appear when spectral broadening is frustrated by competition between pre-solitonic features.

NWA4 • 9.00
Spectral Signatures of Spatio-Temporal Solitons in Arrays of Silicon-on-Insulator Photonic Wires, *W. Ding*[1]*, C. De Nobriga*[1]*, G. Hobbs*[1]*, W. Wadsworth*[1]*, J. C. Knight*[1]*, A. Gorbach*[1]*, O. Stains*[1]*,* ***Dmitry Skryabin***[1]*, A. Samarelli*[2]*, M. Sorel*[2]*, R. De La Rue*[2]*;* [1]*Univ. of Bath, UK,* [2]*Univ. of Glasgow, UK.* We report spatiotemporal effects in silicon nanoarrays. We measure and explain the Cherenkov radiation emitted by solitons and which existence is sensitive with respect to the choice between the edge and central excitations.

8.30–10:00 am
SWA • Bragg Gratings in Sensing
Mikhail A. Maiorov; AKELA Laser, USA, Presider

SWA1 • 8.30 Invited
Large Scale Fibre Optic Bragg-Grating Based Ocean Bottom Seismic Cable System for Permanent Reservoir Monitoring, ***Jon Thomas Kringlebotn****; Optoplan AS, Norway.* A fibre optic ocean bottom seismic cable system for permanent oil reservoir monitoring, including 16000 FBG-based interferometric sensors and to be installed in 2010 at the Ekofisk field in the North Sea, will be presented.

SWA2 9.00
Front and Backside Structured Gratings for X-Ray Phase Contrast Imaging, ***Johannes Kenntner***[1]*, Thomas Grund*[1]*, Barbara Matthis*[1]*, Martin Boerner*[1]*, Eric Blasius*[1]*, Torsten Scherer*[2]*, Juergen Mohr*[1]*;* [1]*Inst. for Microstructure Technology Karlsruhe Inst. of Technology, Germany,* [2]*Inst. for Nano Technology Karlsruhe Inst. of Technology, Germany.* We report on fabricating X-ray gratings with extreme aspect ratios for phase contrast imaging. We modified the LIGA process by splitting the fabrication sequence on both sides of a thin membrane. Image quality is compared with existing gratings.

8.00–10.00
AWA • Next Generation Access Networks
Ingrid van de Voorde; Alcatel-Lucent, Belgium, Presider

AWA1 • 8.00 Invited
European Research Project PIEMAN, ***Paul Townsend***[1]*, P. Ossieur*[1]*, C. Antony*[1]*, A. Naughton*[1]*, A. M. Clarke*[1]*, R. P. Davey*[2]*, H.G. Krimmel*[3]*, T. De Ridder*[4]*, X. Z. Qiu*[4]*, C. Melange*[4]*, A. Borghesani*[5]*, D. Moodie*[5]*, A. Poustie*[5]*, R. Wyatt*[5]*, B. Harmon*[5]*, I. Lealman*[5]*, G. Maxwell*[5]*, D. Rogers*[5]*, D. W. Smith*[5]*, S. Smolorz*[6]*;* [1]*Tyndall Natl. Inst., Univ. College Cork, Ireland,* [2]*BT, UK,* [3]*Bell Labs, Alcatel-Lucent, Germany,* [4]*INTEC/IMEC, Ghent Univ., Belgium,* [5]*Ctr. for Integrated Photonics, UK,* [6]*Nokia Siemens Networks, Germany.* A novel DWDM-TDMA PON with symmetric 320Gb/s capacity shared between 16384 customers is demonstrated. Upstream channels were tested in burst-mode and featured low-cost tuneable lasers, monolithically integrated SOA-EAMs, burst-mode EDFAs and a 10Gb/s burst-mode receiver.

AWA2 • 8.30
LR-EPON Algorithm with Automatic Bandwidth Adaptation to Provide Multi-Profiles Bandwidth Levels, ***Tamara Jiménez****, Noemí Merayo, Patricia Fernández, Ramón J. Durán, Rubén M. Lorenzo, Ignacio de Miguel, Evaristo J. Abril; Univ. of Valladolid, Spain.* A new bandwidth allocation algorithm for Long-Reach EPONs is proposed to provide subscriber differentiation by continuously readjusting the allocated bandwidth to each subscriber with the aim to fulfil every bandwidth requirement and to be independent of traffic conditions.

AWA3 • 8.45
Open Lambda Initiative for Ultra High Capacity Optical Access Networks, ***Jun Shan Wey***[1]*, Harald Rohde*[2]*, Curt Badstieber*[2]*;* [1]*Nokia Siemens Networks, USA,* [2]*Nokia Siemens Networks, GmbH & Co. KG, Germany.* We propose an open network architecture framework and a new initiative to achieve ultra high capacity in optical access networks. We describe the framework objectives, rules and requirements, and a use case example.

AWA4 • 9.00
User-Terminal Subsystems of Next-Generation Access Networks: Trends and Challenges, ***Bernhard Schrenk***[1]*, Johan Bauwelinck*[2]*, Mireia Omella*[1]*, Efstratios Kehayas*[3]*, Paraskevas Bakopoulos*[3]*, Alexandros Maziotis*[3]*, Christophe Kazmierski*[4]*, Dimitrios Klonidis*[5]*, Xing-Zhi Qiu*[2]*, Josep Prat*[1]*, Ioannis Tomkos*[5]*, Hercules Avramopoulos*[3]*, Jose A. Lazaro*[1]*;* [1]*Univ. Politècnica de Catalunya, Spain,* [2]*INTEC/IMEC, Ghent Univ., Belgium,* [3]*Natl. Technical Univ. of Athens, Greece,* [4]*Alcatel-Thales III-V Lab, France,* [5]*Athens Information Technology, Greece.* As a key element in continuously migrating access networks, the customer premises equipment faces new challenges for cost-efficient service delivery, including low-bandwidth transmitters, burst-mode operation and photonic integrated solutions for full-duplex transmission.

Sessions continue on page 38.

Clubraum	Room 2.05	Room 2.08
Signal Processing in Photonic Communications	Solid-State and Organic Lighting	Optical Nanostructures for Photovoltaics

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

7.00–17.30 Registration Open, *Main Foyer*

8.30–10.00
SPWA • Coherent Receivers I
Chris Fludger; CoreOptics GmbH, Germany, Presider

SPWA1 • 8.30 Tutorial
Digital Coherent Transmission Systems, *Reinhold Noé*, *Sebastian Hoffmann, Christian Wördehoff, Mohamed El-Darawy; Univ. Paderborn, Germany.* Polarization-multiplexed QPSK transmission with synchronous coherent digital intradyne receivers has become a megatrend and is expected to provide cost- and spectrally efficient 100 GbE transmission with 50 GHz optical channel spacing.

8.30–10.00
SOWA • SOLED Plenary
Ulrich Lemmer; Univ. of Karlsruhe, Germany, Presider

SOWA1 • 8.30 Plenary
Progress in Conventional Lighting Technologies, *Klaus Stockwald*; *Osram GmbH, Germany.* Remarkable increases in efficiency of LEDs within the last decades as well as some of their unique properties such as long lifetimes, small size or flexibility will be discussed.

8.00–10.00
PWA • Plasmonics I
Kylie Catchpole; Australian Natl. Univ., Australia, Presider

PWA1 • 8.00 Invited
Title to Be Announced, *Diederik S. Wiersma*; *European Lab for Non Linear Spectroscopy, Italy.* Abstract not Available.

PWA2 • 8.30 Invited
Plasmonic Solar Cells, *Albert Polman*; *FOM- Inst. for Atomic and Molecular Physics, Netherlands.* Thin-film amorphous Si:H solar cells with plasmonic backreflectors show efficient light trapping, enabling a strong reduction in semiconductor film thickness. Similarly, crystalline Si solar cells covered with metal nanoparticle surface coatings shows enhanced light coupling and trapping.

PWA3 • 9.00
Absorption Enhancement in an Amorphous Si Solar Cell through Localized Surface Plasmon-Induced Scattering with Metal Nanoparticles, *Fu-Ji Tsai, Jyh-Yang Wang, Yean-Woei Kiang,* ***C. C. Yang***; *Natl. Taiwan Univ., Taiwan.* Absorption enhancement of an amorphous Si solar cell is numerically demonstrated by placing metal and dielectric nanoparticles on the top, including periodical and non-periodical distributions, to induce localized surface plasmon for effectively generating forward scattering.

Sessions continue on page 39.

Hebel	Thoma	Mombert	Scheffel
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Access Networks and In-house Communications

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

BWA • Femtosecond Laser Symposium I—Continued

BWA4 9.30 Invited

Burst Femtosecond Laser Writing of Spectrally Controlled Bragg Grating Waveguides, *Peter Herman*; *Univ. of Toronto, Canada.* Abstract not available.

NWA • Temporal and Spatiotemporal Effects—Continued

NWA5 • 9.15 Invited

Phase Diagram and Condensation in Random Lasers, *Claudio Conti*[1], *Luca Leuzzi[2], Marco Leonetti[3]; [1]INFM - CRS SOFT, Univ. La Sapienza, Italy, [2]INFM - CRS SMC, Univ. La Sapienza, Italy, [3]Dept. of Physics, Univ. La Sapienza, Italy.* Spin-glass theory allows to derive a phase-diagram for random lasers in terms of the degree of disorder and the pump rate. An Haus/Grosss-Pitaevskii equation is in agreement with the observed spectral line-width.

NWA6 • 9.45

Slow- and Fast Light in Photorefractive Sbn:60, *Wolfgang Horn,* *Jan V Basewitz, Cornelia Denz; Inst. für Angewandte Physik, Westfaelische Wilhelms-Univ. Münster, Germany.* We demonstrate slow and fast light by dispersive phase-coupling in a SBN:60 crystal. The gain spectrum is modulated by using multiple frequency shifted pumping beams and the complete dispersion is measured by the phase-modulation technique.

SWA • Bragg Gratings in Sensing—Continued

SWA3 • 9.15

Impact Detection in Aeronautical Structures Using Fibre Bragg Grating (FBG) Arrays, *Javier Gomez Alonso*[1], *Joseba Zubia Zaballa[1], Gerardo Aranguren Aramendia[1], Gaizka Durana Apaolaza[1], Idurre Saez de Ocariz[2]; [1]Dept. of Electronics and Telecommunications, Univ. of the Basque Country, Spain, [2]Aeronautical Technologies Ctr., Spain.* This work analyzes the use of Bragg gratings to detect impacts in composite aeronautical structures. The results show that it can be possible to detect the impacts, but also that specific equipment is necessary.

SWA4 • 9.30

Direct UV Written Planar Bragg Gratings Integrated to Achieve Localised Multi-Parameter Sensing, *Christopher Holmes*, *Richard M. Parker, James C. Gates, Peter G. R. Smith; Optoelectronics Res. Ctr., Univ. of Southampton, UK.* Multiplexed direct UV written planar Bragg gratings are integrated into a compact silica-on-silicon chip, with the ability to locally monitor temperature, chemical species, pressure and flow.

SWA5 • 9.45

Fiber-Optical Accelerometers Based on Polymer Optical Fiber Bragg Gratings, *Wu Yuan*[1], *Alessio Stefani[1], Ole Bang[1], Søren Andresen[2], Finn Kryger Nielsen[2], Torben Jacobsen[3], Bjarke Rose[3], Nicolai Herholdt-Rasmussen[3]; [1]DTU Fotonik, Technical Univ. of Denmark, Denmark, [2]Brüel & Kjær Sound & Vibration Measurements A/S, Denmark, [3]Ibsen Photonics A/S, Denmark.* Fiber-optical accelerometers based on polymer optical fiber Bragg gratings (FBGs) are reported. We have written 3mm FBGs for 1550nm operation, characterized their temperature and strain response, and tested their performance in a prototype accelerometer.

AWA • Next Generation Access Networks—Continued

AWA5 • 9.15

Optical Line Terminal and Remote Node Sub-Systems of Next-Generation Access Networks, *Johan Bauwelinck*[1], *Cleitus Antony[2], Francesc Bonada[3], Antonio Caballero[4], Sotiria Chatzi[5], Aisling M. Clarke[2], Liliana Nicolau Costa[6], Marco Forzati[7], Jose A. Lazaro[3], Alexandros Maziotis[8], Miguel Mestre[3], Idelfonso Tafur Monroy[4], Peter Ossieur[2], Victor Polo[3], Josep Prat[3], Xing-Zhi Qiu[1], Pierre-Jean Rigole[9], Bernhard Schrenk[3], Risto Soila[10], António Teixeira[6], Ioannis Tomkos[5], Paul D. Townsend[2], Xin Yin[1], Hercules Avramopoulos[8]; [1]IMEC, Ghent Univ., Belgium, [2]Tyndall Natl. Inst., Dept. of Physics, Univ. College Cork, Ireland, [3]Dept. TSC, Univ. Politècnica de Catalunya, Spain, [4]Technical Univ. of Denmark, Denmark, [5]Athens Information Technology Ctr., Greece, [6]Inst. de Telecomunicações, Portugal, [7]Acreo AB, Networking and Transmission Lab, Sweden, [8]Natl. Technical Univ. of Athens, Greece, [9]Syntune AB, Sweden, [10]TELLABS Oy, Finland.* Optical line terminal and remote node sub-systems are key elements for the development of scalable, cost-effective and high-bandwidth passive optical networks. This paper presents recent and ongoing research in the FP7 EuroFOS Network of Excellence.

AWA6 • 9.30 Invited

3GPP Compliant Downlink ACLR Performances of PON Distributed Multiple UMTS FDD Carriers, *Florian Frank[1],* ***Benoit Charbonnier**[1], Catherine Algani[2]; [1]Orange Labs, France, [2]ESYCOM, CNAM, France.* To reuse the fixed broadband optical infrastructures for mobile networks, we report experimental results, compliant with 3GPP's Downlink ACLR specifications, of UMTS FDD carriers distributed over PON using RoF, for optical budgets up to 30dB.

10.00–17.00 Exhibits Open, *Weinbrenner Conference Room*

10.00–10.30 Coffee Break/Exhibits, *Weinbrenner Conference Room*

Clubraum	Room 2.05	Room 2.08
Signal Processing in Photonic Communications	Solid-State and Organic Lighting	Optical Nanostructures for Photovoltaics

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

SPWA • Coherent Receivers I—Continued

SPWA2 • 9.15
Optimal Symbol Rate for Optical Transmission Systems with Coherent Receivers, *Kittipong Piyawanno*[1], *Maxim Kuschnerov*[1], *Berthold Lankl*[1], *Bernhard Spinnler*[2]; [1]*Federal Armed Services Univ. Munich, Germany*, [2]*Nokia Siemens Networks GmbH & Co. KG, Germany.* We investigate the nonlinear impairments for future 1Tbit/s transmission in multi-band systems with coherent reception. The optimal baud rate for the sub-band is derived for higher-order QAM and varying dispersion management.

SPWA3 • 9.30 Invited
DSP in Coherent Receivers for Ultra Long-Haul Applications, *Oriol Bertran-Pardo*, *J. Renaudier, G. Charlet, M. Salsi, P. Tran, H. Mardoyan and S. Bigo; Bell Labs, Alcatel-Lucent, France.* Coherent-based solutions are key enablers for 100G systems. Here we review the unique resistance to linear impairments, the tolerance to nonlinearities and potential for reaching ultra long haul distances of 100G coherent PDM QPSK.

SOWA • SOLED Plenary—Continued

SOWA2 • 9.15 Plenary
High Performance White OLED for Lighting Applications, *Junji Kido*; *Yamagata Univ., Japan.* Abstract not available.

PWA • Plasmonics I—Continued

PWA4 • 9.15
Ultrathin Wide-Angle Optical Metamaterial Absorber, *Jiaming Hao, Jing Wang,* ***Min Yan****, Min Qiu; Royal Inst. of Technology (KTH), Sweden.* We present design, analysis, and experimental demonstration of an ultra-thin, wide-angle perfect metamaterial absorber at optical frequency. The absorption is tunable by adjusting the nanostructure dimensions and is almost independent of the incidence angle.

PWA5 • 9.30 Invited
Increasing Polymer Solar Cell Efficiency with Triangular Silver Gratings, *Aimi Abass, Honghui Shen, Peter Bienstman,* ***Bjorn Maes****; Ghent Univ., Belgium.* We investigate strongly enhanced light absorption in a thin P3HT:PCBM solar cell with a triangular silver grating back contact. The correlation between grating and plasmonic absorption spectrum features are identified and studied with rigorous numerics.

10.00–17.00 Exhibits Open, *Weinbrenner Conference Room*

10.00–10.30 Coffee Break/Exhibits, *Weinbrenner Conference Room*

Wednesday 23 June

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

Hebel

Bragg Gratings, Photosensitivity and Poling in Glass Waveguides

10.30–12.30
BWB • Femtosecond Laser Symposium II
Dan Grobnic; Communications Res. Ctr., Canada, Presider

BWB1 • 10.30 Invited
Avant-Garde Femtosecond Laser Writing, *Peter G. Kazansky*[1], *Martynas Beresna[1], Yasuhiko Shimotsuma[2], Kazuyuki Hirao[2], Yuri P. Svirko[3], Selçuk Aktürk[4]; [1]Optoelectronics Res. Ctr., Univ. of Southampton, UK, [2]Kyoto Univ., Japan, [3]Univ. of Joensuu, Finland, [4]Istanbul Technical Univ., Turkey.* Recently discovered phenomena of quill and non-reciprocal femtosecond laser writing in glasses and crystals are reviewed. Common beliefs that laser writing does not change when reversing beam scan or propagation direction are challenged.

BWB2 • 11.00 Invited
Role of the Optical Filamentation Process in the Writing of FBG with Femtosecond Pulses, *Réal Vallée*; *Univ. Laval, Canada.* The role of the optical filamentation process in the writing of FBGs with femtosecond pulses is analysed. Accordingly, it is shown that diffractive elements, such as phase masks, can be used to control the multi-filamentation process that occurs for pulses with input power largely exceeding the critical power for self-focusing. The benefits of this approach are discussed.

Thoma

Nonlinear Photonics

10.30–12.30
NWB • Computational Analysis and Modeling
Majid Taki; Univ. de Lille 1, France, Presider

NWB1 • 10.30
Ultra-High Energy Pulse Generation: Dissipative Soliton Approach, *Wonkeun Chang*[1], *Adrian Ankiewicz[1], Jose M. Soto-Crespo[2], Nail Akhmediev[1]; [1]Australian Natl. Univ., Australia, [2]Inst. de Optica, Spain.* We present an equation that allows one to approximately locate the dissipative soliton resonance in the parameter space of the complex Ginzburg-Landau equation. This equation may provide a systematic approach to ultra-high energy pulse generation.

NWB2 • 10.45
Selfconsistent Theory for Random Lasers in Disordered 3-D Media of Finite Size, *Regine Frank*[1], *Andreas Lubatsch[2], Kurt Busch[1]; [1]Inst. Für Theoretische FestkörperPhysik, Karlsruhe Inst. für Technologie, Germany, [2]Physikalisches Inst. and Bethe Ctr. for Theoretical Physics, Univ. Bonn, Germany.* We develop a semianalytical We develop a semianalytical theory for random lasers. Within this nonlinear self-consistent approach we combine a diagrammatic transport-theory with semiclassical laser-rate-equations. Optical gain is calculated self-consistently, boundary conditions and spatially varying pump strength are respected.

NWB3 • 11.00
Vortex Lattices in the Coherently Pumped Polariton Microcavities, *A.V. Gorbach, R. Hartley,* ***D.V. Skryabin****; Univ. of Bath, UK.* We propose a new class of vortex lattices supported by the parametric conversion of the polaritons in semiconductor microcavities operating in the strong coupling regime and pumped by a coherent beam with finite transverse momentum.

NWB4 • 11.15
Realization of Cavity Soliton Lasers Based on Bandgap Micro-Cavities, *YuanYao Lin*[1], *Jing-San Pan[2], Tsin-Dong Lee[3], Ray-Kuang Lee[1]; [1]Natl. TsingHua Univ., Taiwan, [2]TrueLight Corp., Taiwan, [3]Industrial Technology Res. Inst., Taiwan.* We demonstrate electrical pumping cavity soliton lasers in a micro-structured vertical cavity surface emission semiconductor. Without any holding beams, self-organized soliton clusters are illustrated experimentally and numerically with the assistance of a surface bandgap structure.

Mombert

Optical Sensors

10.30–12.30
SWB • Biophotonics and Fiber-Sensors
Alexei G. Tsekoun; Pranalytica, Inc., USA, Presider

SWB1 • 10.30 Invited
In vivo* Deep Brain Imaging Using Multiphoton Microscopy, *Chris Xu; *Cornell Univ., USA.* Deep tissue multiphoton microscopy (MPM) of mouse brain using 1280-nm excitation is presented. Several challenging issues and a promising new femtosecond fiber source for long wavelength MPM will be discussed.

SWB2 • 11.00 Invited
Fiber Optic Nerve Systems for Smart Materials and Smart Structures, *Kazuo Hotate*; *Univ. of Tokyo, Japan.* "Fiber optic nerve systems" have been studied to make structures and materials that can feel pain. We have developed the nerve systems with mm-order spatial resolution and kHz-order measurement speed, using optical correlation domain techniques.

Scheffel

Access Networks and In-house Communications

10.30–12.45
AWB • Home Network Technologies
Pierre Sansonetti; Draka Comteq, France, Presider

AWB1 • 10.30 Invited
Status of Gigabit Home Networks with Polymer Optical Fibers, *Olaf Ziemann*, *Hans Poisel; POF-AC Polymer Optical Fiber Application Ctr., Univ. of Applied Sciences, Germany.* The paper presents the application of 1mm core diameter step index POF for the transmission of 1Gbit/s and more with extremely robust transmission systems. We compare the different modulation formats for POF.

AWB2 • 11.00
Integrated WDM System for POF Communication with Low Cost Injection Moulded Key Components, *U. H. P. Fischer*, *Matthias Haupt; Harz Univ. of Applied Sciences and Res., Germany.* Polymer Optical Fibres (POFs) systems are limited to bandwidth. To extend the bandwidth, integrated MUX/DEMUX-elements for WDM over POF are developed to use multiple channels. These realised key components are suitable for mass market applications.

AWB3 • 11.15
CWDM Broadcast and Select Home Network Based on Multimode Fibre and a Passive Star Architecture, *F. Richard*[1], *Ph. Guignard[1], J. Guillory[1], L. Guillo[1], A. Pizzinat[1], A. M. J. Koonen[2]; [1]Orange Labs, France, [2]COBRA Inst., Dept. of Electrical Engineering, Eindhoven Univ. of Technology, Netherlands.* We present a high capacity home network based on a multimode passive star and WDM technology, implementing triple play over IP, P2P Gigabit Ethernet and TV broadcasting. Issues concerning the use of MMF are discussed.

Sessions continue on page 42.

Clubraum | Room 2.05 | Weinbrenner Conference Room

Signal Processing in Photonic Communications | Solid-State and Organic Lighting | Optical Nanostructures for Photovoltaics

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

10.30–11.45
SPWB • Coherent Receivers II
Guifang Li; Univ. of Central Florida, USA, Presider

SPWB1 • 10.30
On the Mitigation of Polarization-Dependent Loss in Coherent Systems, *Maxim Kuschnerov*[1], *Kittipong Piyawanno[1], Mohamed Chouayakh[1], Bernhard Spinnler[2], Mohammad S. Alfiad[3], Antonio Napoli[2], Berthold Lankl[1]; [1]Univ. of the Federal Armed Forces, Germany, [2]Nokia Siemens Networks GmbH & Co. KG, Germany, [3]Technical Univ. Eindhoven, Netherlands.* The performance of polarization-dependent loss (PDL) mitigation by means of predistortion is analyzed and compared to theoretical boundaries. Cases of lumped and distributed noise are considered. SNR improvements of 1.3dB are achieved for 6dB PDL.

SPWB2 • 10.45
Limitation of PMD to Digital Timing Recovery, *Fabian N. Hauske*, *Changsong Xie, Chan Zhao, Chuandong Li, Zhuhong Zhang; Huawei Technologies, Germany.* We analyze the systematic limitation of polarization-mode dispersion (PMD) on timing phase estimation in coherent receivers with digital timing recovery. Mitigation schemes for robust, low complexity and reliable timing phase estimation are proposed.

SPWB3 • 11.00
Clock Recovery with DGD-Tolerant Phase Detector for CP-QPSK Receivers, *Christina Hebebrand*[1], *Antonio Napoli[2], Alessandro Bianciotto[2], Stefano Calabro[2], Bernhard Spinnler[2], Werner Rosenkranz[1]; [1]Univ. of Kiel, Germany, [2]Nokia Siemens Networks, Germany.* We present three novel phase detector structures for a 112 Gbit/s CP-QPSK system, which provide, even in the presence of DGD, valid tracking information for a fully digital clock recovery.

SPWB4 • 11.15
Doubly-Differential Coherent 100G Transmission: Multi-Symbol Decision-Directed Carrier Phase Estimation with Intradyne Frequency Offset Cancellation, *Moshe Nazarathy*[1], *Alik Gorshtein[2], Dan Sadot[2]; [1]Electrical Engineering Dept., Technion–Israel Inst. of Technology, Israel, [2]Electrical and Computer Engineering Dept., Ben-Gurion Univ. of the Negev, Israel.* The proposed novel carrier phase and frequency recovery system automatically cancels LO frequency offsets, outperforming conventional schemes in mean square phase error, with low complexity linear processing, using a low number of complex-multiply-adds.

10.30–12.30
SOWB • LED Technology and Characterization II
Martin Dawson; Univ. of Strathclyde, UK, Presider

SOWB1 • 10.30 Invited
GaN on Si, *Armin Dadgar*; *Univ. of Magdeburg, Germany.* The presentation will summarize the current status of GaN based LEDs on silicon and analyze the difficulties and benefits of such LEDs when grown by MOVPE on silicon instead of sapphire.

SOWB2 • 11.10
Polymeric Ambipolar Hosts for Large-Area Phosphorescent Light-Emitting Diodes, *Sung-Jin Kim, Seungkeun Choi, Yadong Zhang, Carlos Zuniga, Gaelle Deshayes, Julie Leroy, Stephen Barlow, Seth R. Marder, **Bernard Kippelen**; Georgia Tech, USA.* We report on a polymer bearing pendant ambipolar carbazole / oxadiazole moieties that can be used as an efficient host material for green-emitting iridium-based phosphorescent guests and discuss large-area diodes without indium-tin oxide electrodes.

10.30–11.30
PWB • PV Poster Session

PWB1
The Anti-Reflection Coating of Triple Junction (InGaP/InGaAs/Ge) Solar Cells, *Liann-Be Chang*, *Ming-Jer Jeng, Tsung-Wen Chang, Chun-Yi Dong, Chia-Ta Chen, Wen-Jia Lee; Chang Gung Univ., Taiwan.* Double (SiO_2/Ta_2O_5) or triple ($SiO_2/TiO_2/Ta_2O_5$) Anti-Reflection Coatings (ARC) have been used to improve the conversion efficiency of the InGaP/InGaAs/Ge solar cells. It is found that the efficiency improvements are 5.4% and 6.31%, respectively.

PWB2
Numerical Modeling and Stochastic Optimization of Dielectric Antireflective Structured Surfaces, *Marco Zocca*; *Technical Univ. of Denmark, Denmark.* Antireflective subwavelength structures were parametrized from SEM scans and simulated with the transfer matrix formalism. Such parametric geometry was then refined with a stochastic algorithm (PSO) yielding good agreement with other methodologies.

PWB3
Metal Nanoparticles for Plasmonic Solar Cell Applications, *Urcan Guler*, *Rasit Turan; Dept. of Physics, Middle East Technical Univ., Turkey.* Metal nanoparticles, which are considered as promising tools to enhance performances of photovoltaic devices, are fabricated via e-beam lithography method to investigate the effect of various parameters such as shape disorders, host materials and aging.

PWB4
Silver /Silver Oxide Nanoparticles as Potential Sensitizers in Dye-Sensitized Solar Cells, *Lorena Barrientos*, *Bárbara Loeb; Pontificia Univ. Católica de Chile, Chile.* This work introduces the use of silver/silver oxide nanoparticles as potential sensitizers in DSC for the conversion solar energy. Optical studies allow obtaining the optimal time of the NPs for use as potential sensitizers (40 s) with a maximum absorption of 473 nm.

PWB5
Analytical Study of Enhanced Optical Absorption of Molecules near Silver Nanoparticles, *Khai Q. Le*, *Aimi Abass, Bjorn Maes, Peter Bienstman; Ghent Univ., Belgium.* The effective mode volume model is employed to study an enhanced light absorption of absorbing molecules in solar cells when they are positioned in close proximity to Ag nanospheres. Furthermore, a procedure for optimal design of Ag nanoparticles for a promising improvement of light absorption is presented.

PWB6
ZnO Nanorod Arrays for Organic Solar Cells, *Jonas Conradt*[1], *Cornelius Thiele[1], Manuel Reinhard[2], Oliver Lösch[2], Janos Sartor[1], Florian Maier-Flaig[1], Reinhard Schneider[3], Mohammad Fotouhi[3], Peter Pfundstein[3], Volker Zibat[3], Alexander Colsmann[2], Dagmar Gerthsen[3], Uli Lemmer[2], Heinz Kalt[1]; [1]Inst. für Angewandte Physik, Karlsruhe Inst. of Technology, Germany, [2]Lichttechnisches Inst., Karlsruhe Inst. of Technology, Germany, [3]Lab für Elektronenmikroskopie, Karlsruhe Inst. of Technology, Germany.* We report on the synthesis and characterization of vapor phase grown zinc oxide nanorod arrays on sputtered aluminum-doped zinc oxide substrates. These arrays can serve as nanostructured electrodes for P_3HT:PCBM solar cells, possibly improving their photovoltaic performance.

PWB7
Are Surface Plasmons Required for Absorbing Light by Metals? *Nicolas Bonod*; *Inst. Fresnel, France.* Metallic nanostructures are widely studied in order to enhance the light matter interaction, with important applications in photovoltaic cells. Surface plasmons are involved in all presented metallic nanostructures. In this talk, we will show that a buried gold substrate can full absorb light without the help of surface plasmons, which opens the way for conceiving cost effective absorbers made of metallic layers.

PWB8
Role of Resonances of Digital Plasmonic Gratings in Absorption Profile Remodulation in Silicon Solar Cells, *Pierfrancesco Zilio*[1,2], *Davide Sammito[2,3,4], Gabriele Zacco[1,2,3], Filippo Romanato[1,2,3]; [1]Univ. di Padova, Italy, [2]LaNN, Lab of Nanofabrication of Nanodevices, Italy, [3]IOM CNR, Lab TASC, Italy, [4]Physics Dept., Trieste Univ., Italy.* Optical simulations of 1-D digital plasmonic grating show that SPPs and cavity-mode resonances can be effectively exploited to enhance NIR-light absorption in shallower regions of a Silicon substrate.

Sessions continue on page 43.

Hebel	Thoma	Mombert	Scheffel
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Access Networks and In-house Communications

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

BWB • Femtosecond Laser Symposium II—Continued

BWB3 • 11.30 Invited

Single Process Femtosecond Microfabrication of Key Components for Integrated Optics, *Ian Bennion,* ***Vladimir Mezentsev****, Mykhaylo Dubov, Andrey Okhrimchuk, Tom D. P. Allsop, Holger Schmitz; Aston Univ., UK.* We present recent results on femtosecond microfabrication of key components for integrated optics such as highly curved low-loss waveguides in glasses, depressed cladding waveguides in crystals. Details of microfabrication and characterisation are discussed.

BWB4 • 12.00 Invited

Femtosecond Laser Micromachining in Transparent Materials, ***Eric Mazur****; Harvard Univ., USA.* Abstract not available.

NWB • Computational Analysis and Modeling—Continued

NWB5 • 11.30

Self-Consistent Analysis of Lasing Action in THz Quantum Cascade Lasers, ***Christian Jirauschek****, Alpar Matyas; Technische Univ. München, Germany.* Based on a coupled simulation of the optical cavity field and the carrier transport in THz quantum cascade lasers, the interplay between lasing action and photon-induced electron transport is self-consistently analyzed.

NWB6 • 11.45

Anomalous Thermalization of Nonlinear Optical Waves, *Pierre Suret[1], Stéphane Randoux[1], Claire Michel[2], Hans Jauslin[2],* ***Antonio Picozzi***[2]*; [1]Lab de Physique des Lasers, Atomes et Molecules, Univ. de Lille, France, [2]Inst. Carnot de Bourgogne, Univ. de Bourgogne, France.* We report theoretically and experimentally an anomalous thermalization process characterized by an irreversible evolution of the waves towards a novel family of equilibrium states of a fundamental different nature than the standard thermodynamic equilibrium state.

NWB7 • 12.00

Control of Dispersive Shock Dynamics Developing from Dark Waveforms, S*tefano Trillo*[1], *Andrea Armaroli[1], Stefania Malaguti[1], Andrea Fratalocchi[2]; [1]Univ. degli Studi di Ferrara, Italy, [2]Univ. La Sapienza, Italy.* We investigate the dynamics of 1-D dispersive shock waves generated from smooth dark waveforms in the weakly-dispersive limit. Different forms of control of their dynamics as well as their stabilization against transverse instabilities are discussed.

NWB8 • 12.15

Transition Dynamics for Multi-Pulsing in Mode-Locked Lasers, ***Brandon G. Bale***[1]*, Khanh Kieu[2], J. Nathan Kutz[3], Frank Wise[2]; [1]Photonics Res. Group, Aston Univ., UK, [2]Dept. of Applied Physics, Cornell Univ., USA, [3]Dept. of Applied Mathematics, Univ. of Washington, USA.* We consider experimentally and theoretically a refined parameter space in a mode-locked fiber laser near the transition to multi-pulsing. Increasing cavity energy drives the dynamics through a periodic instability to chaotic dynamics.

SWB • Biophotonics and Fiber-Sensors—Continued

SWB3 • 11.30

DNA Detection Using a Photonic Crystal Waveguide Sensor, ***Veronica Toccafondo****, Jaime García-Rupérez, María José Bañuls, Amadeu Griol, Javier García-Castelló, Sergio Peransi-Llopis, Angel Maquieira; Univ. Politécnica de Valencia, Spain.* We report an experimental demonstration of DNA detection using a photonic crystal waveguide based optical sensor. A detection limit of 110nM is achieved for hybridized biotinylated DNA oligomers on the streptavidin-coated Silicon biosensor.

SWB4 • 11.45

WDM for Fluorescence Biosensing Using a Multi-Channel Directional Coupler, ***Ravi J. McCosker****, Graham E. Town; Macquarie Univ., Australia.* We describe a 1x2 guided-wave 532/590 nm wavelength division multiplexer for fluorescence biosensing using a multi-channel directional coupler structure.

SWB5 • 12.00

Highly Accurate Surface Plasmon Resonance Based Fiber Optic Sensor as a Human Blood Group Identifier, ***Rajan Jha***[1]*, Anuj Kumar Sharma[2]; [1]Indian Inst. of Technology, India, [2]Jacob Ruisdaellaan, Netherlands.* Surface plasmon resonance sensor for the detection of human blood-groups is investigated. The sensor's performance is analyzed in terms of shift in SPR wavelength and SPR curve width for reliable and accurate blood-group identifier.

SWB6 • 12.15

A Fiber-Optic Surface-Plasmon-Resonance Bio-Sensor, ***Tobias Schuster***[1]*, Niels Neumann[1], Christian Schäffer[2]; [1]Technische Univ. Dresden, Germany, [2]Helmut Schmidt Univ., Germany.* The excitation of surface plasmon waves by a novel fiber-optic biosensor employing a long period fiber Bragg-grating is presented. The fabrication and modeling of the promising sensor concept as well as initial experiments are discussed.

AWB • Home Network Technologies—Continued

AWB4 • 11.30 Invited

In-Building Wireline/Wireless, ***Ton Koonen****, H. P. A. van den Boom[1], E. Ortego Martinez[2], P. Guignard[3]; Eindhoven Univ. of Technology, Netherlands, [2]Telefonica I+D, Spain, [3]France Telecom, Orange Labs R&D, France.* Fiber in-building networks are cost-competitive with Cat-5E networks, when plastic optical fiber and duct sharing with electrical power cabling is applied. Point-to-point topologies are preferred for residential homes; bus or star-bus ones for larger buildings.

AWB5 • 12.00

Multiservice Home Network Based on Hybrid Electrical and Optical Multiplexing on a Low Cost Infrastructure, ***J. Guillory****, Ph. Guignard, F. Richard, L. Guillo, A. Pizzinat; Orange Labs, France.* We propose a new home network delivering various signals (Ethernet, Television, Radio over Fibre) on a unique infrastructure. This architecture, combining electrical and wavelength multiplexing, has been validated by an implementation on a multimode fibre.

AWB6 • 12.15 Invited

Integration of QoS Provisioning in Home and Access Networks, ***Mikhail Popov***[1]*, A. Gavler[1], P. Sköldström[1], L. Brewka[2]; [1]Acreo AB, Sweden, [2]DTU Photonics, Technical Univ. of Denmark, Sweden.* Approaches for QoS provisioning using UPnP for home networks and GMPLS for access networks are described. A solution for interworking the UPnP and the GMPLS at the residential gateway is proposed.

12.30–13.30 Lunch Break *(on your own)*

Clubraum | **Room 2.05** | **Room 2.08**

Signal Processing in Photonic Communications | Solid-State and Organic Lighting | Optical Nanostructures for Photovoltaics

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

SPWB • Coherent Receivers II—Continued

SPWB5 • 11.30
Implementation of Coherent 16-QAM Digital Receiver with Feedforward Carrier Recovery, ***Ali M. Al-Bermani***[1]*, Reinhold Noé*[1]*, Sebastian Hoffmann*[1]*, Christian Wördehoff*[2]*, Ulrich Rückert*[3]*, Timo Pfau*[4]*;* [1] *EIM-E, Univ. of Paderborn, Germany,* [2] *Heinz Nixdorf Inst., Univ. of Paderborn, Germany,* [3] *CITEC, Univ. of Bielefeld, Germany,* [4]*Alcatel-Lucent, USA, USA.* 1.25 Gbit/s synchronous coherent 16-QAM data is transmitted and received in a real-time intradyne setup with BER below FEC threshold. A phase noise tolerant feedforward carrier recovery concept with hardware-efficient implementation was tested.

SOWB • LED Technology and Characterization II—Continued

SOWB3 • 11.30
Luminescence Study of Gan-Based Vertical Light Emitting Diodes, ***Manh-Ha Doan****, N. D. Lam, F. Rotermund , H. Lim, J. J. Lee; Ajou Univ., Republic of Korea.* Luminescence and structural properties of InGaN/GaN LED structure before and after removing the sapphire substrates were investigated by photoluminescence, cathodeluminescence, carrier lifetime measurements, and high-resolution transmission electron microscopy.

SOWB4 • 11.50
Analysis of Exciton Distributions in OLEDs: The Influence of the Optical Environment, ***Benjamin Perucco***[1]*, Daniele Rezzonico*[1]*, Nils Andre Reinke*[2]*, Evelyne Knapp*[2]*, Beat Ruhstaller*[1]*, Beat Ruhstaller*[2]*;* [1]*Fluxim AG, Switzerland,* [2] *Inst. of Computational Physics, Zürich Univ. of Applied Sciences, Switzerland.* Our numerical analysis demonstrates that exciton distributions extracted from spectral emission measurements of OLEDs are equivalent to those obtained with charge and exciton transport simulations when optical quenching effects are taken into account.

SOWB5 • 12.10
Thin Film Encapsulation of Top-Emitting OLEDs Using Atomic Layer Deposition, ***Thomas Riedl***[1]*, Jens Meyer*[2]*, Hans Schmidt*[3]*, Thomas Winkler*[3]*, Wolfgang Kowalsky*[3]*;* [1]*Univ. of Wuppertal, Germany,* [2]*Princeton Univ., USA,* [3]*Technische Univ., Braunschweig, Germany.* Al_2O_3/ZrO_2 multi-layers are used to encapsulate organic light emitting diodes (OLEDs). OLED lifetimes of more than 20,000 h are achieved. For top-emitting OLEDs, the encapsulation layer increases the external quantum efficiency by more than 40%.

11.30–12.30
PWC • Plasmonics II
Albert Polman; FOM - Inst. for Atomic and Molecular Physics, Netherlands, Presider

PWC1 • 11.30 Invited
Localized Surface Plasmons for High Efficiency Solar Cells, ***Kylie Catchpole****; Australian Natl. Univ., Australia.* Plasmonic enhancement is a promising new approach to increasing absorption in solar cells. In this talk we review recent progress and future propsects for enhancement of solar cells using localized resonances on metal nanoparticles.

PWC2 • 12.00
Optical Nanoantennas for High-Efficient Ultra-Thin Solar Cells, ***Stephane Collin****, Fabrice Pardo, Nathalie Bardou, Jean-Luc Pelouard; Lab de Photonique et de Nanostructures, LPN/CNRS, France.* We propose new concepts for light trapping in ultra-thin solar cells. It is shown that optical nanoantennas can lead to broadband absorption in 30 nm-thick GaAs solar cells, with 14.5% energy conversion efficiency.

PWC3 • 12.15
Built-in Quantum Dot Antennas in Dye-Sensitized Solar Cells, ***Stella Itzhakov***[1]*, Sophia Buchbut*[2]*, Dan Oron*[1]*, Arie Zaban*[2]*;* [1]*Weizmann Inst. of Science, Israel,* [2]*Bar-Ilan Univ., Israel.* A new design of dye-sensitized solar cells involves quantum dots that serve as antennas, funneling absorbed light to the charge separating dye molecules via nonradiative energy transfer, providing a full coverage of the visible light.

12.30–13.30 Lunch Break *(on your own)*

Bragg Gratings, Photosensitivity and Poling in Glass Waveguides | Nonlinear Photonics | Optical Sensors | Access Networks and In-house Communications

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

13.30–15.30
BWC • Femtosecond Laser Symposium III
Peter Herman; Univ. of Toronto, Canada, Presider

BWC1 • 13.30 Invited

Intense Field Science in Dielectrics, *M. Gertsvolf[1,2], D. Grojo[1], M. Spanner[1], P. P. Rajeev[1], P. B. Corkum[1,2],* ***D. M. Rayner[1]****; [1]Natl. Res. Council Canada, Canada, [2]Univ. of Ottawa, Canada.* We discuss fundamental aspects of the interaction intense field with dielectrics that underpin femtosecond laser dielectric modification. We establish that sub-cycle dynamics can be observed in dielectrics, introducing possibilities for attosecond science in solids.

BWC2 • 14.00 Invited

Femtosecond Time Resolved Studies of Carrier Excitation and Relaxation Dynamics in Various Dielectrics, ***Stephane Guizard[1]****, Nikita Fedorov[1], Alexandros Mouskeftaras[1], Sergey Klimentov[2]; [1]CEA/DSM/DRECAM, École Polytechnique, France, [2]General Physics Inst., Russian Acad. of Sciences, Russian Federation.* We study the different processes of electronic excitation and relaxation occurring when an intense short laser pulse impinges a transparent dielectric. We show that they are strongly material dependent, and strongly influence optical breakdown.

13.30–15.30
NWC • Harmonic Generation in Photonic Structures
Presider to Be Announced

NWC1 • 13.30

Conical Second Harmonic Generation in Two-dimensional Nonlinear Photonic Structures, ***Yan Sheng[1,2]****, Neshev N. Dragomir[1], Wieslaw Krolikowski[1], Ady Arie[3], Kaloian Koynov[2], Yuri S. Kivshar[1]; [1]Nonlinear Physics Ctr. and Laser Physics Ctr., Australian Natl. Univ., Australia, [2]Max-Planck-Inst. for Polymer Res., Germany, [3]School of Electrical Engineering, Tel Aviv Univ., Israel.* We report conical second harmonic generation in two-dimensional nonlinear photonic structures with fundamental beam of linear, circular, and elliptical polarizations, respectively. We develop a theoretical model for describing this phenomenon and explore its physical origin.

NWC2 • 13.45

Direct Three-Dimensional Visualization of Inverted Domains in Nonlinear Photonic Structures by Čerenkov-Type Second Harmonic Generation Microscopy, *Yan Sheng[1], Wieslaw Krolikowski[2], Ady Arie[3], Solomn M. Saltiel[4],* ***Kaloian Koynov[1]****; [1]Max-Plank-Inst. for Polymer Res., Germany, [2]Nonlinear Physics Ctr. and Laser Physics Ctr., Australian Natl. Univ., Australia, [3]School of Electrical Engineering, Tel Aviv Univ., Israel, [4]Dept. of Physics, Sofia Univ., Bulgaria.* We present a new method for three-dimensional imaging of the inversed ferroelectric domains hidden inside nonlinear photonic structures. The method is based on Cerenkov-type second harmonic generation laser scanning microscopy and offers sub-micrometer resolution.

NWC3 • 14.00

Slow-Light Enhanced Backward Second-Harmonic Generation in a Lithium Niobate Photonic Crystal, ***Rumen Iliew[1]****, Christoph Etrich[2], Thomas Pertsch[2], Yuri S. Kivshar[3], Falk Lederer[1]; [1]Inst. of Condensed Matter Theory and Solid State Optics, Friedrich-Schiller-Univ. Jena, Germany, [2]Inst. of Applied Physics, Ultra Optics, Friedrich-Schiller-Univ. Jena, Germany, [3]Nonlinear Physics Ctr., Res. School of Physics and Engineering, Australian Natl. Univ., Australia.* We obtain greatly enhanced conversion efficiencies of backward second-harmonic generation by exploiting small group velocities at phase matching in a two-dimensional quadratically nonlinear photonic crystal. The efficiencies obtained from a modal approach are rigorously confirmed.

NWC4 • 14.15

Broadband Third Harmonic Generation in Quadratic Nonlinear Media with Disordered Ferroelectric Domains, ***Ksawery Kalinowski[1]****, Vito Roppo[2], Wenjie Wang[3], Yongfa Kong[4], Dragomir N. Neshev[1], Crina Cojocaru[2], Jose Trull[2], Ramon Vilaseca[2], Kestutis Staliunas[2], Wieslaw Krolikowski[3], Salomon M. Saltiel[5], Yuri S. Kivshar[1]; [1]Nonlinear Physics Ctr., Res. School of Physics and Engineering, Australian Natl. Univ., Australia, [2]Univ. Politècnica de Catalunya, Spain, [3]Laser Physics Ctr., Res. School of Physics and Engineering, Australian Natl. Univ., Australia, [4]College of Physics Science, China, [5]Faculty of Physics, Sofia Univ., Bulgaria.* We study nonlinear frequency generation in media with random ferroelectric domain structure. We show that randomness enables one to realize broadband third harmonic generation via cascading of two second order quasiphase matched nonlinear processes.

13.30–15.30
SWC • Lasers for Sensors
Presider to Be Announced

SWC1 • 13.30 Invited

Mid-IR Sources for Sensors, ***Jas S. Sanghera****, Brandon Shaw, Ishwar Aggarwal; NRL, USA.* We have developed infrared fibers based on chalcogenides and will demonstrate examples of the different mid-IR sources we have developed as well as highlight optical sensors using the chalcogenide fibers.

SWC2 • 14.00 Invited

Wideband Ultra-Short Pulse Fiber Lasers and Their Sensing Applications, ***Norihiko Nishizawa****; Osaka Univ., Japan.* We have demonstrated wideband wavelength tunable ultrashort pulses and high quality super continuum based on ultrashort pulse fiber lasers. Ultra-high resolution optical coherence tomography and 3-D optical measurement were demonstrated in fiber laser based system.

13.30–15.30
AWC • Hybrid Access Networks
Frank J. Effenberger; Huawei Technologies, USA, Presider

AWC1 • 13.30 Invited

Ensuring End-to-End QoS in an Integrated Access-Core Based on Massive WDM, ***Alexandros Stavdas****; Univ. of Peloponnese, Greece.* The SMF bandwidth covers 1260-1625 nm offering the potential to create massive channel WDM-PONs. These PONs will play a key role in creating a flat Access network that allowing for a seamless integration with Core.

AWC2 • 14.00

Optical-Wireless Network with Multi-Layer Reconfigurability, ***B. Huiszoon[1]****, J. Aracil[1], H.D. Jung[2], A. M. J. Koonen[2], E. Tangdiongga[2], I. Tomkos[3], C.P. Tsekrekos[3]; [1]Univ. Autónoma de Madrid, Spain, [2]Eindhoven Univ. of Technology, Netherlands, [3]Athens Information Technology Ctr., Greece.* Current telecom access architectures do not support broadband networking in a converged way on fixed/mobile networks. Here, a highly-configurable optical-wireless network is presented capable of handling dynamics inferred by user mobility and varying service demands.

AWC3 • 14.15

Concepts, Potentials and Limitations of Fiber-Copper and Fiber-Wireless (FiWi) Networks, *Navid Ghazisaidi[1],* ***Christoph Lange[2]****, Andreas Gladisch[2], Martin Maier[1]; [1]Optical Zeitgeist Lab, INRS, Canada, [2]Deutsche Telekom Labs, Germany.* We summarize the concepts, potentials, and limitations of integrated fiber-copper and fiber-wireless (FiWi) networks which hold great promise to support a plethora of future and emerging broadband services and applications on the same infrastructure.

Sessions continue on page 46.

Clubraum	Room 2.05	Room 2.08
Signal Processing in Photonic Communications	Solid-State and Organic Lighting	Optical Nanostructures for Photovoltaics

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

13.30–15.30
SPWC • Coherent Receivers II
Dan Sadot; Bersheva Univ., Israel, Presider

SPWC1 • 13.30
Tracking Speed Comparison of Endless Polarization Controller for Single versus Multiplexed Polarizations, *Benjamin Koch*, *Reinhold Noé, Vitali Mirvoda, David Sandel, Kidsanapong Puntsri; Univ. of Paderborn, Germany.* A fast endless optical polarization control system is presented. Maximum polarization tracking speed for a single polarization is 56 krad/s. When demultiplexing 200-Gb/s PDM-RZ-DQPSK with the same control system, maximum tracking speed is 40 krad/s.

SPWC2 • 13.45
Interference Suppression in Visible Light Communication, *Ralph Tanbourgi, **Maximilian Hauske**, Friedrich K. Jondral; Communications Engineering Lab, Karlsruhe Inst. of Technology, Germany.* Visible light communication is highly exposed to interference. We therefore propose the use of interference suppression techniques known from radio communication. Analytic and simulative results show a significant increase in link performance in terms of bit error rate.

SPWC3 • 14.00
Fractionally Spaced Clustering Based Equalizer for Optical Channels, *Kristina Georgoulakis, Chris Matrakidis, **George O. Glentis**, Alexandros Stavdas; Univ. of Peloponnese, Greece.* A Fractionally-Spaced Clustering Based Equalizer is proposed for the electronic equalization of optical channels. Equalization is treated as a classification task. The proposed approach outperforms the recursive Volterra DFE, as it is demonstrated by simulation.

SPWC4 • 14.15
Coherent Equalization for 111Gbps DP-QPSK with One Sample per Symbol Based on Anti-Aliasing Filtering and MLSE, *Alik Gorshtein*[1], *Dan Sadot[1], Gilad Katz[2], Omri Levy[2]; [1]Ben-Gurion Univ. of the Negev, Israel, [2]MultiPhy Networks, Ltd., Israel.* We propose coherent detection with one sample per symbol. MLSE is used to compensate for ISI introduced by anti-aliasing filtering. 100,000 ps/nm CD and 100 ps DGD are fully compensated with only 1.5 dB penalty.

13.30–15.30
SOWC • Lighting Solutions II
Moritz Engl; OSRAM, Germany, Presider

SOWC1 • 13.30 Invited
LED Headlamps, *Michael Kleinkes*; *Hella KGaA, Germany.* Newly introduced Full-LED-headlamps show an extraordinary number of lighting innovations for safety, comfort, styling. Also a view into the future will be presented, showing perspectives for reduced power consumption using LEDs for main light functions.

SOWC2 •14.10 Invited
The Use of LEDs and Application of the New Mesopic Design in Road Lighting, *Liisa Halonen*, *Marjukka Puolakka; School of Science and Technology, Lighting Unit, Aalto Univ., Finland.* The paper reports case studies of using LEDs in road and pedestrian way lighting and introduces the impacts of the new CIE TC1-58 mesopic photometry on road lighting design and energy efficiency.

13.30–15.30
PWD • Novel Concepts and Materials
Thomas Krauss; Univ. of St Andrews, UK, Presider

PWD1 • 13.30 Invited
Towards Thermally-Drawn Nano-Structured Solar Cell, *Ofer Shapira*, *Nicholas Orf, Yoel Fink; MIT, USA.* Generating low cost, high efficiency energy conversion devices having nanometer-size features that span many square meters necessitate new paradigms in device fabrication. We present here the first thermally drawn mutlimaterial photovoltaic fiber via compound synthesis.

PWD2 • 14.00 Invited
Nanovoid Plasmonic-Enhanced Low-Cost Photovoltaics, *Niraj N. Lal*[1], *Fumin M. Huang[1], Bruno F. Soares[1], Sumeet Mahajan[1], Jatin K. Sinha[2], Phil N. Bartlett[2], Jeremy J. Baumberg[1]; [1]Univ. of Cambridge, UK, [2]Univ. of Southampton, UK.* Gold and silver nanovoid structures generate localised plasmon modes which are harnessed to enhance organic and amorphous silicon solar cell performance. Higher absorption at plasmonic resonant wavelengths indicates significant potential for enhanced photocurrent and efficiency.

Sessions continue on page 47.

Hebel	Thoma	Mombert	Scheffel
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Access Networks and In-house Communications

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

BWC • Femtosecond Laser Symposium III—Continued

BWC3 • 14.30

In the Heart of Nanogratings Made up During Femtosecond Laser Irradiation, ***Matthieu Lancry****, Francois Brisset, Bertrand Poumellec; Univ. Paris-Sud, France.* We observed the intimate structure of nanogratings made up by femtosecond laser irradiation. We reveal that nanoplans are meso-porous glass layers that are at the root of the strong refractive index contrast. Nanopores formation is likely due to glass decomposition.

BWC4 • 14.45

Damage Thresholds in Femtosecond Laser Processing of Silica: A Review, ***Bertrand Poumellec****, Matthieu Lancry; Univ. Paris-Sud, France.* This review allows better defining the domains of macroscopic effects produced by the femtosecond laser but the point is now to look at the microscopic effects in order to move towards interpretation.

BWC5 • 15.00

Writing of Fiber Bragg Gratings Using 400 Nm Femtosecond Pulses and Its Application to High Power Fiber Laser, ***Martin Bernier***[1], *Réal Vallée*[1], *Xavier Pruneau-Godmaire*[1], *Marc-André Lapointe*[2], *Bertrand Morasse*[2]; [1]*COPL, Univ. Laval, Canada,* [2]*CorActive High-Tech, Canada.* We report that fundamental-order fiber Bragg gratings written directly in non-photosensitive ytterbium-doped silica fibers using femtosecond pulses at 400 nm and a phase-mask can withstand the operation of high power fiber lasers.

BWC6 • 15.15

Refractive Index Tensor Mapping in Femtosecond Laser Irradiated Silica, *Matthieu Lancry, Bertrand Poumellec,* ***Abdelouahed Erraji Chahid****; Univ. Paris-Sud, France.* Here, we provide quantitative mapping of refractive index tensor in and around the laser tracks photo-induced by femtosecond laser in silica. We tentatively propose an interpretation based on permanent densification and related photo-elastic stress.

NWC • Harmonic Generation in Photonic Structures—Continued

NWC5 • 14.30

Nonlinear Disorder Mapping via Wave Mixing in Poled Lithium Tantalate, ***Alessia Pasquazi***[1], *Alessandro Busacca*[2], *Salvatore Stivala*[2], *Roberto Morandotti*[1], *Gaetano Assanto*[3]; [1]*Ultrafast Optical Processing Group INRS-EMT, Canada,* [2]*DIEET, Univ. of Palermo, Italy,* [3]*Nonlinear Optics Opto-Electronics Lab, Italy.* We introduce and test a simple approach for the characterization of domain distribution in bulk quadratic ferroelectric crystals, specifically periodically poled Lithium Tantalate with random mark-to space ratio.

NWC6 • 14.45

Quasi-Phase Matched Harmonic Generation in Short-Range Ordered Nonlinear Photonic Structure, ***Yan Sheng***[1,2], *Kaloian Koynov*[1]; [1]*Max-Planck-Inst. for Polymer Res., Germany,* [2]*Nonlinear Physics Ctr. and Laser Physics Ctr., Australian Natl. Univ., Australia.* We report the excellent performance of a short-range ordered nonlinear photonic structure as optical frequency converter and demonstrate the generations of broadband second-harmonic wave and cascaded third-harmonic wave at arbitrary given wavelength in it.

NWC7 • 15.00

Multiband Quadratic Solitons in Waveguide Arrays, ***Frank Setzpfandt***[1], *Andrey A. Sukhorukov*[2], *Dragomir N. Neshev*[2], *Roland Schiek*[1,3], *Andreas Tünnermann*[1,4], *Yuri S. Kivshar*[2], *Thomas Pertsch*[1]; [1]*Univ. Jena, Germany,* [2]*Australian Natl. Univ., Australia,* [3]*Univ. of Applied Sciences Regensburg, Germany,* [4]*Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany.* We predict theoretically and observe experimentally multiband quadratic solitons in periodically poled lithium niobate waveguide arrays. We demonstrate an abrupt transition from unstaggered to staggered second harmonic phase profiles with increase of fundamental beam power.

NWC8 • 15.15

Optimization of Cascaded Intracavity Sum Frequency Generation towards the Visible in Periodically Poled MgO-LiNbO$_3$, ***Felix Ruebel****, Johannes A. L'huillier; Photonik-Zentrum Kaiserslautern e.V., Germany.* Optical parametric oscillation and simultaneous sum frequency generation towards the visible in the same MgO:PPLN crystal is investigated. The fs-radiation was systematically optimized in respect of output power and the temporal and spectral properties.

SWC • Lasers for Sensors—Continued

SWC3 • 14.30 Invited

Ultra-Low Noise Fiber Lasers for Optical Fiber Sensor Systems, ***Jens Engholm Pedersen****, Poul Varming, Christian Vestergaard Poulsen; Koheras A/S, Denmark.* Fiber lasers provide a combination of low noise, potential for high power, small size, ease of use and high reliability, and as such present an attractive candidate for a number of fiber optic sensing applications.

SWC4 • 15.00

Analysis of the Optical Dynamics in Fourier Domain Mode-Locked Lasers, ***Sebastian Todor***[1], *Benjamin Biedermann*[2], *Robert Huber*[2], *Christian Jirauschek*[1]; [1]*Inst. for Nanoelectronics, Technische Univ. München, Germany,* [2]*Lehrstuhl für BioMolekulare Optik, Fakultät für Physik, Ludwig-Maximilians-Univ. München, Germany.* We analyze the optical dynamics in Fourier domain mode-locked lasers. The temporal evolution of the instantaneous power spectrum at different positions in the cavity is investigated, providing insight into the interplay between the governing mechanisms.

SWC5 • 15.15

Raman Assisted Lightwave Synthesized Frequency Sweeper, ***Anders T. Pedersen****, Karsten Rottwitt; Dept. of Photonics Engineering, Technical Univ. of Denmark, Denmark.* We present a Lightwave Synthesized Frequency Sweeper comprising a Raman amplifier for loss compensation. The generated pulse train contains 123 pulses and has a flat signal level as well as a low noise level.

AWC • Hybrid Access Networks—Continued

AWC4 • 14.30

Link Aggregation in a Multi-Wavelength Reconfigurable Photonic Access Network, ***Rajeev Roy***[1,2], *Gert Manhoudt*[1], *Wim van Etten*[2]; [1]*AimValley BV, Netherlands,* [2]*Univ. of Twente, Netherlands.* Link Aggregation is a mechanism used in enterprise networks to bundle Ethernet links. This paper proposes the use of such techniques in the Broadband Photonics(BBP) Network. This network is a dynamically re-configurable photonic access network.

AWC5 • 14.45

Spectral Encoded Optical Label Detection for Dynamic Routing of Impulse Radio Ultra-Wideband Signals in Metro-Access Networks, ***Alexey V. Osadchiy***[1], *Xianbin Yu*[1], *Xiaoli Yin*[1,2], *Idelfonso Tafur Monroy*[1]; [1]*DTU Fotonik, Dept. of Photonics Engineering, Technical Univ. of Denmark, Denmark,* [2]*School of Electronic Engineering, Beijing Univ. of Posts and Telecommunications, China.* In this paper we propose and experimentally demonstrate the principle of coherent label detection for dynamic routing of wavelength division multiplexed impulse radio ultra-wideband signals by using four-tone spectral amplitude coded labels.

AWC6 • 15.00

Wireless-PONs with Extended Wavelength Band Overlay, ***Milos Milosavljevic****, Pandelis Kourtessis, John M. Senior; Univ. of Hertfordshire, UK.* An advanced architectural platform based on wireless-enabled PON topologies is described. Network modelling of WiMAX channel transmission, based on FDM, over a multi-wavelength, splitter-based PON has demonstrated EVMs below -30dB and error-free multipath transmission.

AWC7 • 15.15

Optical Generation with FTTH Transmission of 60 GHz Impulse-Radio Ultra-Wideband Signals, ***Marta Beltrán****, Roberto Llorente; Valencia Nanophotonics Technology Ctr., Univ. Politécnica de Valencia, Spain.* The photonic generation with dispersion-tolerant fiber distribution of impulse-radio ultra-wideband signals is proposed and experimentally demonstrated in the 60 GHz band suitable for multi-Gigabit wireless personal area connectivity in fiber-to-the-home networks.

15.30–16.00 Coffee Break/Exhibits, *Weinbrenner Conference Room*

Clubraum	Room 2.05	Room 2.08
Signal Processing in Photonic Communications	Solid-State and Organic Lighting	Optical Nanostructures for Photovoltaics

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

SPWC • Coherent Receivers II—Continued

SPWC5 • 14.30 Invited

Electronic Signal Processing Using Full-Field Detection, *Jian Zhao[1], Vivian Bessler[1], Mary E. McCarthy[1], Andrew Gunning[2],* ***Andrew Ellis***[1]; *[1]Tyndall Natl. Inst., Univ. College Cork, Ireland, [2]Futures Testbed, BT Innovate & Design, UK.* We review various electronic dispersion compensation techniques based on full-field detection, and show the potential of these methods to applications in 10Gbit/s dispersioncompensating-fiber free transparent optical networks up to 2000km.

SPWC6 • 15.00

Differential Phase Recovery in Adaptive Optical Equalizers, ***Francesco Morichetti****, Umberto Spagnolini, Andrea Melloni; DEI - Politecnico di Milano, Italy.* An adaptive optical equalizer based on the QLMS algorithm and capable of operating directly on any optical format is proposed. The devices can be used either at the receiver or for in-line signal regeneration.

SPWC7 • 15.15

Fast and Reliable Frequency-Domain CD Estimation, ***Fabian N. Hauske****, Changsong Xie, Zhuhong Zhang, Chuandong Li, Qianjin Xiong; Huawei Technologies, Germany.* The algorithm estimates the value of residual chromatic dispersion solely from the spectra of filtered signals of a matched-filter-bank in digital coherent receivers. Robust estimation is demonstrated by extensive simulations with combined impairments.

SOWC • Lighting Solutions II—Continued

SOWC3 • 14.50

Integrated LED Headlamp Module, ***Jan Popelek****; Visteon-Autopal, s.r.o., Czech Republic.* LED headlamp module integrates all necessary optics, electronics, and heat management into one compact unit that fits into standard mechanical headlamp frame. It provides high beam, daytime running light and position light functions.

SOWC4 • 15.10

UV-LED Module Design with Maximum Power Density, ***Manfred Scholdt****, Christian Herbold, Marc Schneider, Cornelius Neumann; Karlsruhe Inst. für Technologie, Germany.* We designed an UV-LED module with LEDs mounted as close as possible to each other to achieve the maximum optical output. Resulting from this the heat dissipation density rises up to 61 Wcm^{-2}.

PWD • Novel Concepts and Materials—Continued

PWD3 • 14.30

Flexible Dye-Sensitized Solar Cell Based on ZnO Nanowire Arrays, *S. Chu, D. Li,* ***J. G. Lu****; Univ of Southern California, USA.* Highly flexible dye-sensitized solar cell is fabricated based on ZnO nanowire photoelectrode array. Such system configuration exhibits good bending ability and device performance, demonstrating a promising flexible plastic solar cells.

PWD4 • 14.45

Probing Electron Transfer in Polymer/Fullerene Blends Using Ultrahigh Time Resolution Coherent Vibrational Spectroscopy, ***Sarah M. Falke***[1], *Daniele Brida[2], Giulio Cerullo[2], Christoph Lienau[1]; [1]Int. für Physik, Carl von Ossietzky Univ. Oldenburg, Germany, [2]Natl. Lab for Ultrafast and Ultraintense Optical Science, CNR-INFM, Italy.* We report ultrafast-nonlinear spectra of polymer/fullerene blends measured with unprecedented 10-fs-time resolution. Our results suggest that the photoinduced chargegeneration in such blends proceeds via a hybrid electronic state delocalized over the polymer and fullerene moieties.

PWD5 • 15.00 Invited

Light Incoupling and Optical Optimisation of Organic Solar Cells, ***Jan Meiß***[1], *Rico Schueppel[1], Ronny Timmreck[1], Mauro Furno[1], Christian Uhrich[2], Stefan Sonntag[2], Wolf-Michael Gnehr[2], Martin Pfeiffer[2], Karl Leo[1], Moritz Riede[1]; [1]Inst. für Angewandte Photophysik, Technische Univ. Dresden, Germany, [2]Heliatek GmbH, Germany.* Due to the thin film nature of organic solar cells, light-trapping and interference effects play a significant role. We discuss here the utilisation of these effects in optimisation and simulation of single and tandem devices.

15.30–16.00 Coffee Break/Exhibits, *Weinbrenner Conference Room*

Hebel | Thoma | Mombert | Weinbrenner Conference Room

Hebel

Bragg Gratings, Photosensitivity and Poling in Glass Waveguides

16.00–18.00
BWD • Material Photosensitivity
Martin Kristensen; Aarhus Univ., Denmark, Presider

BWD1 • 16.00 Invited

Chalcogenide Glasses and Their Photosensitivity: Engineered Materials for Device Applications, *J. David Musgraves[1], Nathan Carlie[1], Guillaume Guery[1], Peter Wachtel[1], Laeticia Petit[1], **Kathleen Richardson**[1], Juejun Hu[2], Anu Agarwal[2], Lionel Kimerling[2], Troy Anderson[3], Jiyeon Choi[3], Martin Richardson[3], [1]Clemson Univ., USA, [2]MIT, USA, [3]Univ. of Central Florida, USA.* Chalcogenide glasses are widely used in device applications which capitalize on their unique linear and nonlinear optical properties, and infrared transparency. The role of the glass' photosensitivity in device fabrication and eventual use, is discussed.

BWD2 • 16.30

Cavity-Enhanced Photosensitivity in As_2S_3 Chalcogenide Glass, *Juejun Hu[1], Anu Agarwal[1], Lionel Kimerling[1], **Francesco Morichetti**[2], Andrea Melloni[2], Nathan Carlie[3], Kathleen Richardson[3]; [1]Microphotonics Ctr., MIT, USA, [2]DEI - Politecnico di Milano, Italy, [3]School of Materials Science and Engineering, COMSET, Clemson Univ., USA.* Cavity-enhanced photosensitivity of As_2S_3 chalcogenide glass films is measured using planar micro-disk resonators. We determine the origin of such photosensitivity to be optical absorption arising from sub-gap defects.

BWD3 • 16.45

UV-Photosensitivity of Germanium-Free Bi-Al Silica Fibers, *Christian Ban[1], **Hans G. Limberger**[1], Valery Mashinsky[2], Vladislav Dvoyrin[2], E. Dianov[2]; [1]École Polytechnique Fédérale de Lausanne, Switzerland, [2]Fiber Optics Res. Ctr., Russian Acad. of Sciences, Russian Federation.* Mean index changes up to 2.2 x 10^{-3} were demonstrated in hydrogen loaded germanium free Bi-Al-doped silica fibers. Tensile stress changes indicate a contribution of compaction to the total index change.

BWD4 • 17.00

Large Photosensitivity in Extremely High Index Contrast SiON Waveguides on Si, ***Makoto Abe**, Masayuki Itoh, Toshimi Kominato, Yusuke Nasu, Mikitaka Itoh; NTT Photonics Labs, NTT Corp., Japan.* We demonstrate the photosensitivity of an extremely high index contrast silicon oxynitride waveguide using an arrayed-waveguide grating multi/demultiplexer. We observed a large index change for a 7.7%-Δ waveguide induced by ArF laser irradiation, which was up to 2.4 x 10^{-3} and stable for thermal annealing.

BWD5 • 17.15

Photosensitivity of Hydrogen-Free Optical Fibers Exposed to Nanosecond 213 nm Pulses, ***Mathieu Gagné**, Raman Kashyap; École Polytechnique de Montréal, Canada.* The role of single-photon absorption is studied in the photosensitivity of hydrogen-free optical fibers exposed to the fifth harmonic of a high repetition rate nanosecond Nd:YAG laser source. Strong fiber Bragg gratings are obtained rapidly.

Thoma

Nonlinear Photonics

16.00–18.00
NWD • Microstructures and Parametric Devices
Presider to Be Announced

NWD1 • 16.00 Invited

Monolithic Frequency Comb on a Chip, ***Tobias J. Kippenberg**; Max-Planck-Inst. für Quantenoptik, Germany.* Abstract not available.

NWD2 • 16.30

Optical Parametric Oscillation on a Chip, ***Luca Razzari**[1], David Duchesne[1], Marcello Ferrera[1], Roberto Morandotti[1], Sai Chu[2], Brent E. Little[2], David J. Moss[3]; [1]INRS-EMT, Canada, [2]Infinera Corp., USA, [3]CUDOS, School of Physics, Univ. of Sydney, Australia.* We demonstrate an integrated multiple wavelength source based on parametric oscillation via four-wave-mixing gain in a high-index doped-silica ring resonator. We obtain lasing with spacings from 200 GHz to >6THz, and a threshold of 54mW.

NWD3 • 16.45

Visible Supercontinuum Generation in the Femtosecond Regime in Submicron Structures, *Martina Delgado-Pinar, **Peter J. Mosley**, Jonathan C. Knight, Tim A. Birks, William J. Wadsworth; Univ. of Bath, UK.* We report the generation of supercontinuum confined to the visible in submicron fibre structures pumped by femtosecond pulses centered at 540 nm.

NWD4 • 17.00

Microring Resonators and Photonic Crystal Structures in Ion-Sliced $LiNbO_3$ Thin Films, ***Gorazd Poberaj**, Manuel Koechlin, Frederik Sulser, Peter Günter; Nonlinear Optics Lab, Inst. of Quantum Electronics, ETH Zürich, Switzerland.* We report on the realization of electro-optically tunable microring resonators and photonic crystal structures in ion-sliced lithium niobate thin films.

NWD5 • 17.15

2-µm-Fiber-Laser-Pumped OP-GaAs OPO and Its Polarization Effects, ***Kieleck Christelle**[1], Marc Eichhorn[1], David Faye[2], Eric Lallier[2], Stuart D. Jackson[3]; [1]French-German Res. Inst. of St.-Louis, France, [2]Thales Res. and Technology France, France, [3]Inst. of Photonics and Optical Science, Univ. of Sydney, Australia.* We report on OP-GaAs OPO directly pumped by 2.09 µm fiber lasers at high repetition rates (40-75 kHz). Up to 2.2 W average output power was achieved at 40 kHz repetition rate in the mid-infrared range.

Mombert

Optical Sensors

16.00–17.30
SWD • Sensor Systems II
Presider to Be Announced

SWD1 • 16.00 Invited

WGM-Resonators for Optical Sensing, ***Heinz Kalt**, Tobias Grossmann, Mario Hauser, Torsten Beck, Julian Fischer, Simone Schleede, Christoph Vannahme, Timo Mappes; Karlsruhe Inst. of Technology, Germany.* We report on the utilization of whispering-gallery mode resonators in optical sensing. In particular, we focus on fabrication and characterization of conical PMMA microresonators directly processed on a silicon substrate with Q-factors above 2•106.

SWD2 • 16.30

Non-Contact Reference-Free Optical Measurement of in-Plane Ultrasonic Vibrations, ***Jonathan T. Bessette**, Elsa Garmire; Thayer School of Engineering, Dartmouth College, USA.* Ultrasonic in-plane motion of a laser-lit surface is measured by monitoring the resulting dynamic speckle pattern with silicon-on-insulator photoconducting mesas without a reference beam. Speckle statistics are exploited to calibrate the amplitude of velocity and displacement measurements.

SWD3 • 16.45

Using a Bent Optical Fiber and Polarization-Sensitive Detection for Vibrations Measurements, ***Nicolas D. F. Linze**, Marc Wuilpart, Christophe Caucheteur, Karima Chah, Olivier Verlinden, Patrice Mégret; Univ. de Mons, Belgium.* We investigate the use of a bent fiber as a vibration sensor. In particular, the linear behavior is analyzed to define a range in which the mechanical excitation spectrum is recovered in a reliable manner.

SWD4 • 17.00

Optical Coherence Tomography for the Assessment of Paper Quality, ***Markus Butzbach**, André Malz, Wilhelm Stork; Inst. for Informations Processing Technology, Karlsruhe Inst. of Technology, Germany.* This paper will present the concept of an OCT sensor for the assessment of paper quality. The basic considerations and some of the special boundary conditions for the planned system will be discussed.

SWD5 • 17.15

Optical Subwavelength-Scale Displacement Sensing with Dynamically Controllable Characteristics, ***Erdal Bulgan**; Ozyegin Univ., Turkey.* Silicon photonic devices with embedded MEMS have significantly been studied. Characterization and operation of such devices in the nanometer-level is critical. A novel optical technique for subwavelength displacement measurements with dynamically controllable characteristics is introduced.

Weinbrenner Conference Room

Joint

16.00–17.30
JWA • ANIC/SOLED Joint Poster Session

JWA1

Light Amplification for Plastic Optical Fibre Networks Based on Dye-Doped Organic-Inorganic Hybrids, ***Paulo S. André**[1,2], Telmo Almeida[1,2], Edison Percoraro[1], Maria Rute Ferreira André[2,3], Luís Carlos[2,3]; [1]Inst. de Telecomunicações, Univ. de Aveiro, Portugal, [2]Dept. de Física, Univ. de Aveiro, Portugal, [3]CICECO, Univ. de Aveiro, Portugal.* Authors propose an optical amplifier, suitable to POF networks with external LED CW excitation based on amine functionalized organic-inorganic hybrids doped with Rhodamine 6G. The measured on/off gain yield to a value of 3.15 dB.

JWA2

10 Gb/s Continuous Clock and Data Recovery for Burst Mode Transmissions with Externally Modulated Laser, ***Luiz Anet Neto**[1], Fabienne Saliou[1], Philippe Chanclou[1], Naveena Genay[1], Laurent Bramerie[2], Eric Borgne[2], Christelle Aupetit-Berthelemot[3]; [1]Orange Labs, France, [2]École Natl. Supérieure des Sciences Appliquées et de Technologie, France, [3]Xlim - Univ. de Limoges, France.* We present the performance of a newly developed receiver with embedded CDR for 10 Gb/s burst data transmission. A 30dB loss budget with 6dB extinction ratio, 1024 bits preamble and 12.5 µs bursts is demonstrated.

JWA3

Dynamic Effects in Reflective Semiconductor Optical Amplifier at Downstream Bit Rate of 40Gb/s and 100Gb/s, *Zoran Vujičić, Jasna V. Crnjanski, **Dejan M. Gvozdić**; Faculty of Electrical Engineering, Univ. of Belgrade, Serbia.* We develop a model for simulation of spatial-temporal distribution of photons and carriers in RSOA for downstream optical pulses at 40 and 100 Gb/s, which demonstrates that signal broadening generates CW component of output signal.

JWA4

Effect of Bias Point and Modulation Index of Mach-Zehnder Modulator on the Performance of Coherent Optical OFDM in Nonlinear and Dispersive Fiber Channels, ***Mohammed S. Abdullah**, Ahmed K. S. Salem, Hossam Shalaby; Electrical Engineering Dept., Faculty of Engineering, Alexandria Univ., Egypt.* Coherent detection can be used for optical OFDM where the received signal is mixed with a locally generated carrier. We study the effect of the DC bias point and the modulation index of Mach-Zehnder modulator on the BER performance of coherent optical OFDM.

JWA5

Remotely Power Assisted Optical Network Terminals in Gigabit Ethernet Passive Optical Access Scenarios, ***Giorgio Maria Tosi Beleffi**[1], Antonio Teixeira[2], Alessandro Valenti[3], Josep Prat[4], Gabriele Incenti[5], Silvia di Bartolo[5], Valeria Carrozzo[5]; [1]Ministry of Economic Development ISCTI, Italy, [2]Inst. de Telecomunicacoes, Portugal, [3]Fondazione Ugo Bordoni, Italy, [4]Univ. Politecnica de Cataluna, Spain, [5]Univ. of Tor Vergata, Italy.* In this paper we experimentally analyze the possibility to remotely assist, both in terms of voltage and optical carrier, a gigabit ethernet optical network unit device.

Hebel	Thoma	Mombert	Weinbrenner Conference Room
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors	Joint

BWD • Material Photosensitivity—Continued

BWD6 • 17.30

Development of Photosensitive Glasses for Direct Laser Writing, ***Kevin Bourhis***[1], *Thierry Cardinal*[1], *Mona Treguer*[1], *Philippe Vinatier*[1], *Jean-Jacques Videau*[1], *Arnaud Royon*[2], *Lionel Canioni*[2], *David Talaga*[3], *Marc Dussauze*[3], *Vincent Rodriguez*[3], *Laurent Binet*[4], *Daniel Caurant*[4], *Jiyeon Choi*[5], *Martin Richardson*[5]; [1]*Inst. de Chimie de la Matière Condensée de Bordeaux, Univ. de Bordeaux, France,* [2]*Ctr. de Physique Moléculaire Optique et Hertzienne, Univ. de Bordeaux, France,* [3]*Inst. des Sciences Moléculaires, Univ. de Bordeaux, France,* [4]*École Nationale Supérieure de Chimie de Paris, France,* [5]*CREOL, College of Optics and Photonics, Univ. of Central Florida, USA.* Luminescent silver clusters can be locally formed thanks to multi-photon absorption using high repetition rate femtosecond laser. The optical properties are strongly related to the glass composition and structure.

BWD7 • 17.45

3-D Reconstruction of Complex Dielectric Function of the Glass during the Femtosecond Micro-Fabrication, ***Alexander V. Turchin***[1,2], *Mykhaylo Dubov*[2], *John A. R. Williams*[2]; [1]*Inst. of Physics, Natl. Acad. of Sciences of Ukraine, Ukraine,* [2]*Aston Univ., UK.* We measure complex amplitude of scattered wave in the far field, and justify theoretically and numerically solution of the inverse scattering problem. This allows single-shot reconstructing of dielectric function distribution during direct femtosecond laser micro-fabrication.

NWD • Microstructures and Parametric Devices—Continued

NWD6 • 17.30

Tunable High-Power Continuous-Wave OPO Using a Volume Bragg Grating, ***Mikael Siltanen***, *Markku Vainio, Lauri Halonen; Univ. of Helsinki, Finland.* We have succesfully built a continuous-wave optical parametric oscillator that uses a volume Bragg grating. It produces a tunable, single-frequency, and high-power beam in the middle infrared region.

NWD7 • 17.45

Nonlinear Spectral Broadening of Femtosecond Pulses in Solid-Core Photonic Bandgap Fibers, ***Vincent Pureur,*** *John M. Dudley; Inst. FEMTO-ST, Dept. d'Optique P. M. Duffieux, Univ. de Franche Comté, France.* Nonlinear spectral broadening in solid core bandgap fibers are investigated by a frequency-domain approach. We study the frequency-dependent influence of effective area, dispersion and losses and investigate nonlinear spectral energy transfer between adjacent photonic bandgaps.

JWA • ANIC/SOLED Joint Poster Session—Continued

JWA6

Evaluation of Color Reproduction by OLEDs and wLEDs Technologies, ***Esther Perales***, *Elísabet Chorro, Valentín Viqueira, Francisco Martínez-Verdú; Univ. of Alicante, Spain.* We focus on a methodology useful to know the abilities of the LEDs and OLEDs technology to improve the colorimetric quality of displays and light sources based on the calculation of the theoretical color solid.

JWA7

Synthesis, Characterization and Electroluminescence of Polyfluorene Copolymers with Phenothiazine Derivatives; Their Application to White- and Red-Emitting Pleds, ***Moo-Jin Park***[1], *Hong-Ku Shim*[2]; [1] *Polymer Science and Engineering Program, KAIST, Republic of Korea,* [2] *Dept. of Chemistry, KAIST, Republic of Korea.* New polyfluorene copolymers containing phenothiazine derivatives have been designed, synthesized, and characterized. Synthesized copolymers, PFPCVBs and PFPTRs, are shown that their CIE coordinate values are very close to the standard white and red emission respectively.

JWA8

Transient Characteristics of CBP:Ir(ppy)$_3$-Based Organic Light Emitting Diodes under High Voltages, ***Kenichi Kasahara***[1], *Yoshihiko Sakuma*[1], *Akihiko Teramura*[1], *Takashi Saito*[1], *Takeo Otsuka*[2], *Nobuhito Miura*[2]; [1]*Ritsumeikan Univ., Japan,* [2]*Kaneka Corp., Japan.* The overshoot characteristics of CBP:Ir(ppy)$_3$-based phosphorescent organic light emitting diodes were studied by using the double-pulse excitation method and changing the bias voltage. This provided knowledge on the carrier dynamics occurring in devices.

JWA9

Electrical Characterization of NIR OLED Fabricated Using a Linear Oligomer, ***Mohamamd Taghi Sharbati***, *Farzin Emami, Mohammad Navid Soltani-Rad; Shiraz Univ. of Technology, Islamic Republic of Iran.* In this study we have fabricated a single-layer NIR OLED by a new luminescent material. The characteristics of this diode is considered at different thicknesses. Electroluminescence is observed with the peak at 790 nm.

JWA10

Luminescence Properties of Nanoscale Y_2O_3:Nd^{3+} Phosphors, ***Gökhan Bilir***, *Gönül Özen; İstanbul Technical Univ., Turkey.* The Y_2O_3:Nd^{3+} nanophosphors were synthesized for different Nd^{3+} concentrations by thermal decomposition method. Luminescence measurements were performed at room temperature. Dependence of the integrated luminescence intensities on the Nd^{3+} concentration and structural properties were studied.

Thoma	Scheffel	Clubraum	Room 2.05
Nonlinear Photonics	Access Networks and In-house Communications	Signal Processing in Photonic Communications	Solid-State and Organic Lighting

7.00–17.30 Registration Open, *Main Foyer*

8.00–10.00
NThA • Materials and Devices for All-Optical Processing
Presider to Be Announced

NThA1 • 8.00 Invited
Progress on High Power Supercontinuum Generation in Optical Fibers, *Jeff Nicholson*; *OFS Labs, USA*. Recent progress on high power supercontinuum generation in optical fibers is reviewed.

NThA2 • 8.30
Selectively Filled Photonic Crystal Fibers, *Marius Vieweg*, *Timo Gissibl, Harald Giessen; 4th Physics Inst. and Res. Ctr. SCOPE, Univ. of Stuttgart, Germany.* We present a new technique to fill arbitrary patterns of a photonic crystal fiber selectively with high nonlinear liquids. Thus we can create waveguides and waveguide arrays with tailored dispersion, nonlinearity, and spatial arrangement.

NThA3 • 8.45
Multichannel Wavelength Conversion of 40Gbit/s NRZ DPSK Signals in a Highly Nonlinear Dispersion Flattened Lead Silicate Fibre, *Angela Camerlingo*, *Francesca Parmigiani, Xian Feng, Francesco Poletti, Peter Horak, Wei H. Loh, Periklis Petropoulos, David J. Richardson; Optoelectronics Res. Ctr., Univ. of Southampton, UK.* We experimentally demonstrate the wavelength conversion of three wavelength multiplexed 40 Gbit/s Differential Phase Shift Keyed (DPSK) signals in a 2.2m length of highly nonlinear, dispersion tailored W-type lead-silicate optical fibre.

NThA4 • 9.00
A Highly Birefringent Photonic Crystal Fiber Based Nonlinear Thresholding Device for OCDMA Receiver, *I. Fsaifes*[1], *S. Cordette[2], A. Tonello[1], V. Couderc[1], C. Lepers[3], C. Ware[2], P. Leproux[1], C. Buy-Lesvigne[4]; [1]Xlim Res. Inst., Univ. de Limoges, France, [2]Inst. Télécom, Télécom ParisTech, LTCI CNRS, France, [3]Inst. Télécom, Télécom SudParis, Lab CNRS SAMOVAR, France, [4]Lab APC, AstroParticule et Cosmologie, France.* We study the combination of an erbium-doped fiber amplifier with a short segment of highly birefringent photonic crystal fiber to improve the receiver performances in passive optical networks based on optical code division multiple access.

NThA5 • 9.15
Generation of High Repetition Rate (>100 GHz) Ultrastable Pulse Trains From a Coherent Optical Beat-Signal through Non-Linear Compression Using a High SBS-Threshold Fiber, *Francesca Parmigiani*[1], *Radan Slavik[1], Angela Camerlingo[1], Lars Gruner-Nielsen[2], Dan Jakobsen[2], Soren Herstrom[2], Richard Phelan[3], James O'Gorman[3], Sonali Dasgupta[1], Joseph Kakande[1], Stylianos Sygletos[4], Andrew D. Ellis[4], Periklis Petropoulos[1], David J. Richardson[1]; [1]Optoelectronics Res. Ctr., Univ. of Southampton, UK, [2]OFS, Denmark, [3]Eblana Photonics, Ireland, [4]Tyndall Natl. Inst., Univ. College Cork, Ireland.* A stable beat-signal produced by two comb-phase-locked CW lasers separated by >100 GHz is nonlinearly compressed in a high SBS-threshold highly nonlinear fibre.

8.00–10.00
AThA • Wireless Networks and Technologies
Presider to Be Announced

AThA1 • 8.00 Invited
Indoor Pico-Cellular Network Operation Based on a Simple Optical Millimeter-Wave Generation Scheme, *Nathan Gomes*, *Pengbo Shen, Jeanne James, Anthony Nkansah; Univ. of Kent, UK.* Experimental demonstrations of modulated signal transmission and pico-cellular network operation at millimeter-wave frequencies, which are based on a simple technique for millimeter-wave generation using an optical phase modulator and optical filtering, are reviewed.

AThA2 • 8.30 Invited
Microwave Photonics Solutions for in-Building Networks Signal Transmission, *Beatriz Ortega*, *Jose Mora, Mario Bolea, Fulvio Grassi, Jose Capmany; Univ. Politécnica de Valencia, Spain.* Efficient low cost solutions for UWB signal generation techniques and SCM signal transmission employing broadband sources for in-building networks based on Microwave Photonics are presented in this paper.

AThA3 • 9.00
Multiband OFDM UWB Transmission over 1-mm Core Diameter Graded-Index Plastic Optical Fiber, *Hejie Yang[1], Yan Shi[1], Wenrui Wang[1,2], Chigo Okonkwo[1], Henrie van den Boom[1], Ton Koonen[1],* ***Eduward Tangdiongga*[1]**; *[1]COBRA Res. Inst., Eindhoven Univ. of Technology, Netherlands, [2]Tianjin Univ., China.* Multiband OFDM UWB transmission over 1-mm core diameter graded-index plastic optical fiber is demonstrated using a low-cost and off-the-shelf transceiver. We obtain overall EVM penalties of less than 7 dB for 50-m plastic optical fiber.

AThA4 • 9.15
100 GHz Wireless on-off-Keying Link Employing All Photonic RF Carrier Generation and Digital Coherent Detection, *Rakesh Sambaraju*[1], *Darko Zibar[2], Antonio Caballero[2], Idelfonso T. Monroy[2], Ruben Alemany[1], Javier Herrera[1]; [1]Valencia Nanophotonics Technology Ctr., Spain, [2]DTU Fotonik, Technical Univ. of Denmark, Denmark.* 5 Gb/s wireless signals at 82, 88 and 100 GHz carrier frequencies are successfully generated by heterodyne mixing of two optical carriers. A photonic detection technique with optical coherent receiver and digital signal processing is implemented for signal demodulation.

8.30–10.00
SPThA • Forward Error Correction
Moshe Nazarathy; Technion - Israel Inst. of Technology, Israel, Presider

SPThA1 • 8.30 Tutorial
DSP Based Enhanced FEC for 100G Optical Transmission, *Kiyoshi Onohara*; *Mitsubishi Electric Corp., Japan.* We review the deployment history of FECs. Soft decision FEC classified as third generation for 100G transport systems is discussed. An overview of FECs for upcoming multi-level modulation based digital coherent receivers is also discussed.

SPThA2 • 9.15
Iterative forward Error Correction Decoding for Spectral Efficient Optical OFDM Transmission Systems, *Thorstern H. Lotz*, *Ralph Urbansky, Wolfgang Sauer-Greff; Technische Univ. Kaiserslautern, Germany.* Increasing demands of achieving higher bit-rates requires operating at high spectral efficiency, which makes FEC coding inevitable. In this contribution we combine an optical OFDM transmission system with a capacity approximating FEC technique called BICM-ID.

8.30–10.00
SOThA • SOLED Postdeadline Session

Presentations to Be Announced

Thoma

Nonlinear Photonics

NThA • Materials and Devices for All-Optical Processing—Continued

NThA6 • 9.30

True Time Reversal via Dynamic Brillouin Gratings in Polarization Maintaining Fibers, ***Sanghoon Chin***[1], *Nikolay Primerov*[1], *Kwang Yong Song*[2], *Luc Thevenaz*[1], *Marco Santagiustina*[3], *Leonora Ursini*[3]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland,* [2]*Chung-Ang Univ., Republic of Korea,* [3]*Univ. of Padova, Italy.* A novel technique to realize true time reversal of an optical signal, using dynamic Brillouin gratings in high-birefringence fibers, is proposed. A data sequence of optical pulses with 2-ns duration was efficiently time-reversed.

NThA7 • 9.45

Nonlinear Optical Properties of PbS and PbSe Quantum Dots, ***Gero Nootz***[1,2], *Lazaro A. Padilha*[1], *Scott Webster*[1], *David J. Hagan*[1,2], *Eric W. Van Stryland*[1,2], *Larissa Levina*[3], *Vlad Sukhovatkin*[3], *Edward H. Sargent*[3]; [1]*CREOL, Univ. of Central Florida, USA,* [2]*Physics Dept., Univ. of Central Florida, USA,* [3]*Edward S. Rogers Sr. Dept. of Electrical and Computer Engineering, Univ. of Toronto, Canada.* We measure the size dependent two-photon absorption (2PA) and multi-exciton generation (MEG) efficiency in lead-salt quantum dots (QD). The results are discussed in view of the uniquely symmetric band structure of these materials.

Scheffel

Access Networks and In-house Communications

AThA • Wireless Networks and Technologies—Continued

AThA5 • 9.30

Experimental Demonstration of 2 Gbps IR-UWB over Fiber Using a Novel Pulse Generation Technique, ***S. T. Abraha***, *C. M. Okonkwo, A. M. J. Koonen, E. Tangdiongga; COBRA Res. Inst., Electro-Optical Communication Systems, Eindhoven Univ. of Technology, Netherlands.* We propose novel generation technique of IR-UWB pulse by combining two monocycles using different pulse-shaping factors. We experimentally demonstrate DSP based BER measurement of 2 Gbps IR-UWB over 25 km single-mode fiber for access networks.

AThA6 • 9.45

Effect of Multi-Channel MB-OFDM UWB Radio-over-Fiber Transmission Using Polarization Multiplexed Distribution in FTTH Networks, ***Maria Morant***, *Joaquin Pérez, Roberto Llorente; Valencia Nanophotonics Technology Ctr., Univ. Politécnica de Valencia, Spain.* The effect of multi-channel MB-OFDM ultra-wideband radio-over fiber transmission using polarization multiplexing is experimentally analyzed. 25 km SSMF reach is achieved with 1.2% EVM distortion when transmitting three multiplexed channels with 0.7576 Bit/s/Hz spectral efficiency.

Clubraum

Signal Processing in Photonic Communications

SPThA • Forward Error Correction—Continued

SPThA3 • 9.30 Invited

Rate-Adaptive Coding for Optical Fiber Transmission Systems, *Gwang-Hyun Gho,* ***Joseph Kahn***; *Stanford Univ., USA.* Future networks may employ rate adaptation, e.g., extending reach where regeneration is unavailable. Fixed-symbol-rate PM-QPSK with variable-rate codes yields bit rates of 100/50/25 Gbit/s over distances of 2000/3000/4000 km. Results are compared to information-theoretic limits.

Room 2.05

Solid-State and Organic Lighting

SOThA • SOLED Postdeadline Session—Continued

Main Foyer

Joint

8.30–10.00
JThA • BGPP/SENSORS Joint Poster Session

JThA1

Porphyrin Self-Assembled Monolayers (SAM) Covering Curved Surfaces of Tapered Optical Fibers Acidic Media Sensor, ***Alexei Veselov***[1], *Christoph Thür*[2], *Alexander Efimov*[1], *Mircea Guina*[2], *Helge Lemmetyinen*[1], *Nikolai Tkachenko*[1]; [1]*Tampere Univ. of Technology, Finland,* [2]*Optoelectronics Res. Ctr., Tampere Univ. of Technology, Finland.* Photochemical and physical-properties of tapered-fibers covered with free-base-porphyrin films prepared by self-assembled monolayer (SAM) deposition method are reported. Detection of different hydrochloric-acid-concentrations has been carried out. Photoactive-materials as porphyrin-molecules, hold promise for development of chemical-sensors.

JThA2

Simulation of Liquid Crystal Infiltrated Photonic Crystal Fibers Using the Fourier Modal Method, ***Thomas Zebrowski***, *Sabine Essig, Kurt Busch; Karlsruhe Inst. of Technology, Germany.* We present the Fourier Modal Method (FMM) and demonstrate its capabilities to accurately simulate photonic crystal waveguide problems incorporating inhomogeneous, fully anisotropic materials.

JThA3

Experimental FBG Sensing System and FEA for the Analysis of Dental Macro Implants, ***Paulo A. Lopes***, *Ilda Abe, Marcelo W. Schiller; Dept. de Fisica, Univ. de Aveiro, Portugal.* In this work Fiber Bragg Grating sensors (FBG) are used to assess the strain profile of a dental macro-model system under external loads and the results are compared to the corresponding Finite Element Analysis (FEA).

JThA4

Performance Evaluation of Temperature Sensing System Based on Distributed Anti-Stokes Raman Thermometry, *Amitabha Datta, Bharath Kumar Lagishetty,* ***Balaji Srinivasan***; *Indian Inst. of Technology-Madras, India.* We have reported an improved theoretical model and algorithm for performance evaluation of distributed temperature sensing system based on Raman scattering in optical fibers which is validated by experimental result.

JThA5

Analysis of Multi-Reflection Crosstalk for a Quasi-Distributed Fiber Sensor Interrogated by Coherent-Optical Frequency Domain Reflectometer (C-OFDR), ***Kivilcim Yuksel***, *Marc Wuilpart, Patrice Mégret; Univ. of Mons, Belgium.* We analyze the influence of the three-reflection component of the multi-reflection crosstalk on the SNR of a quasi-distributed fiber sensor to determine the maximum number and reflectivity of sensing points for a given SNR.

JThA6

High-Q Polymeric Microcavities towards Biosensing Applications, ***Tobias Grossmann***[1,2], *Mario Hauser*[1], *Simone Schleede*[1], *Julian Fischer*[1], *Torsten Beck*[1], *Heinz Kalt*[1], *Christoph Vannahme*[2,3], *Timo Mappes*[2], *Richard Diehl*[4], *Kurt Busch*[4]; [1]*Inst. für Angewandte Physik, Karlsruhe Inst. of Technology, Germany,* [2]*Inst. für Mikrostrukturtechnik, Karlsruhe Inst. of Technology, Germany,* [3]*Lichttechnisches Inst., Karlsruhe Inst. of Technology, Germany,* [4]*Inst. für Theoretische Festkoerperphysik, Karlsruhe Inst. of Technology, Germany.* We report on high-Q conical microresonators made of poly(methyl methacrylate) (PMMA) towards biosensing applications. Simulations of the 'whispering gallery' modes (WGMs) of the cavities are performed with the Discontinuous Galerkin Time-Domain (DGTD) method.

JThA7

Influence of the Volume Speckle in Fiber Specklegram Sensors Based on Photorefractive Crystals, ***Jorge A. Gómez***[1,2], *Ángel Salazar*[2]; [1]*Politécnico Colombiano JIC, Colombia,* [2]*Univ. Pontificia Bolivariana, Colombia.* The Influence of volume speckle in a fiber specklegram sensor based on a BSO photorefractive crystal is experimentally demonstrated. A strong effect on the contrast in a double exposure system is experimentally observed and reported.

JThA8

An Auto-Synchronous Optical Chopper for Broad Spectrum Detection of Delayed Luminescence, ***Russell E. Connally***; *Macquarie Univ., Australia.* An auto-synchronous optical chopper (ASOC) enabled real-time detection of delayed luminescence. Europium labeled Giardia cysts were temporally resolved from adjacent autofluorescent algae with a signal-to-noise ratio better than 114:1 in 100 ms.

JThA9

Investigation of a Multi-Point Acetylene Sensing System Employing Dense Wavelength Division Multiplexers, ***Kuanglu Yu***[1], *Chongqing Wu*[1], *Zhi Wang*[1], *Yongjun Wang*[2], *Meirong Shi*[1]; [1]*Inst. of Optical Information, Beijing Jiaotong Univ., China,* [2]*School of Electronic Engineering, Beijing Univ. of Posts and Telecommunications, China.* A simple acetylene sensing system, which do not need to modulate the light source, is put forward. We experimentally demonstrated a three sensors system, and the measured results have excellent agreements with theoretical predictions.

JThA10

Index of Refraction Sensors: Virtually Unlimited Sensing Power at Critical Angle, ***Ruggero Micheletto***, *Hikaru Ishii; Yokohama City Univ., Japan.* We demonstrate analytically that discontinuity at critical angle can be used to reach extremely high sensitivities against any optical properties that modify this angular value. Real test sensors data will be discussed in details.

JThA • BGPP/SENSORS Joint Poster Session—Continued

JThA11
Detection of Explosive Vapors: Development and Performances of an Optical Sensor, *Thomas Caron[1], Simon Clavaguera[1], **Pierre Montméat**[1], Eric Pasquinet[1], François Perraut[2], Philippe Prené[1]; [1]CEA-DAM, France, [2]CEA-DRT, France.* This paper describes a device dedicated to the detection of nitroaromatic explosives such as trinitrotoluene (TNT) consisting of a portable detector based on a specific fluorescent material.

JThA12
Temperature Independent Fiber Bragg Current Sensing for High Voltage Power Transmission Utilizing LED Source, ***Ronald Barnes**, Amin Moghadas, Mehdi Shadaram; Univ. of Texas at San Antonio, USA.* Proposed is a novel solution for current measurement using a Terfenol-D coated Fiber Bragg Grating that responds to magnetically induced strain produced by current inside power lines. Through adaptive filtering, temperature independence is achieved.

JThA13
Investigation of Coal Gasification through Distributed Temperature Sensing Using Fiber Bragg Gratings, *A. V. Harish[1], Jayasubramanian Ragahavendran[1], Sateesh Daggupati[2], Preeti Aghalayam[2], **Balaji Srinivasan**[1]; [1]Indian Inst. of Technology-Madras, India, [2]Indian Inst. of Technology-Bombay, India.* We have explored the possibility of distributed temperature sensing using fiber Bragg gratings for the study of coal gasification. A laboratory model has been constructed to carry out such studies and the corresponding distributed temperature sensing results are reported.

JThA14
Wavelength-Dependent Attenuation Changes during Distributed Temperature Sensing in a Hot Geothermal Well, ***Thomas Reinsch**, Jan Henninges; Helmholtz Ctr. Potsdam, Germany.* Within this study, a novel fibre optic wellbore cable was tested and deployed within a hot geothermal well in Iceland. Attenuation measurements at ordinary telecommunication wavelengths were used to evaluate hydrogen ingression into the fibre.

JThA15
Improvement of Phase Measuring Range Finding Systems through New Analog, High Power Laser Diode Driver, ***Andreas Streck**[1], Christoph Orsinger[2], Armin Wagner[2], Wilhelm Stork[1]; [1]Karlsruhe Inst. of Technology, Germany, [2]Elovis GmbH, Germany.* A new laser driver is presented for direct analog modulation of high power laser diodes and it is shown how the performance of laser range finders can therewith be optimized, especially for scanning (2-D) systems.

JThA16
Surface Plasmon Resonance (SPR) Sensor for Small Cations Detection, ***M. Benounis**[1], N. Jaffrezic-Renault[2], I. Dumazet-Bonnamour[2], R. Lamartine[2]; [1]LAIGM, Ctr. Univ. de Khenchela, Algeria, [2]CPE, Univ. Claude Bernard, France.* Chemical-sensor for alkali-ions-detection based on SPR-phenomenon was elaborated by using a gold-thin-film, of which surface was modified with a Calix[4]arene-SAM. The sensor shows high-sensitivity and low-detection-limit for different alkali-ions.

JThA17
Experimental Testify of Enhanced Rotation Sensing in a Fiber Ring Resonator, ***Yundong Zhang**, He Tian, Xuenan Zhang, Hao Wu, Jing Zhang, Ping Yuan; Harbin Inst. of Technology, China.* We demonstrate the differential of the phase difference introduced by the rotation is proportional to the group index, and thus we can obtain large rotation sensitivity in the slow-light structure with high dispersion.

JThA18
A Simple Demodulation Method for FBG Sensor Using Narrow Band Wavelength Tunable DFB Laser, ***Anlin Yi**, Lianshan Yan, W. Pan, B. Luo; Southwest Jiaotong Univ., China.* We demonstrate a simple demodulation method for FBG temperature sensor through temperature-controlled wavelength scanning of a DFB laser. Such method may suit for applications requiring moderate resolution and low cost implementations.

JThA19
An Iterative Method for Accuracy Improvement in Brillouin Distributed Fiber Optic Temperature and Strain Sensor, *Lida Safaei[1], **Fatemeh Maasoumi**[2], Ayoob Moosavi[2], Seied Mohammad Mirza Bagher Barzy[1], Ali Reza Bahrampour[3]; [1]Shahid Bahonar Univ., Islamic Republic of Iran, [2]Intl. Ctr. for Science and High Technology and Environmental Science of Mahan, Islamic Republic of Iran, [3]Sharif Univ. of Technology, Islamic Republic of Iran.* In this paper the system of governing equations of the BOTDA fiber temprature sensor is reduced to a pair of coupled integral equations. An iterative method for the solution of the system is introduced.

JThA20
Asymmetries of Spontaneous Raman Scattering in Optical Fibers for the forward-backward Directions, ***Livia Ribeiro**[1], Antonio de Toledo[2], João Rosolem[3], Claudio Floridia[3]; [1]Inst. Nacional de Pesquisas Espaciais, Brazil, [2]Inst. de Estudos Avançados, Brazil, [3]Fundação Ctr. de Pesquisa e Desenvolvimento em Telecomunicações, Brazil.* We have measured spontaneous Raman scattering versus pumping, in a standard optical fiber, for forward and backward directions. Directional asymmetries related with full-width at half maximum, crosstalk wavelengths intensities and scattered Raman power are discussed.

JThA21
Polarisation Dependence in Thermally Poled Twin-Hole Silica Fibre, ***Andrew M. Michie**[1,2], Simon Fleming[1], Honglin An[1], Ian Bassett[1]; [1]Inst. of Photonics and Optical Science, School of Physics, Univ. of Sydney, Australia, [2]Interdisciplinary Photonics Labs, School of Chemistry, Univ. of Sydney, Australia.* A hypothesis is presented based on the distribution of the frozen-in electric field around the core that qualitatively explains the smaller than expected polarisation dependence observed in thermally poled twin-hole silica fibre.

JThA22
Grating Writing and Growth at 325nm in Non-Hydrogenated Silica Fiber, ***Graham E. Town**[1], Wu Yuan[2], Alessio Stefani[2], Ole Bang[2]; [1]Macquarie Univ., Australia, [2]Danish Technical Univ., Denmark.* We report on the writing and growth dynamics of Bragg gratings written in standard silica fiber using a 325nm He:Cd laser.

JThA23
Mechanism of Type IIA Photosensitivity in Optical Fibers, ***Mikhail Shlyagin**[1], Sergei Kukushkin[2]; [1]CICESE, Mexico, [2]Inst. of Problems of Mechanical Engineering, Russian Acad. of Sciences, Russian Federation.* Formation of the type IIA Bragg gratings in germanosilicate optical fibers is studied. A mechanism for the type IIA photosensitivity is proposed which is based on nucleation and evolution of nanopores from vacancy-type defects.

JThA24
Line by Line Fiber Bragg Grating by Femtosecond Laser, ***Kaiming Zhou**, Chengbo Mou, Mykhaylo Dubov, Lin Zhang, Ian Bennion; Photonics Res. Group, Aston Univ., UK.* 4th order fibre Bragg grating was made line by line using femtosecond laser. Strong attenuation (~16dB) and low insertion loss (~0.5dB) were obtained with 2000 periods. High thermal annealing showed it can survive at 800°C.

JThA25
Tailoring of the Luminescence Properties of a Silver and Zinc Phosphate Glass at the Nanoscale, *Kevin Bourhis[1], **Thierry Cardinal**[1], Mona Treguer[1], Jean-Jacques Videau[1], Arnaud Royon[2], Lionel Canioni[2], David Talaga[3], Marc Dussauze[3], Vincent Rodriguez[3], Laurent Binet[4], Daniel Caurant[4], Jiyeon Choi[5], Martin Richardson[5]; [1]Inst. de Chimie de la Matière Condensée de Bordeaux, Univ. de Bordeaux, France, [2]Ctr. de Physique Moléculaire Optique et Hertzienne, Univ. de Bordeaux, France, [3]Inst. des Sciences Moléculaires, Univ. de Bordeaux, France, [4]École Natl. Supérieure de Chimie de Paris, CNRS, France, [5]CREOL, College of Optics and Photonics, Univ. of Central Florida, USA.* Fluorescent nanostructures have been written using a femtosecond laser in a glass below the diffraction limit. They are composed of silver clusters. The process enables writing and erasing infinite 3-D features at the nanometric scale.

JThA26
Fiber Bragg Grating Inscription with Ultraviolet Femtosecond Radiation and Two Beam Interference in Germanium-Free Fibers, ***Martin Becker**, Sven Brückner, Eric Lindner, Martin Leich, Manfred Rothhardt, Hartmut Bartelt; Inst. of Photonic Technology, Germany.* Fiber Bragg grating inscription with ultraviolet femtosecond exposure and two beam interference allows Bragg gratings in materials which do not show conventional photosensitivity. Gratings in suspended core fibers and rare earth doped fibers are demonstrated.

JThA27
Withdrawn

JThA28
Direct Laser Written Multimode Waveguides for Astronomical Applications, ***Nemanja Jovanovic**[1,2], Simon Gross[1,3], Christopher Miese[1,3], Alexander Fürbach[1,3], Jon Lawrence[1,2], Michael Withford[1,3]; [1]Macquarie Univ., Australia, [2]Anglo Australian Observatory, Australia, [3]CUDOS, Macquarie Univ., Australia.* With the goal of creating integrated photonic devices which are compatible with existing multimode fibers used on large telescopes, we present a detailed characterization of the largest multimode guides inscribed by the direct write technique.

JThA29
Contrast Dependence of the Thermal Stability in Type I Fiber Bragg Gratings, *Matthieu Lancry[1], David Ramecourt[2], Dominique Razafimahatratra[2], **Sylvain Costes**[1], Marc Douay[2], Bertrand Poumellec[1]; [1]Univ. Paris-Sud, France, [2]Univ. des Sciences et Techniques de Lille, France.* We investigate the contrast and strength dependence of Bragg gratings thermal stability written in H_2-loaded SMF28 fibers using cw244nm laser. Our observations are discussed within the frame of physically stated model for predicting the grating lifetime from the experimental raw data.

JThA30
Effects of Phase and Amplitude Noise on π Phase-Shifted DFB Raman Fibre Lasers, ***Jindan Shi**; Optoelectronics Res. Ctr., Univ. of Southampton, UK.* We show that π phase-shifted Distributed Feedback (DFB) Raman fibre lasers of 30cm length are resilient against phase and amplitude errors up to ~5%, with negligible deterioration of the threshold and slope-efficiency of the lasers.

JThA31
Towards Second Harmonic Generation Micropatterning of Glass Surface, ***Aurelien Delestre**[1], Michel Lahaye[1], Evelyne Fargin[1], Matthieu Bellec[2], Arnaud Royon[2], Lionel Canioni[2], Marc Dussauze[3], Frédéric Adamietz[3], Vincent Rodriguez[3]; [1]Inst. de Chimie de la Matière Condensée de Bordeaux, Univ. de Bordeaux, France, [2]Ctr. de Physique Moléculaire Optique et Hertzienne, Univ. de Bordeaux, France, [3]Inst. des Sciences Moléculaires, Univ. de Bordeaux, France.* Silver layer laser micro-patterning and poling process on glasses allows structured second order NLO properties. Such effect is related to a modulation of the electrostatic field distribution within the structured poled region.

JThA32
Fiber Bragg Grating Filter for Spectral Reshaping of Directly Modulated Laser Diode with 10 Gbit/s NRZ-OOK Modulation Format, ***Alexander Siekiera**, Rainer Engelbrecht, Bernhard Schmauss; Erlangen Graduate School in Advanced Optical Technologies, Univ. of Erlangen, Germany.* Spectral reshaping of a directly modulated laser diode by a FBG improves transmission capacity in optical links without dispersion compensation. Simulation results for the transmission properties at 10Gbit/s are presented for single-channel and multi-channel filters.

JThA33
An Electro-Optically Tunable Bragg Reflector in a Liquid Crystal Waveguide, ***Giovanni Gilardi**, Rita Asquini, Antonio d'Alessandro, Gaetano Assanto; Univ. of Rome, Italy.* A distributed feedback guided-wave device is proposed and analyzed numerically in liquid crystals with a tuning range exceeding 100 nm. The performance of the structure is evaluated, demonstrating an efficient Bragg reflector with voltage-tunable resonance.

JThA • BGPP/SENSORS Joint Poster Session—Continued

JThA34
Electrically Tunable Photonic True-Time-Delay Line, *Yuri Barmenkov*[1], *José Luis Cruz[2], Antonio Diez[2], Miguel Andres[2]; [1]Ctr. de Investigaciones en Optica, Mexico, [2]Dept. de Física Aplicada, ICMUV, Univ. de Valencia, Spain.* We discuss a new application of the acousto-optic superlattice modulation in fiber Bragg grating for photonic true-time-delay (PTTD) lines. The proposed PTTD scheme is capable to vary a group delay in the range of hundreds of picoseconds.

JThA35
Sapphire Thermal Radiation Sensor Based on Femtosecond Induced Bragg Gratings, *Dan Grobnic*, *Stephen J. Mihailov, Christopher Smelser; Communications Res. Ctr. Canada, Canada.* Bragg gratings inscribed in sapphire fiber greatly enhance the thermal radiation guided in the sapphire fiber from a micro- furnace. The thermal radiation spectrum contains spectral information about the Bragg grating.

JThA36
Low-Cost, High-Resolution Strain Sensor for Wind Turbine Applications, *Lars Glavind*[1], *Ib Svend Olesen[1], Morten Thøgersen[1], Bjarne Funch Skipper[2], Martin Kristensen[2]; [1]Vestas Wind Systems A/S, Denmark, [2]Aarhus School of Engineering, Denmark.* We present a low cost optical strain sensor system based on ratio-metric detection used in wind turbine applications. The experiments demonstrate significant improvement of the system's resolution for this application.

JThA37
Fibre Bragg Gratings Characteristics for Temporal Spectral Astronomy, *Geraldine Mariën*[1,2], *Jon Lawrence[1], Nick Cvetojevic[1], Nemanja Jovanovic[1], Judith Dawes[1], Quentin Parker[1], Michael Withford[1], Jon Lawrence[2], Nemanja Jovanovic[2], Roger Haynes[2], Nick Cvetojevic[2]; [1]Macquarie Univ., Australia, [2]Anglo Australian Observatory, Australia.* Fibre Bragg gratings offer the potential for the detection of fast variations in intensity and wavelength of spectral lines of an astronomical source with high resolution. The specific FBG parameters and science requirements are presented.

JThA38
Phase Shift Induced by the Piezoelectric Transducer in a Linearly Chirped Fiber Bragg Grating and Its Application to Fiber Ring Laser, *Hongpu Li*[1], *Xuxing Chen[1], Yves Painchaud[2]; [1]Shizuoka Univ., Japan, [2]TeraXion Inc., Canada.* A simple method enabling to generate a stable and controllable phase shift in a linearly chirped FBG is demonstrated. Based on this kind of FBG, a single-longitudinal-mode Erbium-doped fiber ring laser is also demonstrated.

JThA39
Thermal Distribution across an N_2 Curtain along an MCVD Preform during Thermal Processing with a H_2O_2 Burner Using a Regenerated FBG Array, *Albert Canagasabey[1], Kevin Cook[2], Yang Liu[1], Mattias Aslund[2], Amer Ghias[1],* ***Gang-Ding Peng***[1], *John Canning[2]; [1]Univ. of New South Wales, Australia, [2]Univ. of Sydney, Australia.* A regenerated FBG array was used to profile the temperature across an N_2 curtain along an MCVD preform during heating with the burner. The N_2 curtain had no cooling effect on the tube.

JThA40
Optimization of Optical Equalization of Group Delay Ripple-Induced Penalties from Fiber Bragg Gratings in 112 Gbit/s Metro Networks, ***Matthias Westhäuser***[1], *Christian Remmersmann[1], Stephan Pachnicke[1], Bengt Johansson[2], Peter M. Krummrich[1]; [1]Lehrstuhl für Hochfrequenztechnik, Germany, [2]Proximion Fiber Systems AB, Sweden.* We investigate the performance of optical equalization of GDR-induced penalties from chirped fiber Bragg gratings (CFBGs) in 112 Gbit/s metro networks using FIR filters. The GDR-induced mean OSNR penalties are reduced to <0.2 dB.

JThA41
Single Polarisation Output of Erbium-Doped Fibre Ring Laser Utilising a Small Tilted Fibre Grating Structure, *Pouneh Saffari,* ***Chengbo Mou****, Lin Zhang, Ian Bennion; Photonics Res. Group, School of Engineering and Applied Science, Aston Univ., UK.* Single polarisation operation of a fibre ring laser was realised by employing an intra-cavity 9.3°-tilted fibre Bragg grating as an in-fibre polariser. The laser showed a polarisation-extinction-ratio of ~ 31dB with a good stability.

JThA42
Spectral Superresolution with a Thermally Tuned Sampled Fiber Bragg Grating, *Naum K. Berger*; *Technion – Israel Inst. of Technology, Israel.* We propose and numerically demonstrate a method for at least a ten-fold enhancement of the resolution of optical spectrum analyzers. The light to be measured is reflected from a thermally tuned sampled fiber Bragg grating.

JThA43
Infrared Surface Plasmon Resonance on Subwavelength Periodic Metallic Gratings in Fiber-Optic Sensors, *Sookyoung Roh*, *Hwi Kim, Dongho Oh, Byoungho Lee; Seoul Natl. Univ., Republic of Korea.* Infrared surface plasmon resonance on subwavelength periodic metallic grating structures is investigated numerically. Optimal structural conditions of proposed metallic grating structure for high performance infrared surface plasmon fiber sensor application are analyzed.

JThA44
Noise Improvement of a Bragg Grating Fibre Laser Hydrophone System with Referencing Configuration, *Andrew Michie[1,2], David Jones[3],* ***David Hsiao-Chuan Wang***[1], *David Mann[3], Mattias L. Åslund[2], Simon Fleming[1], John Canning[2]; [1]Inst. of Photonics and Optical Science, Univ. of Sydney, Australia, [2]Interdisciplinary Photonics Labs, Univ. of Sydney, Australia, [3]Thales Underwater Systems, Australia.* A DFB Bragg grating laser is used as a referencing element within a DFB fibre laser hydrophone array system to compensate for the interferometric drift noise of the demodulation mechanism. Preliminary test result shows an improvement of (20-30) dB.

JThA45
TeO_2-WO_3 and TeO_2-CdO-WO_3 Glasses Doped with Er^{3+} Ions for 1.5μm Optical Amplifiers, *Gökhan Bílír*, *Gönül Özen; İstanbul Technical Univ., Turkey.* Absorption and luminescence spectra of Er^{3+} ions doped TeO_2-CdO-WO_3 glasses were measured. Radiative lifetimes were determined using the Judd-Ofelt parameters. Stimulated absorption and emission cross-sections were determined.

JThA46
Arrayed Waveguide Gratings for Astronomical Applications, *Nick Cvetojevic*[1], *Nemanja Jovanovic[1], Jon Lawrence[1], Joss Bland-Hawthorn[2], Roger Haynes[3]; [1]Macquarie Univ., Australia, [2]Univ. of Sydney, Australia, [3]Astrophysikalisches Inst. Potsdam, Germany.* We discuss the modifications necessary to make a commercially-available telecommunications-grade arrayed waveguide grating more favourable for the field of astronomy. The parameters that are discussed include the free-spectral-range, resolution and diffraction order of the device.

JThA47
Fabrication of Large Grating Structures, *Dmitrii Stepanov*; *Dioli Pty Ltd., Australia.* We demonstrate an interferometric method of fabricating extended periodic structures on planar substrates. Translation errors are compensated using phase control of the interfering beams, and seamless transverse stitching of the periodic structures is achieved.

JThA48
Controlling the Properties of Fiber Bragg Gratings by Using Acoustic Waves, *Roberson A. Oliveira*[1,2], *Kevin Cook[2], John Canning[2], Alexandre A. P. Pohl[1]; [1]Federal Univ. of Technology, Brazil, [2]iPL – interdisciplinary Photonics Lab, Australia.* Tuning the properties of an acoustic wave such as the period is used to control the properties of fiber Bragg gratings including reflectivity, bandwidth and introduction of phase shifts or sidebands.

JThA49
Bragg Wavelength Shift in Fabrication of Fiber Gratings Using the Phase Mask Technique, *Héctor H. Cerecedo-Núñez*; *Faculty de Fisica e Inteligencia Artificial, Univ. Veracruzana, Mexico.* Employing a phase mask and two cylindrical lenses in fabrication of fiber gratings, and by varying some parameters of this image system, the center wavelength of the fiber gratings can be shift over 50 nm.

JThA50
Hybrid Fiber Gratings Fabrication by Self-Assembled Polymerization Using Ultraviolet Lamp without Photomask, *Hojoong Jung*[1], *Yong Gon Seo[1,2], Woosung Ha[1], Seung Han Park[1], Kyunghwan Oh[1]; [1]Yonsei Univ., Republic of Korea, [2]Energy-Nano Materials Res. Ctr., Korea Electronics Technology Inst., Republic of Korea.* We report fiber gratings which consist of a polymer core and silica cladding. The polymer core was filled in a hollow optical fiber and cured by ultraviolet lamp which induced self-assembled polymer-air periodic structures.

JThA51
Writing Dynamics Study of Long-Period Fiber Gratings Based on the Non-UV Photosensitivity Using CO_2-Laser, *Yunqi Liu*; *School of Communication and Information Engineering, Shanghai Univ., China.* We demonstrate a new method based on the writing dynamics analysis to study the physical mechanisms of long-period fiber grating. Different non-UV photosensitivities are analyzed based on the experimental results achieved from the grating inscription.

JThA52
Broadband Rejection by Periodically Stress-Induced Perturbation on a Corrugated Hollow Optical Fiber, *Woosung Ha*[1], *Sohee An[1], Hojoong Jung[1], Yongmin Jung[2], Jun Ki Kim[3], Woojin Shin[4], Ik-Bu Sohn[4], Kyunghwan Oh[1]; [1]Yonsei Univ., Republic of Korea, [2]Univ. of Southampton, UK, [3]Massachusetts General Hospital, USA, [4]Gwangju Inst. of Science and Technology, Republic of Korea.* We report broadband long-period gratings on a hollow optical fiber corrugated by a femotosecond laser. The center wavelength and the coupling strength of the peak could be controlled by changing the width of the corrugation.

JThA53
Strain Sensor Chains beyond 1000 Individual Fiber Bragg Gratings Made during Fiber Drawing, *Manfred W. Rothhardt*[1], *Martin Becker[1], Eric Lindner[1], Christoph Chojetzki[2], Hartmut Bartelt[1]; [1]Inst. of Photonic Technology Jena, Germany, [2]FBGS Technologies, Germany.* Numbers of >1000 fiber Bragg gratings have been realized in sensor fibers for monitoring applications by on-line inscription during the fiber drawing process. The method is useful for realization of strain sensor chains.

JThA54
Transmission Characteristics of Metal-Insulator-Metal Waveguide with Saw-Shaped Gratings, *Dawoon Choi*, *Sookyoung Roh, Byoungho Lee; Seoul Natl. Univ., Republic of Korea.* Transmission characteristics of metal-insulator-metal waveguide with the saw-shaped Bragg grating are analyzed by the finite elements method. We discuss the effect of structural parameters such as the width and the length of the saw-shaped grooves.

JThA55
Writing of Complex Fiber Bragg Grating Superstructures with Fiber/Phase-Mask Position Control, *Serge Doucet,* ***Sophie LaRochelle****; COPL, Univ. Laval, Canada.* We demonstrate a simple and flexible approach to make FBGs with elaborate phase functions through proper control of the relative fiber/phase mask position during the fabrication process. The technique avoids the need for complex phase masks.

10.00–10.30 Coffee Break, *Weinbrenner Conference Room*

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

10.30–12.30
BThB • Sensor and Signal Processing Applications
Kyriacos Kalli; Cyprus Univ. of Technology, Cyprus, Presider

BThB1 • 10.30 Invited
Microwave Photonics Applications of Fiber Bragg Gratings, ***Jianping Yao***; *Univ. of Ottawa, Canada.* Fiber Bragg gratings (FBGs) are widely used in microwave photonic systems. In this paper, the applications of FBGs in microwave photonic systems to achieve true-time delay beamforming, microwave filtering and arbitrary microwave generation are discussed.

BThB2 • 11.00
Electrically Controlled Long-Period Gratings for Switching Applications, *Carola Sterner[1], Zhangwei Yu[2], Oleksandr Tarasenko[1],* ***Walter Margulis***[1]; *[1]Acreo AB, Sweden, [2]Royal Inst. of Technology, Sweden.* LPGs written in fibers with internal electrodes are tuned electrically in nanoseconds and the dynamics studied. Wavelength shifts -8 nm (4.5 dB transmission change for X-polarization) and +5 nm (3 dB for y-polarization) are measured.

BThB3 • 11.15
Spectral Phase En/Decoders for OCDMA Access Network, ***I. Fsaifes***[1], *S. Cordette[2], A. Millaud[1,3], C. Lepers[4], C. Ware[2], M. Douay[1]; [1]Lab PhLAM/IRCICA, Univ. de Lille 1, France, [2]Inst. Télécom, Télécom ParisTech, LTCI CNRS, France, [3]3S PHOTONICS, France, [4]Inst. Télécom, Télécom SudParis, France.* OCDMA en/decoders based on chirped fiber Bragg grating with phase shifts are realized by using a photo-writing setup based on the travelling interference fringe method. Experimental results, both for the spectral phase en/decoders fabrication and the OCDMA system demonstration are presented and discussed.

BThB4 • 11.30
Group Delay Tuning in Phase-Shifted Chirped FBGs, ***Christophe Caucheteur***[1], *Damien Kinet[1], Arnaud Mussot[2], Alexandre Kudlinski[2], Patrice Megret[1], Miguel Gonzalez-Herraez[3]; [1]Mons Univ., Belgium, [2]Univ. Lille 1, France, [3]Univ. de Alcala, Spain.* We demonstrate that the group delay curve can be accurately controlled in thermally-tuned phase-shifted chirped FBGs. Depending on the phase-shift value, positive or negative group delay variations are obtained in a band of a few GHz.

10.30–12.30
NThB • Waveguides and Fabrication
Francesca Parmigiani; Optoelectronic Res. Ctr., Univ. of Southampton, UK, Presider

NThB1 • 10.30
Polychromatic Solitons and Symmetry Breaking in Modulated Waveguide Arrays, ***Andrey A. Sukhorukov***[1], *Xinyuan Qi[2], Ivan L. Garanovich[1], Wieslaw Krolikowski[1], Arnan Mitchell[3], Guoquan Zhang[2], Dragomir N. Neshev[1], Yuri S. Kivshar[1]; [1]Nonlinear Physics Ctr. And Laser Physics Ctr., Australian Natl. Univ., Australia, [2]Key Lab of Weak Light Nonlinear Photonics, Nankai Univ., China, [3]School of Electrical and Computer Engineering, RMIT Univ., Australia.* We study theoretically and experimentally nonlinear symmetry breaking of polychromatic beams and formation of polychromatic solitons in periodically curved waveguide arrays. Our results demonstrate new possibilities for tunable spatial filtering of supercontinuum light.

NThB2 • 10.45
Fabrication of Type I Waveguides in Highly Nonlinear SiO_2-PbO Glasses Using fs Laser Pulses at MHz Repetition Rates, ***Alexander Fürbach***[1], *Jennifer Gray[1], Simon Gross[1], Martin Rochette[2], Michael Withford[1]; [1]Macquarie Univ., Australia, [2]McGill Univ., Canada.* Symmetric waveguides that are mode-matched to standard single-mode fiber have been fabricated in SF57 with fs laser pulses at peak powers below the threshold for critical self-focusing and high repetition rates, utilizing cumulative heating effects.

NThB3 • 11.00
Production of Low Loss Highly Nonlinear Chalcogenide Glass Waveguides by Hot Embossing, *Ting Han, Steve Madden, Douglas Bulla,* ***Barry Luther-Davies***; *Laser Physics Ctr., Res. School of Physical Sciences and Engineering, Australian Natl. Univ., Australia.* We report the fabrication of rib waveguides in As-S(-Se) glasses by hot embossing. Optical losses between 0.24dB/cm in $As_{24}S_{38}Se_{38}$ and 0.5dB/cm in As_2S_3 were obtained with nonlinear parameters as high as ≈$9W^{-1}m^{-1}$.

NThB4 • 11.15
Correlated Photon Pair Generation in Chalcogenide As_2S_3 Photonic Integrated Circuits, ***Chunle Xiong***[1], *Alex Judge[1], Graham Marshall[2], Michael J. Steel[2], Benjamin J. Eggleton[1]; [1]Univ. of Sydney, Australia, [2]Macquarie Univ., Australia.* We theoretically investigate correlated photon pair generation using spontaneous four-wave mixing in As_2S_3 waveguides. We show that chalcogenide photonic chip based pair source will exhibit high brightness and correlation if the dispersion is properly engineered.

NThB5 • 11.30
Geometrical Nonlinearities in Photonic Nanowires, ***Fabio Biancalana***, *Truong Tran; Max-Planck-Inst. for the Science of Light, Germany.* We derive new evolution equations for photonic nanowires that include the vector nature of electromagnetic field and the frequency variations of the mode profiles. We discover new nonlinearities that strongly depend on the waveguide geometry.

10.30–12.30
SThB • Sensors Using Photonic Crystal Fibers
Mário F. Ferreira; Univ. of Aveiro, Portugal, Presider

SThB1 • 10.30 Invited
PCF Based Optical Parametric Oscillators in the Visible, ***John Harvey***, *Rainer Leonhardt, Stuart Murdoch; Univ. of Auckland, New Zealand.* Recent advances in the drawing of photonic crystal fibres have enabled the development of fibre optic parametric oscillators generating coherent light tunable over wide regions of the visible and near IR spectrum.

SThB2 • 11.00
A Textile- Fiber Optics Composite Sensor for Geotechnical Applications, ***Olivier Artières***; *TenCate Geosynthetics, France.* A sensor based on textile and optical fibres monitors and generates early warnings for geotechnical structures. With FBG, Brillouin and Raman technologies both soil strain from 0.02% and leaks from 1 l/min/m are measured.

SThB3 • 11.15 Invited
Prospective of Photonic Crystal Fibers for Chemical Sensing, ***Kevin P. Chen***; *Univ. of Pittsburgh, USA.* Abstract not available.

Sessions continue on page 56.

Scheffel

Access Networks and In-house Communications

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

10.30–12.30
AThB • Advanced Optical Transmission Technologies
Henning Bülow; Alcatel-Lucent, Germany, Presider

AThB1 • 10.30 Invited
Coherent MIMO Multimode-Fiber Transmission and Related Signal Processing, *Henning Bülow*; *Univ. Erlangen-Nuernberg, Germany.* Different aspects of transmission over multimode fiber are discussed with a focus on the requirements for outage free transport over a few mode fiber when applying MIMO processing at the receive side.

AThB2 • 11.00 Invited
Advanced DSP for Next-Generation OFDMA-PON, *Neda Cvijetic*; *NEC Labs America, Inc., USA.* Principal requirements and technology trends of advanced DSP for high-speed, real-time Orthogonal Frequency Division Multiple Access (OFDMA)-based PON are analyzed. Key benefits emerge from component integration, mass production and parallel activity in long-haul fiber systems.

AThB3 • 11.30 Invited
Unraveling Multimode Propagation Paths with Mode-Selective Spatial Filtering to Achieve High-Speed Multi-Channel Transmission in Optical Fiber Systems, *C. P. Tsekrekos*; *Athens Information Technology Ctr., Greece.* Mode-selective spatial filtering opens the way in building robust multi-gigabit multi-channel transmission systems with graded-index multimode fibers, towards record bit-rates per wavelength in short-range multimode fiber communications.

Clubraum

Signal Processing in Photonic Communications

10.30–12.15
SPThB • Sensors Using Photonic Crystal Fibers
Jochen Leiberch; Univ. Kiel, Germany, Presider

SPThB1 • 10.30 Invited
Application Scenarios for Optical OFDM, *Sander Lars Jansen*[1], *Susmita Adhikari[2], Beril Inan[3], Dirk van den Borne[1]; [1]Nokia Siemens Networks GmbH & Co. KG, Germany, [2]Christian-Albrechts-Univ., Germany, [3]Technical Univ. of Munich, Germany.* Optical OFDM is a potential modulation format for next generation transmission systems. In this paper several application scenarios are discussed for optical OFDM focusing on applications for metro and long-haul transmission systems.

SPThB2 • 11.00
Experimental Demonstration of a Direct-Detection Constant Envelope OFDM System, *Jair A. L. Silva[1], Tiago M. F. Alves[2], Adolfo Cartaxo[2], **Marcelo E. V. Segatto**[1]; [1]Univ. Federal do Espírito Santo, Brazil, [2]Inst. de Telecomunicações, Portugal.* We propose and experimentally demonstrate an optical constant envelope OFDM system based on electrical phase modulation. We transmit 1.4 Gbps data onto 16-QAM symbols in 500 MHz bandwidth. Our system shows good tolerance to the optical modulator intermodulation effects.

SPThB3 • 11.15
Block- vs. Symbol-Wise Differential Encoding in Spectrally Efficient Digital Subcarrier Multiplexing for Direct Detection, *Oscar Gaete*[1], *Leonardo Coelho[1], Bernhard Spinnler[2], Norbert Hanik[1]; [1]Technische Univ. München, Germany, [2]Nokia Siemens Networks GmbH & Co. KG, Germany.* Digital Subcarrier Multiplexing allows simple direct detection of multicarrier signals. We show, by means of simulations, that by differentially encoding in symbol-wise manner, the tolerance to both, nonlinearities and dispersion, is remarkably improved.

SPThB4 • 11.30
Accuracy Control of Numerical Simulations in High Speed DWDM Fiber Optic Communication Systems Modeling, *Xianming Zhu, **William A. Wood**; Corning, Inc., USA.* We propose a simple adaptive step size method for band-limited signals based on analytic double commutator estimates. The proposed adaptive step size method efficiently suppresses numerical artifacts in high-speed DWDM systems and is several times more efficient than other common methods.

Room 2.05

Solid-State and Organic Lighting

10.30–12.30
SOThB • LED Technology and Characterization III
Karl Leo; Technische Univ. Dresden, Germany, Presider

SOThB1 • 10.30 Invited
AlInGaN Micro-Pixel Light Emitting Diodes: Novel Sources for Displays, Instrumentation, Communications and Hybrid Inorganic/Organic Optoelectronics, *Martin Dawson*; *Univ. of Strathclyde, UK.* We review the design, fabrication, operation and performance of micro-pixel AlInGaN light-emitting diode arrays and illustrate their applications in areas including visible light communications, hybrid inorganic/organic optoelectronics, ultraviolet direct writing and bioinstrumentation.

SOThB2 • 11.10
Periodic Nanostructures Fabricated by Laser Interference Lithography for Guided Mode Extraction in OLEDs, *Julian Hauss*[1], *Boris Riedel[1], Tobias Bocksrocker[1], Sebastian Gleiss[1], Klaus Huska[1], Ulf Geyer[2], Uli Lemmer[1], Martina Gerken[2]; [1]Lichttechnisches Inst., Karlsruhe Inst. of Technology, Germany, [2]Inst. of Electrical and Information Engineering, Christian-Albrechts-Univ. zu Kiel, Germany.* Laser interference lithography was used to fabricate periodically nanostructured ITO and metal anodes for guided mode extraction in OLEDs. Experimental results as well as simulations revealed that the nano-structuring leads to an enhanced OLED efficiency.

SOThB3 • 11.30
LED-Fabrication Independent Light Extraction Enhancement Structure on Back-Side of Sapphire Substrate with Large Area Auto-Cloned Photonics Crystals, *Shiuh Chao*[1], *Chen Yang Huang[1,2], Hao Min Ku[1]; [1]Natl. Tsing Hua Univ., Taiwan, [2]Electronics and Opto-Electronics Res. Labs, Industrial Technology Res. Inst., Taiwan.* Large area 3-D auto-cloned photonics crystal was fabricated on the backside of the InGaN/GaN LED. Averaged 94±13% light extraction enhancement was obtained uniformly across the 2" wafer that contained more than 14,000 LED.

Sessions continue on page 57.

Hebel	Thoma	Mombert
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors

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

BThB • Sensor and Signal Processing Applications—Continued

BThB5 • 11.45
Visible Wavelength Fiber Bragg Grating Arrays for High Speed Biomedical Spectral Sensing, *Gary E. Carver[1], Daniel L. Farkas[2], Jerome Porque[3], Ken S. Feder[3],* ***Paul S. Westbrook***[3]*; [1]Omega Optical, USA, [2]Cedars-Sinai Medical Ctr., USA, [3]OFS Labs, USA.* Spectral data for each pixel in a confocal spatial scan are acquired by mapping spectral slices into the time domain with an array of visible fiber Bragg gratings. Multispectral images of biomedical tissue can be generated in real time.

BThB6 • 12.00
Superimposed Oppositely Chirped FBGs for Ultrafast FBG Sensor Interrogation with Significantly Improved Resolution, ***Jianping Yao****, Chao Wang; Univ. of Ottawa, Canada.* A temporal-spectroscopy-based ultrafast FBG sensor interrogation system using two superimposed oppositely chirped FBGs is proposed. Compared with conventional temporal-spectroscopy-based FBG sensor interrogation systems, an improvement in interrogation resolution of two orders of magnitude is achievable.

BThB7 • 12.15
A Novel Scheme to Lock Distributed Multimode Optical Fiber Vibration Sensors, ***Bilel Bensalem****, Raman Kashyap, Christian Cardinal, Renato Bosisio, Chahe Nerguizian, Pierre-Mathieu Demizieux, Xavier Proulx; École Polytechnique de Montréal, Canada.* In this work we introduce a control mechanism to assure operation in quadrature of distributed multimode optical fiber vibration sensors. Tests conducted indicate that the technique could find wide application in seismological sensing.

NThB • Waveguides and Fabrication—Continued

NThB6 • 11.45
Highly Nonlinear $Ge_{11.5}As_{24}Se_{64.5}$ Nanowires with a Nonlinear Parameter up to 150,000 $W^{-1}km^{-1}$, *Xin Gai, Amrita Prasad, Steve Madden, Duk-Yong Choi, Douglas Bulla,* ***Barry Luther-Davies****; CUDOS, Laser Physics Ctr., Res. School of Physical Sciences and Engineering, Australian Natl. Univ., Australia.* We report the properties of dispersion-engineered nanowire waveguides fabricated in $Ge_{11.5}As_{24}Se_{64.5}$ chalcogenide glass with γ ranging from ≈25,000-150,000$W^{-1}km^{-1}$. These waveguides are capable of generating broadband super-continuum when pumped with ps pulses with peak power ≈20W.

NThB7 • 12.00
Wave Propagation in Waveguide Arrays with Alternating Positive and Negative Couplings, ***Nikolaos K. Efremidis***[1]*, Peng Zhang[2], Zhigang Chen[2], Demetrios N. Christodoulides[3], Christian E. Ruter[4], Detlef Kip[4]; [1]Dept. of Applied Mathematics, Univ. of Crete, Greece, [2]Dept. of Physics and Astronomy, San Francisco State Univ., USA, [3]Ctr. for Res. and Education in Optics and Lasers, School of Optics, Univ. of Central Florida, USA, [4]Dept. of Electrical Engineering, Helmut Schmidt Univ., Germany.* We introduce a physically realizable waveguide array model with alternating positive and negative couplings between adjacent waveguides. The beam dynamics exhibit several interesting properties such as beam self-splitting and self-induced Talbot oscillations.

NThB8 • 12.15
High Speed Fabrication of Toroidal Micro-Ring Resonators by Two Photon Direct Laser Writing, ***Carsten Eschenbaum****, Thomas Woggon, Uli Lemmer; Karlsruhe Inst. of Technology, Germany.* We report on the fabrication of ring resonators by two photon direct laser writing. Using circular vector scanning and optimized control feedback loop parameters enables the patterning of circular shapes with writing speeds of 1.5mm/s.

SThB • Sensors Using Photonic Crystal Fibers—Continued

SThB4 • 11.45
Photoswitching in Photonic Crystal Fiber, ***Jocelyn S. Y. Chen***[1]*, Tijmen G. Euser[1], Gareth O. S. Williams[2], Anita C. Jones[2], Philip St.J. Russell[1]; [1]Max-Planck-Inst. for the Science of Light, Germany, [2]School of Chemistry, Univ. of Edinburgh, UK.* The photoswitching dynamics of an azobenzene in hollow-core photonic crystal fiber are monitored in real-time via absorption spectroscopy, with greatly reduced irradiation time and sample volume requirement compared to a conventional cuvette.

SThB5 • 12.00
Photonic Bandgap Fiber Bundle Spectrometer, ***Hang Qu****, Bora Ung, Francis Boismumu, Ning Guo, Alexandre Depuis, Maksim Skorobogatiy; École Polytechnique de Montréal, Canada.* Utilizing a fiber-bundle mainly composed of 10×10 photonic band-gap fibers and a CCD camera, we report a spectroscopic system. In addition, we study the resolution of our fiber spectrometer by resolving several spectral peaks.

SThB6 • 12.15
Transmission Properties of Hollow-Core Photonic Bandgap Fibers, ***Charlotte I. Falk***[1]*, Jan Hald[1], Jan C. Petersen[1], Jens K. Lyngsø[2]; [1]Danish Fundamental Metrology, Denmark, [2]NKT Photonics, Denmark.* Variations in optical transmission of four types of hollow-core photonic bandgap fibers are measured as a function of laser frequency. These variations influence the potential accuracy of gas sensors based on molecular spectroscopy in HC-PBFs.

12.30–13.30 Lunch Break *(on your own)*

13.30–15.30
BThC • Grating Sensors and Device Properties
Presider to Be Announced

BThC1 • 13.30 Invited
New Developments in Tilted Fiber Bragg Gratings for Biochemical and Structural Sensing, ***Jacques Albert****; Carleton Univ., Canada.* A weakly tilted fiber Bragg grating can excite a large number of cladding modes in optical fibers, with high wavelength and polarization selectivity. Experimental results for new sensing modalities of several TFBG configurations are presented.

BThC2 • 14.00
Transmission Bandpass Filters Based on Force-Induced Fiber Gratings for Sensor and Tunable Laser Applications, ***Hajime Sakata****, Takuya Saito, Keisuke Nishio; Shizuoka Univ., Japan.* We present an all-fiber bandpass filter consisting of a force-induced long-period fiber grating and a fiber coil made along a double-clad fiber. We discuss its adjustable transmittance, temperature sensitivity, and laser wavelength tuning.

13.30–15.30
NThC • Wavelength Conversion
Thomas Pertsch; Friedrich-Schiller-Univ., Germany, Presider

NThC1 • 13.30 Invited
Mirrorless Optical Parametric Oscillators, ***Carlota Canalias****, G. Strömqvist, V. Pasiskevicius; Royal Inst. of Technology, Sweden.* We present the experimental implementation of a mirrorless optical parametric oscillator based on sub-μm periodically poled $KTiOPO_4$. The poling process for sub-μm gratings and the unique properties of the device will be discussed.

NThC2 • 14.00
Influence of the Spectral Properties of the Pump Laser on the Behaviour of an Optical Parametric Oscillator with a Volume Bragg Grating Output Coupler around Degeneracy, ***Peter Koch***[1]*, Felix Ruebel[1], Martin Nittmann[2], Thorsten Bauer[2], Juergen Bartschke[2], Johannes A. L'huillier[1]; [1]Photonik-Zentrum Kaiserslautern e. V., Germany, [2]Xiton Photonics GmbH, Germany.* We investigate the influence of the pump laser's longitudinal mode structure on the spectral properties and stability of a narrowband Q-switched OPO near and on degeneracy (2128 nm) with a volume Bragg grating output coupler.

13.30–15.30
SThC • Fibers and Sensors II
Katerina Krebber; BAM Federal Inst. for Materials Res. and Testing, Germany, Presider

SThC1 • 13.30 Invited
Fibre Optic Sensors: Achievements and Prospects, ***Brian Culshaw****; Univ. of Strathclyde, UK.* This paper reviews the scientific, technical and applications of fibre optic sensors as they enter their fifth decade and considers future prospects triggered by new science and new needs.

SThC2 • 14.00 Invited
Middle Infrared Fiber - Optic Sensors, ***Abraham Katzir****; Tel Aviv Univ., Israel.* Several families of optical fibers are highly transparent in the mid-IR. These fibers can be used for non-contact thermometry, chemical sensing and many other sensing applications in science, industry, environmental protection, homeland security and medicine.

Sessions continue on page 58.

Scheffel	Clubraum	Room 2.05
Access Networks and In-house Communications	Signal Processing in Photonic Communications	Solid-State and Organic Lighting

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

AThB • Advanced Optical Transmission Technologies—Continued

AThB4 • 12.00
Comparison of NRZ and OFDM Modulation for Sliced Sources in an Optical Access Network, ***Fabia Nirina Raharimanitra**, Philippe Chanclou, Benoît Charbonnier, Naveena Genay; Orange Labs, France.* The proposed study compares transmission performance using NRZ and OFDM modulation in a SMF link by direct modulation of low bandwidth spectrum sliced sources.

AThB5 • 12.15
A CD and OSNR-Insensitive DGD Monitoring Technique for High-Speed Data Using a Low-Speed Detector, ***Ruth Vilar**[1], Nishaanthan Nadarajah[2], Ampalavanapillai Nirmalathas[2], Roberto Llorente[1], Francisco Ramos[1]; [1]Univ. Politécnica de Valencia, Spain, [2]Univ. of Melbourne, Australia.* A DGD monitoring technique using a low-speed detector for 40Gb/s-RZ data is experimentally demonstrated. RF power increment of 18dB, which is insensitive to CD and OSNR, is measured in the DGD range from 0 to 25ps.

SPThB • Sensors Using Photonic Crystal Fibers—Continued

SPThB5 • 11.45 Invited
Equalization Enhanced Phase Noise Interference in Coherent Optical Communications, *William Shieh[1], **Alan Pak Tao Lau**[2], Keang-Po Ho[3]; [1]Univ. of Melbourne, Australia, [2]Hong Kong Polytechnic Univ., Hong Kong, [3]SiBEAM Technologies, USA.* Electronic-equalizer based on DSP techniques enhances phase noise impairment. This equalization-enhanced phase noise (EEPN) interference imposes a tighter constraint on the laser linewidths in systems with high symbol-rate and large electronically-compensated chromatic dispersion.

SOThB • LED Technology and Characterization III—Continued

SOThB4 • 11.50
Enhancement of Light Extraction in a Light-Emitting Diode by Fabricating Surface Gratings with Photoelectrochemical Wet Etching, *Cheng-Hung Lin, Cheng-Yen Chen, Dong-Ming Yeh, **C. C. Yang**; Natl. Taiwan Univ., Taiwan.* The >43% enhancement of light extraction by fabricating a surface grating structure around the mesa of a light-emitting diode with an approach combining photoelectrochemical wet etching and phase mask interferometry is demonstrated.

SOThB5 • 12.10
Glass Surface Structuring for Dosed Optical Scattering, ***Eric Hein**, Dennis Fox, Henning Fouckhardt; Integrated Optoelectronics and Microoptics Res. Group, Kaiserslautern Univ. of Technology, Germany.* Reactive ion etching of unstructured metal coated glass substrates is applied for surface modification resulting in many different morphologies and extents of roughness. Choice of the process parameters enables user-defined tuning of optically scattering characteristics.

12.30–13.30 Lunch Break *(on your own)*

13.30–15.30
AThC • Photonic Technologies for Next Generation Access Networks
Christophe Kazmierski; Alcatel-Thales III-V Lab, France, Presider

AThC1 • 13.30 Invited
Potential Benefits and Limitations of SOA in Access Networks, ***R. Brenot**, G. De Valicourt, F. Poingt, F. Lelarge, F. Pommereau; Alcatel-Thales III-V Lab, Bell Labs, France.* Access networks evolve towards longer reach, higher bit-rates and more subscribers per central office. This evolution could require flexible amplifiers such as Semiconductor Optical Amplifiers

AThC2 • 14.00
Tuning Characteristics and Switching Speed of a Modulated Grating Y Structure Laser for Wavelength Routed PONs, *Miquel Mestre[1], **Josep M. Fabrega**[1], Jose Antonio Lazaro[1], Victor Polo[1], Anders Djupsjobacka[2], Marco Forzati[2], Pierre-Jean Rigole[3], Josep Prat[1]; [1]Univ. Politècnica de Catalunya, Spain, [2]ACREO AB, Sweden, [3]Syntune AB, Sweden.* An entire coverage over the C-band is demonstrated, with high resolution while maintaining a SMSR > 40 dB. The wavelength switching time was found to be as low as 400 ps for different reflector currents.

13.30–15.00
SPThC • OFDM II
Fred Buchali; Alcatel-Lucent, Germany, Presider

SPThC1 • 13.30 Invited
Nonlinear Impairments in Coherent Optical OFDM Systems and Their Mitigation, ***Moshe Nazarathy**; Electrical Engineering Dept., Technion-Israel Inst. of Technology, Israel.* We review and extend the nonlinear Volterra unified formalism for modeling nonlinear impairments in coherent optical OFDM and devising decision-directed frequency-shaped nonlinear compensators, with favorable performance vs. complexity tradeoffs.

SPThC2 • 14.00 Invited
Signal Processing for 100Gb/s: OFDM vs Single Carrier, ***Enrico Forestieri**[1], Giulio Colavolpe[2], Tommaso Foggi[2], Gianmarco Bruno[3]; [1]Scuola Superiore Sant'Anna, Italy, [2]Univ. di Parma, Italy, [3]Ericsson Telecomunicazioni, Italy.* OFDM is compared to the well-established single-carrier data transmission using high-level modulation formats and coherent detection. The analysis of the two alternative solutions is carried out in the 100 Gb/s scenario.

13.30–15.10
SOThC • LED Technology and Characterization IV
Joachim Wagner; Fraunhofer Inst. for Applied Solid State Physics, Germany, Presider

SOThC1 • 13.30 Invited
Highly Efficient Organic LED, ***Karl Leo**; Inst. für Angewandte Photophysik, Technische Univ. Dresden, Germany.* We discuss recent progress in highly efficient organic LED. Using novel emitter designs and outcoupling concepts, we have realized devices with efficiency exceeding fluorescent tubes.

Sessions continue on page 59

Hebel	Thoma	Mombert
Bragg Gratings, Photosensitivity and Poling in Glass Waveguides	Nonlinear Photonics	Optical Sensors

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

BThC • Grating Sensors and Device Properties—Continued

BThC3 • 14.15
Ultrafast Induced Narrow-Band High Temperature Stable Fiber Bragg Grating in Hydrogen Loaded SMF-28 Fiber, *Christopher Smelser*, *Stephen J. Mihailov, Dan Grobnic; Communications Res. Ctr. Canada, Canada.* A narrow band (<200 pm 3 dB bandwidth) fiber Bragg grating temperature sensor is demonstrated in hydrogen loaded SMF-28 fiber.

BThC4 • 14.30
Moiré Bragg Gratings with Coinciding Reflection Bands for TE and TM Polarization in Highly Birefringent Waveguides, *Hagen Renner*, *Michael Krause, Ernst Brinkmeyer; Technische Univ. Hamburg-Harburg, Germany.* We propose a Moiré-type modulation of corrugated Bragg gratings in highly birefringent waveguides to let the reflection and transmission bands for the two fundamental-mode polarizations coincide.

BThC5 • 14.45
Side-Scattering Analysis of Structural Rocking Filters in Photonic Crystal Fiber, *Leyun Y. Zang,* ***Tijmen G. Euser****, Myeong S. Kang, Michael Scharrer, Philip St. J. Russell; Max-Planck-Inst. for the Science of Light, Germany.* The internal twist profile of structural rocking filters in birefringent photonic crystal fiber is precisely measured by optical side-scattering. Multiple scattering effects are avoided by filling the hollow channels with index-matching fluid.

BThC6 • 15.00
Tailored Mode Coupling with Highly Localized Intracore Fiber Bragg Gratings, *Jens U. Thomas*[1], *Nemanja Jovanovic[2], Graham D. Marshall[2], Ria Becker[1], Christian Voigtländer[1], Mike Steel[2], Michael J. Withford[2], Stefan Nolte[1], Andreas Tünnermann[1]; [1]Friedrich-Schiller-Univ. Jena, Germany, [2]MQ Photonics Res. Ctr., Australia.* Femtosecond laser-written micro void FBG's offer control of core-cladding coupling. Careful placement of localized defects within the core cross section permits tailoring of the reflection into modes of higher azimuthal order.

BThC7 • 15.15
Polarization-Sensitive Spectral Characterization of Bragg Gratings in Silicon Waveguides, *Tino Pagel*, *Thomas Waterholter, Michael Krause, Hagen Renner, Ernst Brinkmeyer; Technische Univ. Hamburg, Germany.* Bragg gratings are increasingly important in silicon photonics. Solving the problem of polarization-sensitive characterization is indispensable but still open so far. We present a simple and reliable technique which yields separate TE and TM spectra.

NThC • Wavelength Conversion—Continued

NThC3 • 14.15
High Efficient kHz Repetition Rate Optical Parametric Generator in LBO with Octave Spanning Tunability, *Tobias Traub*, *Felix Ruebel, Johannes L'huillier; Photonik-Zentrum Kaiserslautern e.V., Germany.* We report on a high efficient kHz repetition rate ps OPG in LBO with an octave spanning tuning range. The total conversion efficiency exceeded 50% over a 950nm broad wavelength interval from 770nm to 1720nm.

NThC4 • 14.30
Topology of Four-Wave Mixing and Resonant Radiation in PCFs with Three Zero-Dispersion Wavelengths, *Sebastian P. Stark*, *Fabio Biancalana, Alexander Podlipensky, Philip St. J. Russell; Max-Planck-Inst. for the Science of Light, Germany.* We discuss four-wave mixing and resonant radiation in photonic crystal fibers with three zero dispersion wavelengths. We find a complex phase-matching landscape that allows multiple frequencies to be generated by both continuous waves and solitons.

NThC5 • 14.45
Observation of Spontaneous Parametric Down-Conversion Excited by High-Brightness Blue LED, *Gintaras Tamosauskas*, *Justinas Galinis, Audrius Dubietis, Algis Piskarskas; Dept. of Quantum Electronics, Vilnius Univ., Lithuania.* We report on what is to our knowledge the first observation of the parametric fluorescence in bulk nonlinear crystals excited by commercial high-brightness incoherent blue LED.

NThC6 • 15.00
Hydrothermal Growth and Properties of $KBe_2BO_3F_2$ (KBBF) and $RbBe_2BO_3F_2$ (RBBF) Single Crystals, *Colin McMillen[1], Joseph Kolis[1], Chang Liu[2], Adam Kaminski[2],* ***John Ballato****[1]; [1]Clemson Univ., USA, [2]Ames Lab and Iowa State Univ., USA.* Centimeter-size KBBF and RBBF single crystals have been grown hydrothermally for NLO applications. Second harmonic generation of 800 nm fundamental light has been demonstrated using both KBBF and RBBF in preliminary studies.

NThC7 • 15.15
High Effciency Harmonic Generation in $LiNbO_3$ Membranes, *Alexander S. Solntsev*[1], *Andrey A. Sukhorukov[1], Dragomir N. Neshev[1], Yuri S. Kivshar[1], Rumen Iliew[2], Thomas Pertsch[2]; [1]Australian Natl. Univ., Australia, [2]Friedrich-Schiller-Univ. Jena, Germany.* We reveal simultaneous phase- and group-velocity matching for frequency doubling of ultra-short pulses at telecom wavelengths in $LiNbO_3$ membranes. Furthermore, we predict complete phase-matched cascaded third-harmonic generation for optimized membrane thickness.

SThC • Fibers and Sensors II—Continued

SThC3 • 14.30
Design and Fabrication of Photonic Crystal Fibers for Plasmonic Sensing, Applications from the Visible to THz, *Maksim Skorobogatiy*; *École Polytechnique de Montréal, Canada.* Design of highly sensitive bio- and chemical plasomn-assisted sensors based on photonoic crystal fibers with metallic inclusions are reviewed. Recent advance in the experimental realization of such sensors are presented.

SThC4 • 14.45
Fibre Bragg Distributed Chemical Sensor, *Arjen Boersma*, *Lun Cheng, Rob Jansen; TNO Science and Industry, Netherlands.* A distributed chemical sensor is developed by coating multiple Bragg gratings in a fibre with chemical selective responsive coatings. The optical response of the coated grating is optimised and the recoat process is very reproducible.

SThC5 • 15.00
Distributed Brillouin Fiber Sensor Featuring 2 Meter Resolution and 75 Km Dynamic Range, *Félix Rodríguez-Barrios*[1], *Sonia Martín-López[1], Ana Carrasco-Sanz[2,1], Pedro Corredera[1], Juan Diego Ania-Castañón[3], Luc Thévenaz[4], Miguel González-Herráez[5]; [1]Dept. de Metrología, Inst. de Física Aplicada, CSIC, Spain, [2]Dept. de Óptica, Facultad de Ciencias, Univ. de Granada, Spain, [3]Dept. Imágenes, Visión y Óptica Física, Inst. de Óptica, CSIC, Spain, [4]Inst. of Electrical Engineering, École Polytechnique Fédérale de Lausanne, Switzerland, [5]Dept. de Electrónica, Escuela Politécnica Superior, Univ. de Alcalá, Spain.* We have used distributed Raman amplification to extend the measurement distance of a Brillouin Optical Time-Domain Analysis (BOTDA) sensor. We successfully demonstrate a dynamic range of 75 km with 2 meter spatial resolution.

SThC6 • 15.15
Quality Assurance in Textile Industry Using a Fiber-Optics Spectroscopy Sensor, *Olga M. Conde*, *Ana M. Cubillas, Pedro Anuarbe, Jose M. Lopez-Higuera; Univ. of Cantabria, Spain.* An optical fiber sensor is proposed for color matching assessment of textile dyes. UV-Vis-NIR transmission spectra are converted to CIELAB coordinates. ROC curves are obtained to determine the optimum threshold to identify equal/different dye samples.

Scheffel	Clubraum	Room 2.05
Access Networks and In-house Communications	Signal Processing in Photonic Communications	Solid-State and Organic Lighting

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

AThC • Photonic Technologies for Next Generation Access Networks—Continued

AThC3 • 14.15
Demonstration of the Use of an Optical Fibre Combiner with Low Loss to Connect Four Single Mode Fibres to One Photo-Receiver, ***Fabia Nirina Raharimanitra***[1], *Philippe Chanclou*[1], *Gabrielle Perrin*[1], *Monique Thual*[2]; [1]*Orange Labs, France,* [2]*Lab FOTON/CCLO, France.* New design for an optical fibre combiner connecting four single mode fibres to one photoreceiver with ~1 dB insertion loss is studied. This new combiner increases the optical budget for the Passive Optical Network (PON) architecture.

AThC4 • 14.30
Optimizing SOA for Large Input Power Dynamic Range with Respect to Applications in Extended GPON , ***Thomas Vallaitis***[1], *Rene Bonk*[1], *Johanna Guetlein*[1], *Christian Meuer*[2], *David Hillerkuss*[1], *Wolfgang Freude*[1], *Dieter Bimberg*[2], *Juerg Leuthold*[1]; [1]*Karlsruhe Inst. of Technology, Germany,* [2]*Technische Univ. Berlin, Germany.* Design guidelines for SOA with largest possible input power dynamic range as needed in extended GPON networks are given. Indications are that long QD SOA with few layers may provide input power dynamics >35 dB.

AThC5 • 14.45
Symmetric 10Gb/s Transmission with IM-IM Remodulation in Extended WDM PONs, ***Natasa B. Pavlovic***, *Antonio Teixeira; Inst. de Telecomunicações, Portugal.* Experimental demonstration of symmetric 10Gb/s transmission with low-cost IM-IM remodulation in PONs is shown with SSB Manchester DS signal. SSB generation based on SOA prototype allows an extended reach and high capacity WDM transmission.

AThC6 • 15.00 Invited
Single-Trench-Assisted Fibers for Access Networks, *Pierre Sillard, Louis-Anne de Montmorillon, David Boivin, Lionel Provost,* ***Pierre Sansonetti***; *Draka Communications, France.* All-solid single-trench-assisted step-index profiles allow to improve properties of standard single-mode fibers. Macro- and micro-bending performances can significantly be increased for direct benefits in optical networks.

SPThC • OFDM II—Continued

SPThC3 • 14.30
Performance of 100 Gbit/s PM-QPSK on Ultra-Long-Haul Systems with Legacy Dispersion Maps, *S. Lobanov*[1], *P. Sterlingov*[1], *N. Kaliteevskiy*[1], *S. Ten*[2], ***J. H. B. Nijhof***[3], *W. Forysiak*[3]; [1]*Corning Scientific Ctr., Russian Federation,* [2]*Corning, Inc., USA,* [3]*Ericsson Ltd., UK.* We consider 50GHz-spaced WDM transmission of 100Gbit/s PM-QPSK over a 2836km link. Theoretical performance on a "lumped" dispersion map is within 1dBQ of the optimal performance achievable with no dispersion compensation.

SPThC4 • 14.45
Single Polarization Direct Detection Optical OFDM with 100 Gb/s Throughput: A Concept Taking into Account Higher Order Modulation Formats, ***Jochen Leibrich***, *Abdulamir Ali, Werner Rosenkranz; Chair for Communications, Christian-Albrechts-Univ. zu Kiel, Germany.* Several strategies to achieve 100 Gb/s throughput for single polarization DD-OFDM are considered. Based on state-of-the-art in converter technology, using higher order modulation formats a concept aiming at high sensitivity is proposed.

SOThC • LED Technology and Characterization IV—Continued

SOThC2 • 14.10 Invited
OLEDs for Lighting: Can They Ever Be Bright Enough? ***Stephen Forrest***; *Dept. of Electrical Engineering and Computer Science, Univ. of Michigan, USA.* A potential limitation to using OLEDs for lighting is their low intensity emission per area, leading to high cost. We examine the fundamental limits to OLED brightness.

SOThC3 • 14.50
High Power Near-UV LEDs on Metal Alloy Base, ***Chao-Cheng Cheng***[1], *Jiunn-Yi Chu*[1], *Chen-Fu Chu*[1], *Feng-Hsu Fan*[1], *Wen-Huan Liu*[1], *Hao-Chun Cheng*[1], *Chuong Anh Tran*[2], *Trung Doan*[2]; [1]*SemiLEDs Optoelectronics Corp., Taiwan,* [2]*SemiLEDs Corp., USA.* High power near-UV LEDs with the wavelengths ranging from 365 nm to 410 nm are released for the curing application. Owing to the superior design and the process technologies of the vertical LED on metal alloy base, the conventional mercury-based lamps can be replaced by the LED emitters providing higher reliability, longer life time, lower cost and the environmentally friendly benefits. Coupled with the silicon sub-mount package, the vertical LED can sustain very little UV output decay more than 1000 hours by the high power input of 2W-up. The external quantum efficiencies of 45% and 12% are achieved for the wavelengths of 410 nm and 365 nm, respectively, with the help of the vertical design to eliminate the current crowding issue and the optimal surface pattern to extract UV photons.

Brahms Conference Room

Joint

17.00–19.00
JThB • Nobel Laureate Session: 50 Years of Lasers
Presider to Be Announced

JThB1 • 17.00
Adventures in Laser Spectroscopy, ***Theodor Hänsch***; *Univ. of Munich, Germany.* Abstract not available.

JThB2 • 18.00
The Laser - How New Things Happen, ***Charles H. Townes***; *Univ. of California Berkeley, USA.* Abstract not available.

Key to Authors and Presiders

(**Bold** denotes Presider or Presenting Author)

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• Wednesday, June 23, 2010 •

• Optical Nanostructures for Photovoltaics (PV) Postdeadline Abstracts •

PWB • PV Poster Session

10:30 a.m.–11:30 a.m.
Weinbrenner Conference Room

PWB9P
Grating Mirror Based High Efficiency Optical Resonance Cavity: Application to IR Photodetectors, ***Moshe Zohar***[1], *Mark Auslender*[1], *Lorenzo Faraone*[2], *Shlomo Hava*[1]; [1]*Dept. of Electrical and Computer Engineering, Ben Gurion Univ. of the Negev, Israel,* [2]*School of Electrical, Electronic and Computer Engineering, Univ. of Western Australia, Australia.* In this work the concept of merging diffraction grating as a mirror into optical resonance cavity is proposed and proved by rigorous simulations on example of mercury cadmium telluride resonance cavity enhanced IR photodetector.

PWE • PV Postdeadline Session

4:00 p.m.–4:40 p.m.
Room 2.08
Thomas Krauss; Univ. of St Andrews, UK, Presider

PWE1 • 4:00 p.m.
Bio-Inspired Broadband and Omni-Directional Antireflective Surface Based on Semiconductor Nanorods, ***Silke L. Diedenhofen***[1], *Rienk E. Algra*[2], *Erik P. A.M Bakkers*[2], *Jaime Gómez Rivas*[1]; [1]*FOM Inst. AMOLF, Netherlands,* [2]*Philips Res. Labs Eindhoven, Netherlands.* Bio-inspired layers of semiconductor nanorods increase light coupling into a high refractive index substrate. Reflection and transmission measurements show unambiguously, that the reduced reflection is due to optical impedance matching at the interfaces.

PWE2 • 4:10 p.m.
All-Oxide Embedded-Nanowire Solar Cell, *Jingbiao B. Cui*[1], ***Ursula Gibson***[2]; [1]*Univ. of Arkansas, USA,* [2]*Thayer School of Engineering, Dartmouth College, USA.* We describe electrodeposition of a (Cu_2O)-(ZnO nanowire) thin film p-n junction solar cell. The efficiency of this prototype large junction-area nanostructured cell is 1.6 times that of a planar cell fabricated from the same materials.

PWE3 • 4:20 p.m.
Plasmonic Anti-Reflection Coating for Thin Film Solar Cells, ***Pierpaolo Spinelli***[1], *Maarten Hebbink*[1], *Claire van Lare*[1], *Marc Verschuuren*[2], *René de Waele*[1], *Albert Polman*[1]; [1]*FOM Inst. AMOLF, Netherlands,* [2]*Philips Res. Labs, Netherlands.* We study plasmonic nanoparticle arrays on top of silicon solar cells for efficient light coupling. An optimized array combined with a Si_3N_4 spacer layer shows 8% more incoupling than the standard Si_3N_4 antireflection coating.

PWE4 • 4:30 p.m.
Solar Cell Characterization with High Spatial Resolution, ***Michael Schwalm***, *Christoph Lange, Wolfgang Rühle, Wolfgang Stolz, Kerstin Volz, Sangam Chatterjee; Philipps-Univ. Marburg, Germany.* New techniques for a solar cell characterization with high spatial resolution are introduced and evaluated both by experiments on test structures and numerical simulations. The reliability is demonstrated and technical limits are assessed.

• Thursday, June 24, 2010 •

• Solid State and Organic Lighting (SOLED) Postdeadline Abstracts •

SOThA • SOLED Postdeadline Session

8:30 a.m.–10:10 a.m.
Room 2.05
Bernard Kippelen; Georgia Tech, USA, Presider

SOThA1 • 9:10 a.m.
Red Top-Emitting Organic Light-Emitting Diodes with 29 % External Quantum Efficiency Using Doped Charge Transport Layers and Optical Simulation, ***Simone Hofmann***, *Michael Thomschke, Patricia Freitag, Mauro Furno, Björn Lüssem, Karl Leo; Inst. für Angewandte Photophysik, Technische Univ. Dresden, Germany.* We present highly efficient red top-emitting organic light-emitting diodes with an external quantum efficiency of 28.6 % at 1000 cd/m^2. This high efficiency is obtained by electrical and optical optimization of the phosphorescent pin-structure.

SOThA2 • 9:30 a.m.
The Role of Non-Radiative Energy Transfer for Efficient Colour-Conversion in Hybrid Organic/GaN LEDs, ***Jan J. Rindermann***, *Pavlos G. Lagoudakis; School of Physics and Astronomy, Univ. of Southampton, UK.* Non-radiative energy transfer (FRET) is used to enhance the colour-conversion efficiency in hybrid organic/GaN LEDs. We study FRET from the LED to an organic overlayer under optical pumping and electrical operation of the LEDs.

SOThA3 • 9:50 a.m.
Photoluminescence and Electroluminescence in InGaN/GaN Nano-Rod Array LEDs Fabricated on a Wafer Scale, *Philip A. Shields*[1], *Christopher Chan*[2], *Nathaniel Read*[2], ***Duncan W. E. Allsopp***[1], *Robert A. Taylor*[2]; [1]*Univ. of Bath, UK,* [2]*Univ. of Oxford, UK.* The fabrication of nano-rods containing InGaN/GaN quantum wells with diameter and the evolution of their optical properties are

reported. A prototype nano-rod array LED device with strong photonic crystal effects in its electroluminescence is demonstrated.

• Access Networks and In-house Communications (ANIC) Postdeadline Abstracts •

AThD • ANIC Postdeadline Session

3:45 p.m.–4:15 p.m.
Scheffel
Ioannis Tomkos; Athens Inst. of Telecomm, Greece, Presider

AThD1 • 3:45 p.m.
UWB Radio over MMF Transmission with Optical Frequency up-Conversion to the 24 GHz Band, *Ruben Alemany[1], Yan Shi[2], Hejie Yang[2], Rakesh Sambaraju[1], Chigo M. Okonkwo[2], Eduward Tangdiongga[2], Antonius M. J. Koonen[2], **Javier Herrera**[1]; [1]Univ. Politécnica de Valencia, Spain, [2]Eindhoven Univ. of Technology, Netherlands.* Optical frequency up-conversion of UWB signals to 24-GHz and MMF transmission is demonstrated. An acceptable range of powers with EVM below -16 dB limit and power penalty of 6 dB for 1.5 km is achieved.

AThD2 • 4:00 p.m.
High Gain RSOA 10G ONU Transmitter and Optical Phase Adjustment at the OLT, ***Mireia Omella**[1], Philippe Chanclou[2], Jose A. Lazaro[1], Josep Prat[1]; [1]Univ. Politècnica de Catalunya, Spain, [2]France Telecom-Orange Labs, France.* As a key element in continuously migrating access networks, the RSOA is a low cost candidate for ONU transmitter. Optical phase adjustment at the OLT premises may allow improving its performance.

• Bragg Gratings, Photosensitivity and Poling in Glass Waveguides (BGPP) Postdeadline Abstracts•

BThD • BGPP Postdeadline Session

3:45 p.m.–4:45 p.m.
Hebel
Paul Westbrook; OFS Labs, USA, Presider

BThD1 • 3:45 p.m.
Ultrafast Laser Photoinscription of Polarization Sensitive Devices in Bulk Silica Glass, ***Konstantin Mishchik**, Guanghua Cheng, Cyril Mauclair, Eric Audouard, Aziz Boukenter, Youcef Ouerdane, Razvan Stoian; Lab Hubert Curien, Univ. Jean Monnet, France.* Laser-induced self-organization of nanopatterns in silica under ultrafast laser exposure is investigated using microscopy and spectroscopy methods. Taking advantage on the resulting anisotropic optical properties, efficient 3-D polarization sensitive devices were fabricated.

BThD2 • 3:57 p.m.
Second-Harmonic Generation by Direct-Laser-Induced-Poling in a Femto-Photo-Luminescent Glass, *Arnaud Royon[1], Matthieu Bellec[1], Ji Yeon Choi[2,3], Kevin Bourhis[2], Thierry Cardinal[2], Martin Richardson[3], **Lionel Canioni**[1]; [1]CPMOH-CNRS, Univ. of Bordeaux, France, [2]ICMCB-CNRS, Univ. of Bordeaux, France, [3]Townes Laser Inst., College of Optics and Photonics, Univ. of Central Florida, USA.* Femtosecond-direct-laser induced poling is demonstrated in a silver containing glass. The diffusion of the photo-induced species inside the irradiated area enables the creation of a permanent electric field, responsible of efficient second-harmonic generation.

BThD3 • 4:09 p.m.
Novel Phase Mask Apparatus for "through the Jacket" Inscription of FBG's in Unloaded SMF-28 Fiber, *Christopher W. Smelser, François Bilodeau, Bernard Malo, Dan Grobnic, **Stephen J. Mihailov**; Communications Res. Ctr. Canada, Canada.* We demonstrate, for the first time to our knowledge, phase mask assisted fiber Bragg grating fabrication through the acrylate jacket of SMF-28 fiber without the use of hydrogen loading.

BThD4 • 4:21 p.m.
Enhanced Light Backscattering in Thermally Poled Plasmonic Nanocomposite and Its Application to Vapour Sensing, ***Olivier Deparis**[1], Martynas Beresna[2], Costantino Corbari[2], Peter G. Kazansky[2]; [1]Univ. of Namur, Belgium, [2]Optoelectronics Res. Ctr., Univ. of Southampton, UK.* We show theoretically that gold nanoparticles embedded in glass can exhibit enhanced light backscattering in presence of leaky waveguide and report on selective vapour sensing in thermally poled nanocomposite in which this concept is implemented.

BThD5 • 4:33 p.m.
Simultaneous Poling and Planar Waveguide Fabrication in Glasses, ***Andre L. R. Brennand**[1], James S. Wilkinson[2]; [1]Inst. de Estudos Avançados, Brazil, [2]School of Electronics and Computer Science, Univ. of Southampton, UK.* Fabrication of buried planar waveguides with 2nd order nonlinear susceptibility in the upper cladding is carried out in soda-lime and BK7 glass substrates in one step by thermal poling.

• Nonlinear Photonics (NP) Postdeadline Abstracts •

NThD • NP Postdeadline Session

3:45 p.m.–4:45 p.m.
Thoma
Wieslaw Z. Krolikowski; Laser Physics Ctr., Australia, Presider

NThD1 • 3:45 p.m.
Continuous-Wave Second Harmonic Generation in Sub-Micron AlGaAs Waveguides, ***David Duchesne***[1], *Katarzyna Rutkowska*[1,2], *Maite Volatier*[3], *Francois Légaré*[1], *Sebastien Delprat*[1], *Mohamed Chaker*[1], *Daniele Modotto*[4], *Andrea Locatelli*[4], *Constantino De Angelis*[4], *Marc Sorel*[5], *Demetrios Christodoulides*[6], *Greg Salamo*[7], *Richard Arès*[3], *Vincent Aimez*[3], *Roberto Morandotti*[1]; [1]*INRS-EMT, Canada,* [2]*Warsaw Univ. of Technology, Poland,* [3]*Univ. of Sherbrooke, Canada,* [4]*Univ. de Brescia, Italy,* [5]*Univ. of Glasgow, UK,* [6]*CREOL, Univ. of Central Florida, USA,* [7]*Univ. of Arkansas, USA.* Modal phase-matched second harmonic generation is obtained in sub-micron AlGaAs waveguides using a continuous-wave laser at telecommunication wavelengths. The tunability and robust fabrication process make this device ideal for integrated wavelength conversion.

NThD2 • 3:57 p.m.
Intrinsic Nonlinear Circular Dichroism in Pump-Probe Experiments Due to the Spin Hall Effect of Light, ***Jean-Michel Ménard***[1], *Christine Hautmann*[2], *Markus Betz*[2,3], *Henry M. van Driel*[1]; [1]*Univ. of Toronto, Canada,* [2]*Technische Univ. München, Germany,* [3]*Technische Univ. Dortmund, Germany.* We observe an intrinsic nonlinear circular dichroism in a non-collinear ultrafast pump-probe geometry due to the spin Hall effect of light: the transverse displacement of the circularly polarized components of an off-normally incident light beam.

NThD3 • 4:09 p.m.
Ultra High Speed Soliton Laser Based on a C-MOS Compatible Integrated Microring Resonator, ***Marco Peccianti***[1,2], *Alessia Pasquazi*[1], *Yongwoo Park*[1], *Brent Little*[3], *Sai Chu*[3], *David J. Moss*[1,4], *Roberto Morandotti*[1]; [1]*INRS Énergie, Matériaux et Télécommunications, Canada,* [2]*Inst. for Chemical and Physical Processes, CNR, "Sapienza" Univ., Italy,* [3]*Infinera Ltd., USA,* [4]*CUDOS, School of Physics, Univ. of Sydney, Australia.* We present a subpicosecond, 200GHz-repetition rate, passively mode-locked laser based on the dissipative four-wave mixing scheme exploiting a integrated CMOS-compatible high-Q nonlinear ring resonator.

NThD4 • 4:21 p.m.
New Regimes of Polarization Bistability in Linear Birefringent Waveguides and Optical Logic Gates, ***Wen Qi Zhang***, *Max A. Lohe, Tanya M. Monro, Shahraam Afshar V.; Univ. of Adelaide, Australia.* Structural anisotropic nonlinearity in linear birefringent optical waveguides leads to the discovery of new unstable polarization states which exhibit periodic bistable behavior. Such properties are relevant to the construction of integratable optical logic gates.

NThD5 • 4:33 p.m.
Photonic Chip Based Optical Performance Monitoring of Ultrahigh Bandwidth Phase-Encoded Optical Signals, ***Trung D. Vo***[1], *Jochen Schröder*[1], *Mark D. Pelusi*[1], *Stephen J. Madden*[2], *Duk Y. Choi*[2], *Douglas A. P. Bulla*[2], *Barry Luther-Davies*[2], *Benjamin J. Eggleton*[1]; [1]*CUDOS, Univ. of Sydney, Australia,* [2]*CUDOS, Laser Physics Ctr., Australian Natl. Univ., Australia.* We report the first demonstration of optical performance monitoring of ultrahigh bit-rate phase-encoded optical signals using a cm-scale, dispersion-engineered, highly nonlinear Chalcogenide planar waveguide.

• Optical Sensors (Sensors) Postdeadline Abstracts •

SThD • Sensors Postdeadline Session

3:45 p.m.–4:45 p.m.
Mombert
Mário F. Ferreira; Univ. of Aveiro, Portugal, Presider

SThD1 • 3:45 p.m.
Stretching Sensor Based on Polymer Optical Fibers, *Joerg Diez, Michael Luber,* ***Hans Poisel****, Olaf Ziemann; Polymer Optical Fiber Application Ctr., G.S. Ohm-Univ. of Applied Sciences, Germany.* High flexibility and robustness make Polymer Optical Fibers attractive for applications such as structural load monitoring using LEDs or DVD Lasers yielding low-cost but nevertheless powerful sensor systems with comparatively high bandwidth.

SThD2 • 3:57 p.m.
Fiber-Optic Probes as Sensors for Diffuse Backscattering, ***Axel Kramer****, Thomas A. Paul; ABB Switzerland, Switzerland.* We analyze the performance of various fiber-optic probe designs for in-situ measurement of diffusely back-scattered light by turbid media. The characteristics of probes with different interaction volumes is discussed and fitted to model calibration functions.

SThD3 • 4:09 p.m.
ZnO Based Interdigited MIS Ultraviolet Photodetectors, ***Ghusoon M. Ali***, *P. Chakrabarti; Banaras Hindu Univ., India.* The article reports fabrication and characterization of ZnO-based interdigited metal-insulator-semiconductor (MIS) ultraviolet photodetectors. We estimated the contrast-ratio, responsivity, detectivity and quantum-efficiency of the photodetectors for an incident optical-power of 0.1mW at 365nm ultraviolet-wavelength.

SThD4 • 4:21 p.m.
Self-Assembled Monolayers (SAMs) of Porphyrin Deposited inside Hollow-Core Photonic Bandgap Fiber (HCPBGF) and Polarization Maintaining Fiber (PMF), ***Alexei Veselov***[1], *C. Thür*[2], *A. Efimov*[1], *A. Chamorovskiy*[2], *M. Guina*[2], *O. Okhotnikov*[2], *H. Lemmetyinen*[1], *N. Tkachenko*[1]; [1]*Dept. of Chemistry and Bioengineering, Tampere Univ. of Technology, Finland,* [2]*Optoelectronics Res. Ctr., Tampere Univ. of Technology, Finland.* Properties of porphyrin films deposited inside photonic crystal and polarization maintaining fibers are reported. Self-assembled monolayer (SAM) method was used. Such photoactive materials as porphyrin hold promise for the development of chemical sensors.

SThD5 • 4:33 p.m.
High Power DFB Laser for Trace Gas Concentration and Precision Metrology, Lars Hildebrandt, J. Koeth, M. Fischer, M. Legge, J. Seufert, K. Rössner, C. Zimmermann, W. Zeller; nanoplus Nanosystems and Technologies GmbH, Germany. We report about state-of-the-art DFB laser technology with a particular focus on novel high power lasers with sub-1MHz emission linewidth which enable previously unattained levels of precision in sensing applications.

NOTES

Key to Authors and Presiders

(**BOLD** denotes Presider or Presenting Author)