Welcome to Guangzhou and the Asia Communications and Photonics Conference

It is a great pleasure to invite you to participate in the Asia Communications and Photonics Conference (ACP) 2012 and share the latest news in communications and photonics science, technology and innovations from leading companies, universities and research laboratories throughout the world. ACP is Asia's premier conference in the Pacific Rim for photonics technologies, including optical communications, biophotonics, nanophotonics, illumination and applications in energy. ACP is co-sponsored by five technical societies–IEEE Photonics Society, OSA, SPIE, the Chinese Optical Society and the Chinese Institute of Communications. The local organization of the technical conference is led by South China Normal University.

The ACP technical conference features a full suite of plenary, invited, and contributed talks given by international academic and industrial researchers who are leaders in their respective fields. This year's conference will feature the following topics: Novel Fibers and Fiber-based Devices; Optoelectronic Integration, Devices, and Materials; Optical Transmission Systems, Subsystems, and Technologies; Network Architectures, Management, and Applications; Biophotonics and Optical Sensors; LEDS, Photovoltaics, and Optoelectronics in Energy; and a Mini Symposium on Advanced Photonics Materials. The conference will also include a wide spectrum of workshops, and an Industry Forum to provide participants with the latest technical breakthroughs and emerging new commercial applications of optoelectronics subsystems and technologies. With a conference program of broad scope and of the highest technical quality, ACP provides an ideal venue to keep up with new research directions and an opportunity to meet and interact with the researchers who are leading these advances. We have over 650 papers scheduled, including 130 invited and six tutorial presentations made by many of the world's most prominent researchers from academia and industry. We thank all the contributors and authors for making ACP a truly unique, outstanding global event.

Our conference highlight is the Plenary Session scheduled on the morning of Friday, 9 November. Four outstanding, distinguished speakers will give presentations. Professor Stefan W. Hill of the Department of Nanobiophotonics at the Max-Planck-Institute for Biophysical Chemistry in Germany will give a Keynote Address on *High Resolution Optical Microscopy.* Professor Yasuhiko Arakawa from the Institute for Nano Quantum Information Electronics at the University of Tokyo in Japan will present on Advances of Quantum Dot Photonics: From Science to Practical Implementation. Dr. Peter Winzer from the Optical Transmission Systems and Networks Research Department at Bell Laboratories, Alcatel-Lucent, USA will discuss Optical Networking Beyond WDM. Mrs. Wei Bing (on behalf of Dr. Zhengmao Li, Executive Vice President of China Mobile) will give a presentation about the strategy and requirement on 100G WDM of China Mobile. In addition to the regular technical sessions, four workshops will also be held featuring over thirty invited speakers. Two pre-conference workshops on "Photonic Integrated Circuits for Next Generation Computers and Networks," and "Energy Efficient Optical Communications and Networking," have been scheduled for Wednesday, 7 November and are complimentary to conference registrants. Other workshops include "Biophotonics Challenges-Research Frontiers vs. Biomedical Applications in the Real World and Commercialization" (10th Nov.) and an "ICAM Workshop on Emerging Topics of Silicon Photonics" (8th and 10th Nov.). These workshops will also be held free of charge to conference registrants. An Industry Forum will be held from 08:30-18:00 on Thursday, 8 November. The Forum will address challenging issues of great interest to the industry. This year the Industry Forum will explore Optical Transport Systems and Networks – Current Status and Future Trends. We would like to thank the workshop and Industry Forum organizers and speakers for the excellent program.

Best Student Paper Awards will be given to students who are first authors and presenters of exceptional contributed talks. For each technical track, one winner and two honorable mentions will be selected. Awards will be presented during the Banquet on Friday, 9 November. We would like to acknowledge Synopsys and Photon Design for sponsoring this awards program. Two poster-only sessions will be held on Friday afternoon from 15:30-18:30. This is a good chance for you to meet with the authors and discuss technical issues in-depth.

In addition to the technical program, we have prepared a rich social program to facilitate meeting and networking with colleagues from all over the world. A Welcome Reception will be held on a boat in the evening on Wednesday, 7th Nov, including dinner and the Pearl River Night Cruise. The cruise will allow you to tour the most scenic spots of Guangzhou, including more than 30 areas of cultural or historical significance. On the evening of Friday, 9 November, we will hold a banquet for conference registrants in the Garden Hotel's Convention Hall. The banquet will feature many professional musical performances and the presentations of the Best Student Paper Awards. If you want to visit any local Guangzhou institutions, organizations and companies, you may contact our local organizer, South China Normal University. They will be glad to assist you for any request you may have.

It is an enormous task to organize a conference and it is impossible to succeed without the dedicated efforts of many supporters and volunteers. We are indebted to the entire Technical Program Committee led by Chennupati Jagadish *(Australian National Univ., Australia*); Xiang Liu (*Bell Labortories, USA*); Xiaomin Ren (*Beijing Univ. of Posts and Telecommunications, China*); and Perry Ping Shum (*Nanyang Technological Univ., Singapore*); and the Subcommittee Chairs who have worked persistently throughout the whole year to invite speakers, solicit and review papers, organize the technical sessions which results in the excellent technical program. We also thank the staff and volunteers of the professional societies from OSA, IEEE/PS, SPIE, COS, and CIC for organizing and sponsoring the event.

Guangzhou (Canton) is the capital of China's most populous province (Guangdong), where the Chinese Revolution of 1911 started, as well as China's reform (1978). Guangzhou is also famous for its delicate Canton food. We hope you will enjoy the conference and your stay in Guangzhou.

Sincerely,

Sailing He
The Royal Inst. of Technology, Sweden
and Zhejiang Univ.,China,
General Chair

Arthur Chiou
National Yang-Ming Univ.,Taiwan,
General Chair

Thomas L. Koch
Univ. of Arizona, USA,
General Chair

Yikai Su
Shanghai Jiaoton Univ., China,
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Hongping Zhao, *Case Western Reserve Univ., USA*

Conference Highlights

Plenary

The ACP Plenary Session will take place on Friday, 9 November in the Convention Hall of the Garden Hotel. The session will feature presentations by the following esteemed leaders in the field.

08:30–08:35
Welcome and Opening Remarks

08:35-10:05
Plenary Session I

08:05-09:20
High Resolution Optical Microscopy, Stefan W. Hell; *Department of Nanobiophotonics, Max-Planck-Institute for Biophysical Chemistry, Germany*

09:20-10:05
Advances of Quantum Dot Photonics: From Science to Practical Implementation, Yasuhiko Arakawa; *Institute for Nano Quantum Information Electronics, The Univ. of Tokyo, Japan*

10:05-10:30
Tea Break

10:30-12:00
Plenary Session II

10:30-11:15
Optical Networking Beyond WDM, Peter Winzer; *Optical Transmission Systems and Networks Research Department, Bell Laboratories, Alcatel-Lucent, USA*

11:15-12:00
The Strategy and Requirement on 100G WDM of China Mobile, Wei Bing (on behalf of Zhengmao Li, Executive Vice President); *China Mobile, China*

12:00
Lunch Break

High Resolution Optical Microscopy, Stefan W. Hell; *Department of Nanobiophotonics, Max-Planck-Institute for Biophysical Chemistry, Germany*

Stefan W. Hell is a scientific member of the Max Planck Society and a director at the Max Planck Institute for Biophysical Chemistry in Göttingen, where he currently leads the Department of NanoBiophotonics. He is an honorary professor of experimental physics at the Univ. of Göttingen and adjunct professor of physics at the Univ. of Heidelberg. Since 2003 he has led the High Resolution Optical Microscopy division at the German Cancer Research Center (DKFZ) in Heidelberg. He is a member of the board of directors of the Göttingen Laser Laboratory as well as a member of the Academy of Sciences of Göttingen and Heidelberg. Stefan W. Hell received his diploma (1987) and doctorate (1990) in physics from the Univ. of Heidelberg (both advised by Prof. S. Hunklinger). From 1991 to 1993 he worked at the European Molecular Biology Laboratory, also in Heidelberg, and followed with stays as a senior researcher at the Univ. of Turku, Finland, between 1993 and 1996, and as a visiting scientist at the Univ. of Oxford, England, in 1994. In 1997 he was appointed to the Max Planck Institute for Biophysical Chemistry in Göttingen, where he has built up his current research group dedicated to sub-diffraction-resolution microscopy. In 2002, following his appointment as a director, he established the department of Nanobiophotonics. Stefan W. Hell is credited with having conceived, validated and applied the first viable concept for breaking Abbe's diffraction-limited resolution barrier in a light-focusing microscope. He has published about 200 original publications and has received several awards, including the Prize of the International Commission in Optics (2000), the Carl Zeiss Research Award (2002), the "Innovation Award of the German Federal President" (2006), the Julius Springer Award for Applied Physics (2007), Leibniz Prize (2008), the Lower Saxony State Award (2008), the Otto-Hahn-Prize in Physics (2009), the Ernst Hellmut Vits Prize (2010), the Hansen Family Award (2011), the Körber European Science Prize (2011) and the Gothenburg Lise Meitner Prize 2010/2011.

Advances of Quantum Dot Photonics: From Science to Practical Implementation, Yasuhiko Arakawa; *Institute for Nano Quantum Information Electronics, The Univ. of Tokyo, Japan*

Yasuhiko Arakawa received his BE, ME, and PhD degree in Electronics and Electrical Engineering from The Univ. of Tokyo, Japan in 1975, 1977 and 1980, respectively. In 1980, he joined The Univ. of Tokyo as an assistant professor and promoted to an associate professor in 1981. He became a full professor in 1993. He is currently a professor of Institute of Industrial Science and the director of Institute for Nano Quantum Information Electronics, The Univ. of Tokyo. He has been a member of Science Council of Japan (SCJ) since 2009. He is also Fellow of the IEEE, OSA, JSAP, and IEICE, respectively and a Vice President of International Commission for Optics (ICO). He has been engaged in pioneering research on quantum dots and nanophotonics devices, including the proposal of the quantum dots and their application to lasers, the discovery of cavity polariton effect in semiconductors, single photon emitters operating at telecom wavelengths, the demonstration of single artificial atom lasers, and the theoretical limit of conversion efficiency of quantum dot solar cells. For his seminal contributions, he received numerous awards including JSAP Isamu Akasaki Award ('12), Heinrich Welker Award ('11), OSA Nick Holonyak, Jr. Award ('11), C&C Award ('10), Medal with Purple Ribbon ('09), IEEE David Sarnoff Award ('09), Prime Minister Award ('07), Fujiwara Award ('07), IEEE/LEOS William Streifer Award ('04), and Leo Esaki Prize ('04).

Optical Networking Beyond WDM, Peter Winzer; *Optical Transmission Systems and Networks Research Department, Bell Laboratories, Alcatel-Lucent, USA*

Wavelength-division multiplexing (WDM) has economically enabled network traffic growth for two decades, but is now approaching fundamental scalability limits. Space-division multiplexing (SDM) is needed to scale transport networks to Petabits/s and beyond, ushering in a new era in optical fiber communications.

Dr. Peter Winzer heads the Optical Transmission Systems and Networks Research Department at Bell Laboratories, Alcatel-Lucent, in Holmdel, NJ. At Bell Labs since 2000, he has focused on various aspects of high-bandwidth fiber-optic communication systems, including Raman amplification, advanced optical modulation formats and receiver concepts, digital signal processing and coding, as well as on robust network architectures for dynamic data services. He demonstrated several high-speed and high-capacity optical transmission records from 10 to 400 Gb/s, including the first 100G and the first 400G electronically multiplexed optical transmission systems and the first field trial of live 100G video traffic over an existing carrier network. Since 2008 he has been investigating spatial multiplexing as a promising option to scale optical transport systems. He has widely published and patented and is actively involved in technical and organizational tasks with the IEEE Photonics Society and the OSA. He is a Distinguished Member of Technical Staff at Bell Labs and a Fellow of the IEEE and the OSA.

The Strategy and Requirement on 100G WDM of China Mobile, Wei Bing (on behalf of Executive Vice President, Zhengmao Li); *China Mobile, China*

Mrs. Wei Bing is the Deputy General Manager of China Mobile Research Institute (CMRI). She has over 20 years of Telecom experience. She is well accomplished in Core Network, Intelligent Network, Transport network, IP network, Security and Service network. She was in charge of many projects including "Technique roadmap of China Mobile", "Technique foundation of TD-SCDMA", "The development strategy of soft switch", "The research and development of Data Service Management Platform (DSMP)". She was rewarded the second prize of the "National science and technology development". She holds more than 20 domestic and international patents and has published many scientific papers.

Mr. Li Zhengmao is Executive Vice President of China Mobile Communications Corporation. He was appointed to the position in May 2008 and currently assists the President in relation to technology, R&D, overseas investment issues and management of China Mobile Charity Foundation, etc. From 1994 onwards, Mr. Li held several positions in China United Telecommunications Corporation ("former China Unicom") as Deputy General Manager of Network Technology, General Manager of Wireless Communications, General Manager of Technology and Deputy Chief Engineer. Mr. Li was appointed Executive Director and Vice President of China United Telecommunications Limited in April 2000, and General Manager of the Yunnan Branch of former China Unicom in May 2002. In December 2003, he was appointed Vice President of former China Unicom and assisted the President in relation to value-added services, data and fixed-line value-added services, international business, etc.

Welcome Reception

Wednesday, 7 November
18:30–21:00
Pearl River Cruise. Meet in Lobby of Garden Hotel.

The Conference Welcome Reception will be held on Guangzhou's newest and largest luxury cruise ship on the evening of 7 November. The event will include dinner and a Pearl River Night Cruise aboard a three-tiered, glass-bottomed cruise ship. The Cruise will feature a river tour of the most scenic sights in Guangzhou, including over 30 sites of historical or cultural significance, as well as six karaoke rooms, restaurants and breath-taking views from the observation decks.

Poster Sessions

Friday, 9 November
15:30–18:30

Poster Session I
Hydrangea, Chrysanthemum, and Hibiscus, Garden Hotel

Poster Session II
Lobby of Convention Hall, Garden Hotel

Over 100 posters will be displayed during ACP 2012. These sessions are designed to provide an opportunity for selected papers to be presented in greater visual detail and facilitate vivid discussions with attendees. Authors will remain in the vicinity of the bulletin board for the duration of the session to answer questions.

Banquet

Friday, 9 November
19:00–21:00
Convention Hall, Garden Hotel

The banquet will be held in the Garden Hotel's Convention Hall on the evening of 9 November. The banquet will feature many professional musical performances and the Best Student Paper Awards presentations.

General Information

Registration

Lobby, Garden Hotel

Registration Hours

Wednesday, 7 November	12:00–18:00
Thursday, 8 November	07:45–18:00
Friday, 9 November	07:45–18:00
Saturday, 10 November	07:45–18:00

Speaker Preparation

All oral presenters should check in at the corresponding session room at least thirty minutes prior to their scheduled talk to upload and check their presentation.

Exhibition

3rd Floor Hallway (close to the coffee break area), Garden Hotel

The ACP Exhibition is open to all registered attendees.

Exhibition Hours

Thursday, 8 November	08:00–17:30
Friday, 9 November	08:00–17:30
Saturday, 10 November	08:00–17:30

Conference Materials

ACP Technical Digest on CD-ROM

The ACP 2012 Technical Digest on CD-ROM is composed of the 3-page summaries of invited and accepted contributed papers. The Technical Digest CD-ROM is included with a technical conference registration and can be found in your registration bag. The Digest will be available after the conference on **OSA's Optics InfoBase** (http://www.opticsinfobase.org/) and **IEEE Xplore Digital Library** http://www.ieee.org/web/publications/xplore/). The ACP 2012 Technical Digest is not available in print form. IEEE Xplore Digital Library and OSA's Optics InfoBase and archived and indexed by INSPEC R and Ei Compendex, where it will be available to the international technical community. All international registrants will receive a copy of the proceedings as part of their registration fee.

Workshops

Photonic Integrated Circuits for Next Generation Computers and Networks

Wednesday, 7 November
13:30-17:45
Begonia, Garden Hotel

In the next generation of computer and network technology, it is essential to increase the computation performance and network efficiency to a higher level by increasing the speed and bandwidth with the lowest possible power consumption. While CMOS-based silicon transistors might follow the expectations of the Moore's Law, the copper-based electrical interconnects are certainly not likely to meet these expectations. The CMOS-based electronic integrated circuit technology, for both computers and network systems, is rapidly approaching its limits in scaling with ever-increasing power consumption. Thus, the optics and photonics community has been looking for ways to overcome these limits by way of devising revolutionary alternate means such as optoelectronic and photonic integrated circuits, optical interconnects, silicon photonics, and nanophotonics. The rapid development of these integration technologies is showing promising solutions to the next generation computers and networks not only in power consumption but also in offering advantages like compactness, light-weight, resource saving, and increased functionalities. Photonic integrated circuits technology is offering promises of monolithic/hybrid integration of building block devices of diverse new functionalities of low cost, footprint, and power consumption based on compound semiconductors, group four semiconductors like silicon and germanium, dielectric wires, micro-rings, photonic crystals, nanowires, plasmonics, metamaterials, and others. Photonic integrated circuits can impact the existing architectures and performances in computers and networks with components of new design concepts and functionalities. Silicon photonics is also developing rapidly to provide solutions for micro/nano-photonic devices and integrated devices, active and passive, of diverse functionalities - modulators, detectors, waveguides, and filters - with benefits capitalizing the already well-established silicon foundry technology. The silicon platform offers especially high potentials based on large wafer sizes and high-yield fabrication. Optical interconnection technology is offering promising solutions of high-speed and high-bandwidth data movement not only within the computers but also between computers in data centers by way of board-to-board, chip-to-chip, and on-chip optical interconnection. The transition from copper to optics is expected to occur within the foreseeable future. The markets of these technologies are expected to grow fast in the next decade but many practical challenges still remain including cost issues. This workshop is to provide a forum for international experts to present and discuss the visions and perspectives of these technologies including recent progresses and future prospects and challenges for applications. A series of invited presentations, covering a variety of subjects, are scheduled for this half-day workshop.

Organizers:

El-Hang Lee
Inha Univ., Republic of Korea

Graham Reed
Southampton Univ., UK

Thomas Koch
Univ. of Arizona, USA

Photonic Integrated Circuits for Next Generation Computers and Networks I

13:30-15:00
Presider: El-Hang Lee; Inha University, South Korea

13:30 **Heterogeneous Photonic and Electronic Integrated Circuit Technologies for Future Computing and Networking Systems**, S. J. Ben Yoo; *University of California at Davis, USA*

14:00 **III-V and Silicon Photonic Integrated Circuit Technologies,** Thomas Koch; *University of Arizona, USA*

14:30 **Silicon- and Plasmonics-based Nanophotonics for Telecom and Interconnects,** Lech Wosinski; *KTH, Sweden*

15:00 **Silicon Based Modulators and Systems for Short Reach Interconnect**, Graham Reed; *Southampton University, UK*

Photonic Integrated Circuits for Next Generation Computers and Networks II

15:45-17:45
Presider: Graham Reed; Southampton University, UK

15:45 **Si/Ge/silica Monolithic Photonic Integration for Telecommunication Applications**, Koji Yamada; *NTT, Japan*

16:15 **Recent Advances in Manufactured Silicon Photonics Integrated Circuits,** Dazeng Feng; *Kotura, USA*

16:45 **Silicon and Hybrid Silicon Photodetectors for Photonic Integrated Circuits,** Andrew Poon; *Hong Kong Univ. of Science and Technology, Hong Kong*

17:15 **Modeling Challenges for Large-scale Photonic Integrated Circuits,** Andre Richter; *VPI Systems, Germany*

Energy Efficient Optical Communications and Networking

Wednesday, 7 November
13:30-18:00
Camellia, Garden Hotel

There is a rising concern about the energy consumption figures of communication networks. It has been estimated that the global ICT energy consumption amounts to 7% of the entire electricity production, while the energy requirements of data centers and network equipment are foreseen to grow with a yearly rate of 12%. Furthermore, with an ever-increasing demand for bandwidth, connection quality, and end-to-end interactivity, computer networks are requiring more and more sophisticated and power-hungry technologies. This is why every network segment, i.e., from the access to the core, has been the target of optimization studies aimed at reducing their power consumption. In this regard optical communication plays a central role. In the core segment transport solutions based on wavelength division multiplexing (WDM) technologies are able to significantly lower the overall power levels. Similarly, in the access segment Passive Optical Networks (PONs) are becoming an attractive alternative to their active counterparts. For this reason, and in order to foster further improvements, energy efficiency in the optical layer has attracted a lot of attention and a wide range of topics are addressed in the literature.

The scope of this workshop is to create a forum where experts from both academia and industry will have an opportunity to present and discuss the latest advances in the field of green optical communication and networking. The topics that will be addressed will cover both core and access segments, where in the latter energy efficient techniques specifically tailored for converged wired-wireless scenarios will also be included. Particular attention will also be devoted to the impact that energy efficiency strategies have on the Quality of Service (QoS) levels of the provisioned connections, e.g., end-to-end delay and quality of optical transmission, just to name a few. This former aspect is of the utmost importance for network operators who need to ensure that the savings in terms of reduced power do not affect the level of satisfaction of their customers.

The workshop is expected to last half a day, with two technical sessions consisting of invited talks given by experts, from industry and academia. A panel discussion will be organized at the end where the audience and the speakers will have the possibility to interact by asking/answering questions. We believe that addressing energy efficiency in optical communications and networking has the potential to greatly enrich the technical program of the conference. Academia, service providers, and network operators are the envisioned target for this event.

Organizers:

Paolo Monti
Royal Institute of Technology, Sweden

Jiajia Chen
Royal Institute of Technology, Sweden

Dan Kilper
Alcatel-Lucent, USA

Gangxiang (Steven) Shen
Soochow Univ., China

Schedule

13:30 Workshop Introduction

13:35 **Green RAN and Optical Fronthaul**, Chih-Lin I; *China Mobile Research Institute, China*

14:00 **An Intelligent Green Access Network for Organic Growth**, Xiaolin Lu, *Morning Forest, USA*

14:25 **Energy Evaluation of NGOA Architectures on Different Deployment Scenarios,** Carmen Mas, *Technical University Munich, Germany*

14:50 **Power Savings in Various Next-generaqtion of NGOA Architectures on Different Deployment Scenarios,** Bart Lannoo; *iMinds, Belgium*

15:15 Tea Break

15:45 **CHT's View on Green Network and ICT Services,** Ching-Sheu Wang; *Chunghwa Telecom, Taiwan*

16:10 **Photonic Technologies for Creating Energy Efficient Networks,** Ken-ichi Sato, *Nagoya University, Japan*

16:35 **Energy-Aware Protection in Optical Transport Networks,** Yabin Ye, *Huawei, Germany*

17:00 **An Overview of Research at the Centre for Energy-Efficient Telecommunications**, Chien Aun, *University of Melbourne, Australia*

17:25 **Simulative and Experimental Evaluation of Cyclic Sleep with Service Based Variable Sleep Period (CSVP),** Luca Valcarenghi; *Scuola Superiore S. Anna, Italy*

17:50 Closing Remarks

Biophotonics Challenges — Research Frontiers vs. Biomedical Applications in the Real World and Commercialization

Thursday, 8 November
13:45-18:00
Camellia, Garden Hotel

Organizers:

Chinlon Lin
Lightel, USA; National Chiao-Tung Univ., Hsinchu, Taiwan; National Sun Yet-sen Univ., Taiwan

Katarina Svanberg
Department of Oncology, Lund Univ., Sweden; Centre for Optical and Electromagnetic Research, South China Normal Univ., China

Sune Svanberg
Physics Department, Lund Univ., Sweden; Centre for Optical and Electromagnetic Research, South China Normal Univ., China

Biophotonics Challenges — Research Frontiers vs. Biomedical Applications in the Real World and Commercialization Session I: Presentations

13:45—16:15
Presider: Chinlon Lin; Lightel, USA

- **Welcome and Introduction to Workshop,** Chinlon Lin; *Lightel, USA*
- **Un-met Challenges in the Biomedical Field — Examples from Medicine-Can Photonics Meet Some of These?**, Katarina Svanberg; *Department of Oncology, Lund Univ., Sweden; Centre for Optics and Electromagnetic Research, South China Normal Univ., China.*
- **Promoting Innovation in Biophotonics to Economical Growth,** Dennis Matthews; *Univ. of California Davis, USA*
- **How Far Are we Away from Noninvasive Visualization of Histology in vivo and in situ?,** Xingde Li; *Johns Hopkins Univ., USA*
- **Microrheology for Biomedical Applications,** Arthur Chiou; *National Yang-Ming Univ., Taiwan*
- **Multiscale Photoacoustic Imaging for Biomedical Applications**, Da Xing; *South China Normal Univ., China*
- **In Vivo Noninvasive THz Imaging of Blood Glucose Level**, Chi-Kuang Sun; *National Taiwan Univ., Taiwan*
- **BioPhotonics in Europe**, Jürgen Popp; *Inst. for Physical Chemistry, Friedrich-Schiller Univ. Jena, Germany*
- **The Global Market for Photonics,** Eugene Arthurs; *SPIE, USA*
- **Problems and Opportunities in Commercialization in Applied Photonics,** Sune Svanberg; *Physics Department, Lund Univ., Sweden; Centre for Optical and Electromagnetic Research, South China Normal Univ., China.*

Biophotonics Challenges — Research Frontiers vs. Biomedical Applications in the Real World and Commercialization

17:00-18:00
Presider: Chinlon Lin; Lightel, USA

A panel, including ACP Plenary Speaker Stefan Hell, with a broad composition representing various aspects of Biophotonics, will have a strategic discussion on the role of Biophotonics R&D, and the challenges of advanced exploratory research in the frontier areas, versus the challenges of making a truly significant impact in the real-world biomedical applications. Aspects of commercialization will also be discussed.

Industry Forum on Optical Transport Systems and Networks – Current Status and Future Trends

With the development of new technologies, internet applications have diversified in recent years. Internet users continue to grow exponentially. Demand for bandwidth is increasing constantly. In Asia, traffic on backbone networks is estimated to increase 60% to 70% per year during the next five years. The total bandwidth for the backbone transport network in China alone will increase from 64 Tbit/s to 150~200 Tbit/s. Facing such a large traffic demand, optical interfaces supporting ultra-high speed communication are required and the transmission line rate will increase from 40-Gbit/s, 100-Gbit/s, to 400-Gbit/s, and even more than 1-Tbit/s. Beyond 100-Gbit/s, multi-carrier superchannel technologies are becoming a new trend. How to improve the spectral efficiency and how to adjust network resources to enhance overall network utilization efficiency are becoming very important.

Cloud computing and data centers are driving the introduction of new services and applications. The data traffic patterns are also becoming more dynamic and more unexpected. Traditional optical transport networks use fixed-rate OTN interfaces, fixed WDM channel spacing, and separated management and control plane, whose excess provisioning and static connectivity can no longer meet the new optical transport requirements. This industry forum is dedicated to present and discuss the next generation optical transport network in terms of its key technologies, current status, and future tend. A series of invited presentations, covering a rich variety of topics, are scheduled for this one-day event, which consists two half-day workshops, with the first one being organized by Huawei Technologies Co., and the second one being organized by Alcatel-Lucent. Many internationally renowned experts in the field of optical transport from the Asia-Pacific Regime will be presenting and leading panel discussions.

Industry Forum on Optical Transport Systems and Networks – Current Status and Future Trends I
Thursday, 8 November
08:30-12:00
Conference Room 7

Organizers:

Qianjin Xiong
Huawei Technologies Co., Ltd., China

Zhiyong Feng
Huawei Technologies Co., Ltd., China

- **Title to be Announced,** Qianjin Xiong; *Optical Advanced Technology Research Dept., Huawei, China*
- **Title to be Announced,** Zhang Chengliang; *China Telecom, China*
- **100G Transmission System Test and Standard in China,** Haiyi Zhang; *CATR of MIIT, China*
- **Title to be Announced,** Chao Lu; *The Hong Kong Polytechnic University, China*
- **Hot Topics of Next-generation Broadband Optical Networks,** Gangxiang Shen; *Soochow Univ., China*
- **Components and Modules for Next Generation Optical Network,** Brandon Collings; *JDS Uniphase, USA*
- **Title to be Announced,** Ian Clarke; *Finisar Shanghai, China*

Industry Forum on Optical Transport Systems and Networks – Current Status and Future Trends II
Thursday, 8 November
14:00-17:30
Conference Room 7

Organizers:

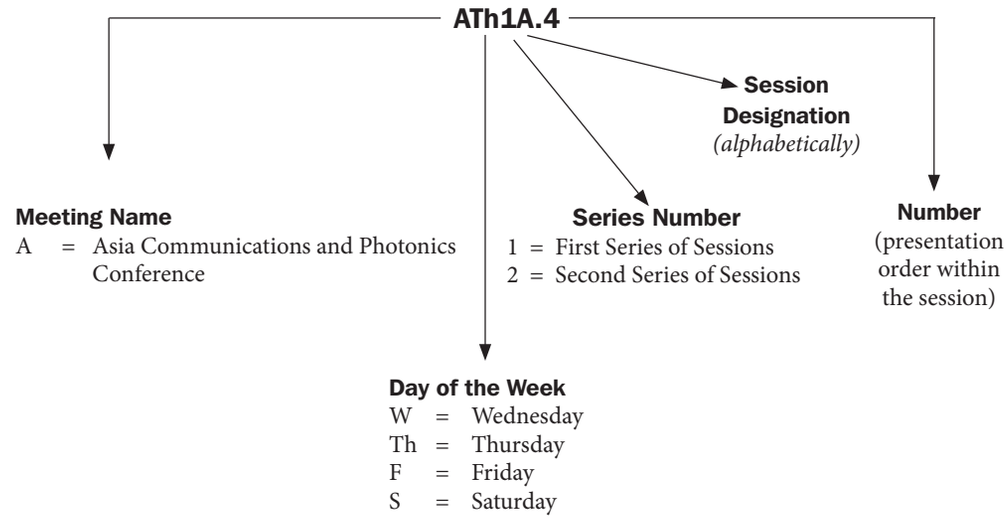
Xiang Liu
Bell Labs, Alcatel-Lucent, USA

Xiaobo Yi
Shanghai Bell, Alcatel-Lucent, China

- **Optical Mobile Backhaul and Broadband Access,** Jun Terada, *Optical Wireless Convergence Group, NTT Access Technology and Service Labs, NTT, Japan*
- **China Mobile's Vision on 100G Deployment,** Han Li; *China Mobile, China*
- **China Unicom's View 100G Deployment,** Guangquan Wang; *China Unicom, China*
- **NEC's R&D on 100G and Beyond,** Ting Wang; *NEC America, USA*
- **ZTE's R&D on 100 G and Beyond,** Hung-Chang Chien; *ZTE America, USA*
- **R&D for Future Optical Transport Systems in China,** Qi Yang, *Wuhan Research Institute of Posts and Telecommunications, China*
- **Alcatel-Lucent's 100G Transmission Test and Deployment,** Xiaochong Zhang, *Alcatel-Lucent, China*

Wednesday, 7 November		
	Begonia	**Camellia**
12:00–18:00	**Registration,** *Lobby*	
13:30–15:30	**Workshop • Photonic Integrated Circuits for Next Generation Computers and Networks I**	**Workshop • Energy Efficient Optical Communications and Networking I**
15:30–15:45	**Tea Break,** *3rd Floor Hallway*	
15:45–17:45	**Workshop • Photonic Integrated Circuits for Next Generation Computers and Networks II**	**Workshop • Energy Efficient Optical Communications and Networking II**
18:30–21:00	**Welcome Reception, Pearl River Cruise** *(meet in Lobby)*	

Explanation of Session Codes



The first letter of the code designates the meeting. The second element denotes the day of the week (Wednesday = W, Thursday = Th, Friday = F, Saturday = S). The third element indicates the session series in that day (for instance, 1 would denote the first parallel sessions in that day). Each day begins with the letter A in the fourth element and continues alphabetically through a series of parallel sessions. The lettering then restarts with each new series. The number on the end of the code (separated from the session code with a period) signals the position of the talk within the session (first, second, third, etc.). For example, a presentation coded ATu1A.4 indicates that this paper is being presented on Thursday (Th) in the first series of sessions (1), and is the first parallel session (A) in that series and the fourth paper (4) presented in that session.

Program Updates and Changes may be found on the Update Sheet distributed at registration.

Thursday, 8 November									
	Orchid	Hydrangea	Chrysanthemum	Begonia	Hibiscus	Marigold	Magnolia	Dahlia	Camellia
07:45–18:00	Registration, Lobby								
08:00–10:00	ATh1A • SC 1 - Novel Fibers I	ATh1B • SC 2 - Silicon Photonics I	ATh1C • SC 3 - Electronic Processing	ATh1D • SC 4 - Energy Efficiency in Optical Access Networks	ATh1E • SC 5 - Micromanipulation and Cellular Microscopy	ATh1F • SC 6 - LED Technologies and Applications	Industry Forum (begins at 08:30)	ATh1G • Symposium on Advanced Photonics: Novel Optical Materials I	ATh1H • SC 3 - Future Transport Networks
10:00–10:30	Tea Break, *3rd Floor Hallway (near Exhibition Area)*								
10:30–12:15	ATh2A • SC 1 - Best Student Paper Competition: Novel Fibers and Fiber-based Devices	ATh2B • SC 2 - Best Student Paper Competition: Optoelectronic Integration, Devices, and Materials	ATh2C • SC 3 - Best Student Paper Competition: Optical Transmission Systems, Subsystems, and Technologies	ATh2D • SC 4 - Best Student Paper Competition: Network Architectures, Management, and Applications	ATh2E • SC 5 - Best Student Paper Competition: Biophotonics and Sensors	ATh2F • SC 6 - Best Student Paper Competition: LEDs, Photovoltaics, and Optoelectronics in Energy	Industry Forum	ATh2G • Symposium on Advanced Photonics: Novel Optical Materials II	ATh2H • SC 5 - Optical Sensors
12:15–13:45	Lunch Break *(on your own)*								
13:45–15:30	ATh3A • SC 1 - Novel Fibers and Fiber-based Devices	ATh3B • SC 2 - Silicon Photonics II	ATh3C • SC 3 - Future Access Networks	ATh3D • SC 4 - Optical Access Networks I	ATh3E • SC 5 - Raman-based Biophotonics	ATh3F • SC 6 - Novel Solar Technologies	Industry Forum	ATh3G • Symposium on Advanced Photonics: Photosensitive and Photomobile Materials	Workshop • Biophotonics Challenges-Research Frontiers vs. Biomedical Applications in the Real World and Commercialization I
15:30–16:00	Tea Break, *3rd Floor Hallway (near Exhibition Area)*								
16:00–18:00	ATh4A • SC 1 - Fiber Devices I	ATh4B • SC 2 - Silicon Photonics III	ATh4C • SC 3 - Coherent Systems	ATh4D • SC 4 - Network Survivability and Reconfiguration (ends at 18:15)	ATh4E • SC 5 - MIR Sensing	ATh4F • SC 6 - Development and Production of High Performance LEDs	Industry Forum	ATh4G • Symposium on Advanced Photonics: Advanced Photonics	Workshop • Biophotonics Challenges-Research Frontiers vs. Biomedical Applications in the Real World and Commercialization II

Friday, 9 November							
	Orchid	**Hydrangea**	**Chrysanthemum**	**Hibiscus**	**Begonia**	**Marigold**	**Lobby of the Convention Hall**
07:45–18:00	**Registration,** *Lobby*						
08:30–10:05	**AF1A • Plenary Session I,** *Convention Hall*						
10:05–10:30	**Tea Break,** *3rd Floor Hallway (near Exhibition area)*						
10:30–12:00	**AF2A • Plenary Session II,** *Convention Hall*						
12:00–13:30	**Lunch Break**						
13:30–15:30	**AF3A • SC 1 - Novel Fibers II**	**AF3B • SC 2 - Silicon Photonics Sources**	**AF3C • SC 3 - PON**	**AF3D • SC 5 - Remote Sensing**	**AF3E • SC 4 - Elastic Optical Networks I**	**AF3F • SC 6 - Solar Cells and Thermoelectric Technologies**	**AF3G • SC 3 - Performance Monitoring**
15:30–16:00	**Tea Break,** *3rd Floor Hallway (near Exhibition area)*						
15:30–18:30	**Post-Deadline Session I** (ends at 18:00)	**AF4A • Poster Session I**			**Post-Deadline Session II** (ends at 18:00)	**Post-Deadline Session III** (ends at 18:00)	**AF4B • Poster Session II**
19:00–21:00	**Conference Banquet,** *Convention Hall*						

Saturday, 10 November								
	Orchid	**Hydrangea**	**Chrysanthemum**	**Begonia**	**Hibiscus**	**Marigold**	**Dahlia**	**Camellia**
07:45–18:00	**Registration,** *Lobby*							
08:00–09:45	**AS1A • SC 1 - Fiber Amplifiers and Lasers II**	**AS1B • SC 2 - Plasmonic and Nonlinear Effects I**	**AS1C • SC 3 - Long Distance Transmission Systems**	**AS1D • SC 4 - Optical Access Networks II**	**AS1E • SC 5 - Optical sensors and trace gas sensing**	**AS1F • SC 6 - Appraoches for High Efficiency and White LEDs**	**AS1G • SC 3 - Innovative Subsytems**	**AS1H • SC 2 - Quantum Well and Quantum Dot Structures**
09:45–10:15	**Tea Break,** *3rd Floor Hallway (near Exhibition Area)*							
10:15–12:00	**AS2A • SC 1 - Fiber Devices II**	**AS2B • SC 2 - Plasmonic and Nonlinear Effects II**	**AS2C • SC 3 - Advanced Subsystems**	**AS2D • SC 4 - Optical Transport Networks**	**AS2E • SC 5 - Clinical biophotonics**	**AS2F • SC 6 - White LEDs Technologies and III-Nitride Solar Technologies**	**AS2G • SC 3 - Optical Processing I**	**AS2H • SC 2 - Plasmonic Nanostructures**
12:00–13:30	**Lunch Break** *(on your own)*							
13:30–15:30	**AS3A • SC 4 - Optical and Radio-over-Fiber Transmission**	**AS3B • SC 2 - Silicon Modulators**	**AS3C • SC 3 - Access and Indoor Systems**	**AS3D • SC 4 - Network Design and Energy Efficiency**	**AS3E • SC 5 - Nanoparticle-based Biophotonics**	**AS3F • SC 6 - Physics and Devices for High Efficiency LEDs**	**AS3G • SC 3 - Optical Processing II**	**AS3H • SC 2 - Slow Light**
15:30–16:00	**Tea Break,** *3rd Floor Hallway (near Exhibition Area)*							
16:00–18:00	**AS4A • SC 4 - Data Centers and Optical Interconnects**	**AS4B • SC 2 - Photonic Integrated Circuits**	**AS4C • SC 2 - Transmission Impairments**	**AS4D • SC 4 - Elastic Optical Networks II**	**AS4E • SC 5 - Biophotonics**	**JS4F • SC6 - ICAM Joint Session on Plasmonics, LEDs, and Solar Cells**	**AS4G • SC 3 - Optical OFDM**	**AS4H • SC 2 - III-V Semiconductor Lasers**

1 层 F

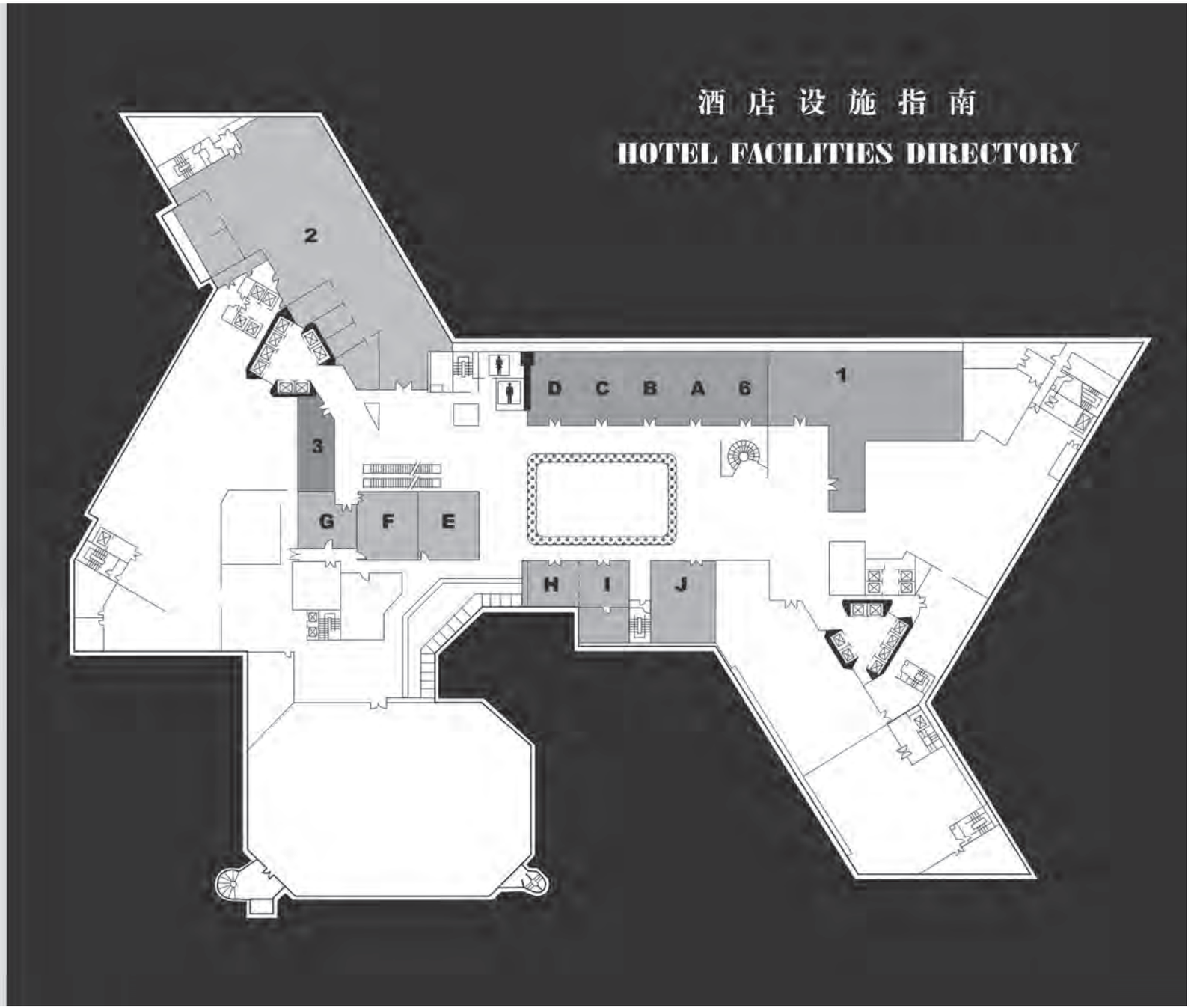
1 观瀑廊咖啡厅
2 美食阁
3 接待处
4 国际会议中心
5 荷塘雅座
6 绅士轩
7 中国银行
8 票务中心
9 礼宾部及运输部
10 香港上海汇丰银行有限公司
11-25 商场
26 泰国国际航空大众有限公司广州办事处
27 美国联合航空公司广州办事处
28 越南航空公司广州办事处
29 在广州日本国总领事馆
30 网球场

1 The Cascade Cafe
2 The Delicatessen Corner
3 Reception
4 The Convention Hall
5 The Lotus Pond
6 Tavern Bar
7 Bank of China
8 Ticketing Centre
9 Concierge and Transportation
10 The Hongkong and Shanghai (Banking Corporation Limited GZ Branch)
11-25 Shops
26 Thai Airways International Public Company Limited
27 United Airlines GZ Office
28 Vietnam Airlines
29 Consulate-General of Japan, GZ
30 Tennis Court

3 层 F

1 名仕阁
2 桃园馆
3 商务中心
4 宴会厅
A 玉兰厅 B 芍药厅
C 山茶厅 D 海棠厅
E 绣球厅 F 菊花厅
G 芙蓉厅 H 万寿菊厅
I 兰花厅 J 紫荆厅

1 The Connoisseur
2 The Peach Blossom
3 Business Centre
4 Function Rooms
A Magnolia B Dahlia
C Camellia D Begonia
E Hydrangea F Chrysanthemum
G Hibiscus H Marigold
I Orchid J Bauhinia



NOTES

Orchid	Hydrangea	Chrysanthemum	Begonia

07:45–18:00 Registration Open

08:00–10:00
ATh1A • SC 1 - Novel Fibers I
Presider: Kin Chiang; City Univ. of Hong Kong, Hong Kong

ATh1A.1 • 08:00 Tutorial

Enhancing Optical Communications with New Generation Fibers, David J. Richardson[1]; [1]*Univ. of Southampton, UK.* I will describe recent work on the development of the underpinning fiber technology (mainly transmission fibers and associated amplifiers) required for next generation ultrahigh capacity networks. Particular focus will be placed on space division multiplexed approaches.

David J. Richardson was born in Southampton, England in 1964 and obtained his B.Sc. and PhD in fundamental physics from Sussex University U.K. in 1985 and 1989 respectively. He joined the Optoelectronics Research Centre (ORC) at Southampton University as a Research Fellow in May 1989 and was awarded a Royal Society University Fellowship in 1991 in recognition of his pioneering work on short pulse fiber lasers. Professor Richardson is now Deputy Director of the ORC with responsibility for fiber related research. His current research interests include amongst others: optical fiber communications, microstructured optical fibers and high-power fiber lasers. He has published more than 800 conference and journal papers and produced more than 20 patents. Professor Richardson was one of the co-founders of SPI Lasers Ltd an ORC spin-off venture acquired by the Trumpf Group in 2008. He is a Fellow of the Optical Society of America, the Institute of Engineering and Technology and was made a Fellow of the Royal

08:00–10:00
ATh1B • SC 2 - Silicon Photonics I
Presider: Danxia Xu; National Research Council of Canada, Canada

ATh1B.1 • 08:00 Invited

Silicon Photonics: Opportunities and Challenges, Haisheng Rong[1]; [1]*Intel Corporation, USA.* This paper will discuss the opportunities and challenges presented by silicon photonics.

ATh1B.2 • 08:30

Low Loss Silicon Nanowire Waveguide Fabricated with 0.13μm CMOS Technology, Zhen Sheng[1], Chao Qiu[1,2], Hao Li[1,3], Le Li[2], Albert Pang[2], Aimin Wu[1], Xi Wang[1], Shichang Zou[1], Fuwan Gan[1]; [1]*Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China;* [2]*Grace Semiconductor Manufacturing Corporation, China;* [3]*Graduate Univ. of Chinese Academy of Sciences, China.* Silicon nanowire waveguides are fabricated on silicon-on-insulator (SOI) wafers with 0.13μm CMOS technology. Propagation losses of 2.4dB/cm and 0.59dB/cm are obtained for TE and TM modes, respectively, for the 500nm×220nm channel waveguide.

08:00–10:00
ATh1C • SC 3 - Electronic Processing
Presider: Xiang Liu; Alcatel-Lucent, USA

ATh1C.1 • 08:00

Rapid Soft-Decision Trellis Coded 32QAM for Free Space Optical Communication, KM Wang[1]; [1]*Beijing Univ. of Posts and Telecommunications (BUPT), China.* The author applies multiple states trellis coded modulation schemes as well as rapid soft decision algorithm at different convolution length and achieves better bit error performance and high efficiency in free space optical communication systems.

ATh1C.2 • 08:15

Non-Decision Aid Modified Least Mean Square Algorithm for Joint Blind Equalization and Carrier Recovery in Optical Coherent Receiver, Md. Mosaddek H. Adib[1], Md. Ibrahim Khalil[1], Arshad M. Chowdhury[1,2], Md. Saifuddin Faruk[3], Geekung Chang[2]; [1]*Department of Electrical Engineering and Computer Science, North South Univ., Bangladesh;* [2]*School of Electrical and computer Engineering, Georgia Institute of Technology, USA;* [3]*Department of Electrical and Electronic Engineering, Dhaka Univ. of Engineering and Technology, Bangladesh.* We propose and demonstrate a new Non-Decision Aid Modified Least Mean Square (NDA-MLMS) algorithm for joint blind equalization and carrier recovery. The BER of 10^-3 is achieved with less than 1.9dB OSNR penalty for 14Gbaud 4-QAM system after 100km transmission and 500 KHz line width laser.

ATh1C.3 • 08:30 Invited

Symbol Spaced Adaptive MIMO Equalization for Ultra High Bit Rate Coherent Optical Communication, Dan Sadot[1,2], Albert Gorshtein[1,2]; [1]*Ben Gurion Univ. of the Negev, Israel;* [2]*Multiphy Ltd, Israel.* An improved adaptive MIMO equalizer is proposed for 1Sample/Symbol coherent systems ISI introduced by the AAF is kept and eventually recovered by MLSE. 1dB improvement is achieved compared to conventional MIMO.

08:00–10:00
ATh1D • SC 4 - Energy Efficiency in Optical Access Networks
Presider: Gangxiang Shen; Soochow Univ., China

ATh1D.1 • 08:00 Invited

Cognitive PONs: a Novel Approach Toward Energy Efficiency, Luca Valcarenghi[1]; [1]*Scuola Superiore Sant Anna di Pisa, Italy.* This paper introduces the concept of cognitive PONs, i.e. PONs capable of adapting their configuration based upon network status. Their potentials in decreasing PON energy consumption are highlighted in several scenarios.

ATh1D.2 • 08:30 Invited

Energy Star Rating for Future Telecom Services: Motivation, Methodologies and Challenges, Chien Aun Chan[1], Elaine Wong[1], Andre F. Gygax[1], Christopher A. Leckie[1], Ampalavanapillai Nirmalathas[1], Daniel C. Kilper[2]; [1]*Univ. of Melbourne, Australia;* [2]*Bell Labs, Alcatel Lucent, USA.* To help mitigate the adverse environmental impact of the growing Internet, we propose an Energy Star Rating system, which serves as a systematic framework for assessing, reporting, and benchmarking the sustainability of Internet services.

Hibiscus	Marigold	Dahlia	Camellia

07:45–18:00 Registration Open

08:00–10:00
ATh1E • SC 5 - Micromanipulation and Cellular Microscopy
Presider: Stefan Andersson-Engels; Lund Univ., Sweden

ATh1E.1 • 08:00 Invited

Shaped Light for Biophotonics**,** Kishan Dholakia[1]; [1]*Univ. of St Andrews, UK.* I will discuss how shaping light (Bessel, vortex etc) has been useful for many areas (OCT, STED, light sheet, trapping) and describe what other opportunities there are with an emphasis on work of many groups around the world.

ATh1E.2 • 08:30 Invited

Optically Driven Micromachines, Halina Rubinsztein-Dunlop[1]; [1]*School of Math & Physics, Univ. of Queensland, Australia.* All optically driven micromachines can use angular momentum of light to achieve their functions. These micromachines are produced by two photon photopolimerisation process or by producing new materials with a significant birefringence. Applications of these machines will be discussed.

08:00–10:00
ATh1F • SC 6 - LED Technologies and Applications
Presider: Nelson Tansu; Lehigh Univ., USA

ATh1F.1 • 08:00 Tutorial

Smart Lighting - More than Illumination, Robert F. Karlicek[1]; [1]*Electrical, Computer and Systems Engineering, Rensselaer Polytechnic Institute, USA.* Future Smart Lighting systems will sense and control the intensity, color and modulation of light for autonomous illumination systems that illuminate, inform and optimize energy efficiency and light quality and include video and communication services.

Dr. Robert F. Karlicek, Jr. directs the Smart Lighting Engineering Research Center and is a Professor of Electrical, Computer and Systems Engineering at Rensselaer Polytechnic Institute. He obtained his Ph.D. in Physical Chemistry from the University of Pittsburgh and has over 40 published technical papers and 26 U.S. patents.

08:00–10:00
ATh1G • Symposium on Novel Optical Materials I
Presider: Iam-Choon Khoo; Pennsylvania State Univ., USA

ATh1G.1 • 08:00 Invited

Trends and Future perspective of Electronic, Electro-Optic and Magnetic Materials, Jim J. Chang[1]; [1]*Lawrence Livermore National Laboratory, USA.* The approach and challenge of innovation through cross-discipline research will be presented to demonstrate the feasibility of achieving major advancement in both fundamental science understanding and capability enhancement. Specific examples will be given to illustrate the approaches and benefits from inspired and fostered innovations in electronic, electro-optics and magnetic materials and devises development.

ATh1G.2 • 08:30 Invited

Nanophotonics for Organic Material Sensing, Richard M. De La Rue[1], Basudev Lahiri[2], Graham Sharp[1], Scott G. McMeekin[3], Nigel P. Johnson[1]; [1]*School of Engineering, University of Glasgow, U.K.;* [2]*NIST, Maryland, USA;* [3]*Glasgow Caledonian University, U.K.* Metamaterial surfaces that exploit nanophotonic techniques are now being widely explored for applications in the sensing of organic materials. Our presentation will explore localisation and sensitivity issues for resonant structures.

08:00–10:00
ATh1H • SC 3 - Future Transport Networks
Presider: Benny Mikkelsen; Acacia Communications, Inc., USA

ATh1H.1 • 08:00 Invited

Terabit Superchannel Transmission: from Laboratory Testing to Field Demonstration, Hung-Chang Chien[1], Zhensheng Jia[1], Jianjun Yu[1], Ze Dong[1]; [1]*ZTE USA, USA.* The long reach capability of superchannel transmission using noise-suppressed Nyquist wavelength-division multiplexing (NS-N-WDM) has been evaluated. Field demonstration was achieved by co-transmitting 100G real-time channels, and 400G and 1T superchannels over 1750km with EDFA-only amplification.

ATh1H.2 • 08:30

Field Trial of Coherent Channel Tuning from Co-existing Channels Filling Full C-band Using 100GbE Transponder, Yoshiaki Aono[1], Masaki Sato[1], Tsutomu Tajima[1], Tiejun J. Xia[2], Glenn A. Wellbrock[2], Akihiro Tanaka[3], Philip N. Ji[3], Yue-Kai Huang[3], Ming-Fang Huang[3], Ezra Ip[3], Ting Wang[3]; [1]*Optical Network Division, NEC Corporation, Japan;* [2]*Verizon, USA;* [3]*NEC Laboratories America, USA.* We present the world first field trial with coherent channel tuning from co-existing channels distributed among full C-band, 4.4 THz, after 1,500-km transmission, and record 3,000-km single-channel transmission, both using an accomplished 100-GbE transponder.

Orchid

Academy of Engineering in 2009. Professor Richardson is Technical Co-ordinator on the EU FP7 project MODE GAP which is focussed on the development of SDM technology.

ATh1A.2 • 09:00 Invited

Bandwidth Measurement of Multimode Fibers Using Bit Error Rate Testing, Xin Chen[1], Jason E. Hurley[1], Ming-Jun Li[1]; [1]*Corning Incorporated, USA*. We demonstrate the measurement of multimode fiber bandwidth using bit error rate testing and the related power penalty. The measurement principle is illustrated both experimentally on actual fibers and theoretically through system level numerical modeling.

Hydrangea

ATh1B.3 • 08:45

Fabrication and Characterization of Silicon Photonic Waveguides and Devices via Selective Oxidation Process, Xiaokun Wang[1], Xiaowei Guan[1], Yaocheng Shi[1], Daoxin Dai[1]; [1]*Center for Optical and Electromagnetic Research,State Key Laboratory for Modern Optical Instrumentation, Zhejiang Provincial Key Laboratory for Sensing Technologies, Zhejiang Univ., China.* Silicon-on-insulator (SOI) optical waveguides are fabricated via selective oxidation process without any silicon etching step so that the waveguide surface becomes very smooth to achieve low-loss light propagation potentially. A high-Q ring-resonator is also demonstrated.

ATh1B.4 • 09:00

Novel suspended small SiO2 ridge optical waveguides for optical sensing, Pengxin Chen[1], Yunpeng Zhu[1], Yaocheng Shi[1], Sailing He[1], Daoxin Dai[1]; [1]*Zhejiang Univ., China.* Novel suspended SiO2 ridge optical waveguides on silicon are fabricated and characterized. The propagation loss and the bend loss measured are about 0.385dB/cm and 0.037dB/90° respectively for the fabricated 1μm-wide waveguides with a bending radius of 100μm when operating at 1550 nm.

ATh1B.5 • 09:15

Ultra-short Silicon Polarization Beam Splitter Based on an Asymmetrical Bent Directional Coupler, Jian Wang[1], Di Liang[2], Yongbo Tang[3], Daoxin Dai[1,3], John E. Bowers[3]; [1]*Centre for Optical and Electromagnetic Research, State Key Laboratory for Modern Optical Instrumentation, Zhejiang Provincial Key Laboratory for Sensing Technologies, Zhejiang Univ., Zijingang Campus, China;* [2]*Hewlett Packard Laboratories, USA;* [3]*Department of Electrical and Computer Engineering, Univ. of California, USA*. An ultra-short (L=9.5μm) polarization beam splitter (PBS) based on an asymmetrical bent directional coupler is demonstrated experimentally. The measured extinction ratios are about 15dB and 10dB for the TE and TM polarized lights around 1550nm.

Chrysanthemum

ATh1C.4 • 09:00

Experimental Demonstration of Digital Predistortion for Linearization of Mach-Zehnder Modulators in Direct-Detection MB-OFDM Ultra-Wideband over Fiber Systems, Oluyemi Omomukuyo[1], Manoj P. Thakur[1], John E. Mitchell[1]; [1]*Electronic and Electrical Engineering, Univ. College London, UK*. Digital predistortion for an intensity-modulated direct-detection MB-OFDM UWB system is proposed and experimentally demonstrated to compensate for the non-linear transfer characteristics of the utilized Mach-Zehnder modulator and improve system performance

ATh1C.5 • 09:15

Improvement of Phase Noise Compensation for Direct-Detection Optical OFDM via Data-Aided Phase Equalizer, Lilong Liu[1], Xuelin Yang[1], Weisheng Hu[1]; [1]*Shanghai Jiao Tong Univ., China.* We experimentally demonstrate a data-aided phase equalizer which adaptively compensates the phase noise for optical OFDM. The BER of 10-3 could be achieved by 7dBm less received optical power and therefore corroborates its superior performance.

Begonia

ATh1D.3 • 09:00

Investigating the Energy Savings of Cyclic Sleep with Service Guarantees in Long Reach PONs, Michele Chincoli[2], Luca Valcarenghi[1], Jiajia Chen[2], Paolo Monti[2], Lena Wosinska[2]; [1]*Scuola Superiore Sant Anna di Pisa, Italy;* [2]*KTH, Sweden.* This paper evaluates what are the conditions, in terms of increased overhead time and number of optical network units (i.e., ONUs), in which cyclic sleep based techniques are effective in Long Reach PONs.

ATh1D.4 • 09:15

Energy-Efficient Dynamic Bandwidth Allocation Algorithm for Sleep/Doze Mode VCSEL-ONU, Maluge Pubuduni Imali Dias[1], Elaine Wong[1,2]; [1]*National ICT Australia, Victoria Research Laboratory, Australia;* [2]*Centre for Energy Efficient Telecommunications, Australia.* An energy-efficient Just-In-Time based dynamic bandwidth allocation algorithm exploiting the sleep/doze capability of the VCSEL based ONU is proposed for 10 Gbps EPONs, achieving tangible amounts of energy savings even at low network loads.

Hibiscus

ATh1E.3 • 09:00
Manipulation of Cellular Calcium and Reactive Oxygen Species by a Femtosecond Laser, Hao He[1], Minglie Hu[1], Chingyue Wang[1]; [1]*Ultrafast Laser Laboratory, Tianjin Univ., China.* We report manipulation of cellular calcium and reactive oxygen species by a femtosecond laser. Modulation of fluorescence conversion from green fluorescence protein and intercellular calcium signaling were thus performed with little side effects.

ATh1E.4 • 09:15
The effect of calcium (Ca2+) induced externalization of ankyrin and phosphatidylserine on the viscoelasticity of human red blood cells measured by jumping optical tweezers, Yin Quan Chen[1], Yi Chun Ho[1], Lanping Amy Sung[2], Arthur Chiou[1]; [1]*Biophotonics, National Yang-Ming Univ., Taiwan;* [2]*Department of Bioengineering and Institute of Engineering in Medicine, Univ. of California, USA*. We trapped and stretched individual human red blood cells via jumping optical tweezers to demonstrate that calcium (Ca2+) induced externalization of ankyrin and phosphatidylserine increased their Young's modulus by 38% and viscosity by 25%

Marigold

ATh1F.2 • 09:00
Analysis of Position and Thickness Dependences of Delta Layer in InGaN-Delta-InN Quantum Wells Light-Emitting Diodes, Hongping Zhao[1], Xuechen Jiao[1], Nelson Tansu[2]; [1]*Department of Electrical Engineering and Computer Science, Case Western Reserve Univ., USA;* [2]*Department of Electrical and Computer Engineering, Lehigh Univ., USA.* The effects of position and thickness of the delta layer in InGaN-Delta-InN quantum wells were analyzed for light-emitting diodes, and both parameters have strong effects on its spontaneous emission rates.

ATh1F.3 • 09:15 Invited
Performance Enhancement of InGaN/GaN LEDs by Using Localized Surface Plasmons: Problems and Possible Solutions, Lee-Woon Jang[1], Alexander Y. Polyakov[1], Yong-Hoon Cho[2], In-Hwan Lee[1]; [1]*Chonbuk National Univ., Republic of Korea;* [2]*Department of Physics, KAIST, Republic of Korea.* Localized surface plasmon effects due to Ag and Ag/SiO2 nanoparticles deposited on GaN/InGaN multi-quantum well light-emitting diode structures were studied. The enhanced photoluminescence efficiency was attributed to energy coupling between the quantum well and surface plasmon in the nanoparticles.

Dahlia

ATh1G.3 • 09:00 Invited
Tunable Metamaterials, Dragomir N. Neshev[1]; [1]*Australian National Univ., Australia.* We review our recent studies on photonic metamaterials infiltrated with liquid crystals and show that their properties can be easily tuned by external optical fields, thus enabling the realization of highly tunable and nonlinear metamaterials.

Camellia

ATh1H.3 • 08:45 Invited
500-Gb/s Transmission by 41-GBd PDM-64QAM, Wei-Ren Peng[1]; [1]*KDDI R&D Laboratories Inc., Japan.* We generate 41.425-GBd PDM-64QAM (~497 Gb/s) using one I/Q modulator driven with eight-level signals synthesized by all binary electrical inputs. We demonstrate transmission over > 720-km standard single mode fiber.

ATh1H.4 • 09:15
4×1.875-Tb/s transmission over 1280-km SSMF basing on superchannel coherent optical OFDM, Xin Q. Zhang[1], Min Luo[1], Zhu Yang[1]; [1]*WRI, China.* We demonstrate the WDM transmission over 1280-km SSMF with four 1.875-Tb/s superchannels, which is the highest bit rate per superchannel among those WDM reports using NGI-CO-OFDM. The BERs of all the four superchannels are below 3.8×10-3 after transmission.

Orchid

ATh1A.3 • 09:30 Invited

Fabrication of Yb^{3+}-doped photonic crystal fibers, Guiyao Zhou, Changmin Xia, Jiangtao Liu, Wei Zhang, Qiangsheng Hu; *School of Information and Optoelectronic science and Engineering, South China Normal University, China.* Large mode area and multi-core Yb^{3+} doped photonic crystal fibers (PCFs) have been considered as perfect medium for high power optical fiber laser, but it is difficult to be fabricated above mentioned PCFs by conventional chemical vapor deposition technology. We present the novel fabrication method for Yb^{3+} doped PCFs.

Hydrangea

ATh1B.6 • 09:30 Invited

Silicon Photonics Based Transceivers for High-Capacity Optical Interconnetcs, Mehdi Asghari[1]; [1]*Kotura, Inc., USA.* We will discuss silicon photonics-based transceivers for high-capacity optical interconnects.

Chrysanthemum

ATh1C.6 • 09:30

Comparison of CO-SCFDM and CO-OFDM with High-order QAM Mapping, Juhao Li[1], Duo Li[1], Paikun Zhu[1], Yongqi He[1], Zhangyuan Chen[1]; [1]*Peking Univ., China.* We compare the quantization requirement and nonlinear transmission performance for CO-SCFDM and CO-OFDM with higher-order QAM mapping. The simulation results show that the CO-SCFDM always performs better than the CO-OFDM.

ATh1C.7 • 09:45

Optimization of a Feedforward Symbol Timing Estimator Using Two Samples per Symbol for Optical Coherent QPSK Systems, Wang Dawei[1], Alan Pak Tao Lau[2], Chao Lu[3], Sailing He[1]; [1]*Optical Engineering, Centre for Optical and Electromagnetic Research, Zhejiang Univ., China;* [2]*Electrical Engineering, The Hong Kong Polytechnic Univ., Hong Kong;* [3]*Electronic and Information Engineering, The Hong Kong Polytechnic Univ., Hong Kong.* A feedforward symbol timing estimator using only two samples per symbol is proposed and optimized for optical coherent QPSK signal. Simulation results are presented and discussed.

Begonia

ATh1D.5 • 09:30

Energy-Efficient Master-Slave Edge-Router Upgrade Paths in Active Remote Nodes of Next-Generation Optical Access, Michael C. Parker[1], Stuart D. Walker[1], Richard Martin[1], Ward van Heddeghem[2], Bart Lannoo[2]; [1]*CSEE, Univ. of Essex, UK;* [2]*INTEC, IBBT - Ghent Univ., Belgium.* Our design rules offers maximally energy-efficient Gb/s→Tb/s edge-router upgrade paths. One path assumes 10% average traffic intensity with 68% energy-efficiency gains over 5 upgrades, while 30% traffic load enables 45% energy-efficiency gains over 9 generations.

ATh1D.6 • 09:45

A Novel Sleep Scheme for Optical Network Unit Based on Downstream Traffic Scheduling in EPON, Lincong Zhang[1], Yejun Liu[1], Lei Guo[1], Xiaoxue Gong[1]; [1]*Northeastern Univ. (China), China.* This paper focuses on the energy saving in Ethernet Passive Optical Network (EPON). A novel sleep scheme is proposed based on the downstream traffic scheduling. Simulation results show good performances of the proposed scheme.

10:00–10:30 Tea Break, *3rd Floor Hallway (Near Exhibition Area)*

NOTES

Hibiscus

ATh1E.5 • 09:30
Quantitative Measurement of Fluorescence Resonance Energy Transfer (FRET) Efficiency, Tongsheng Chen; *MOE Key Laboratory of Laser Life Science & Institute of Laser Life Science, College of Biophotonics, South China Normal University, China.* We present some quantitative FRET methods based on partial acceptor photobleaching, termed emp-PbFRET. These methods can be used to determine the FRET efficiency of construct with multiple acceptors

ATh1E.6 • 09:45
In Situ Detection of Chemical Drugs in Tissue by Two Step Laser Desorption Photoionization Mass Spectroscopy, Yongjun Hu, Qing Yang, Honglei Wang; *College of Biophotonics, South China Normal University, China.* Two-step laser desorption photoionization mass spectrometry (L2MS) method with 10.5 eV vacuum ultraviolet (VUV 118 nm) single photon ionization is firstly used to detect medicinal chemicals in situ in the tumor tissue.

Marigold

Dahlia

ATh1G.4 • 09:30
On Enhancement of Absorption and Fluorescence within Metal Nanostructures, Jie Li[1], Tengpeng Guang[1], Wei Chen[1], Zhijun Sun[1]; [1]*Department of Physics, Xiamen Univ., China.* Metal nanostructures can enhance the optical absorption and fluorescence emission in incorporated media. We numerically and experimentally show that high intrinsic absorption of metals in the visible range may suppress the effects beyond nonradiative damping.

ATh1G.5 • 09:45
Printing color at the optical diffraction limit using plasmonics, Huigao Duan; *School of Physics and Microelectronics, Hunan University, China.* The highest printing resolution of a laser color printer is less than 10,000 dpi. Here, we demonstrate that 100,000 resolution could be achieved using plamsonic colors.

Camellia

ATh1H.5 • 09:30 Invited
New applications and evolution of optical transport network in China Mobile, Lei Wang[1]; [1]*China Mobile, China.* This presentation will discuss China Mobile and new applications of optical transport networks.

10:00–10:30 Tea Break, *3rd Floor Hallway (Near Exhibition Area)*

NOTES

Orchid

10:30–12:15
ATh2A • SC 1 - Best Student Paper Competition Novel Fibers and Fiber-based Devices
Presider: Wei Jin; Hong Kong Polytechnic University, China

ATh2A.1 • 10:30
Gain and Noise Figure Study of Er-doped Multi-element Fiber Amplifier, Saurabh Jain[1], Timothy C. May-Smith[1], Anirban Dhar[1], Andrew S. Webb[1], Belal Usmani[1], Jayanta K. Sahu[1]; *[1]Univ. of Southampton, UK.* We report a crosstalk-free Er-doped amplifier, consisting 3-fibers, each behaving as a single fiber in isolation. 32dB of gain and <5dB of noise figure have been obtained at 1530 nm for input signal of -23dBm.

ATh2A.2 • 10:45
Generation of Dissipative Solitons and noise-like pulse from Figure of Eight Fiber Laser, BO XU[1], Amos Martinez[1], Sze.Yun Set[2], Chee. Seong. Goh[2], Shinji Yamashita[1]; *[1]Electrical Engineering and Information Systems, The Univ. of Tokyo, Japan; [2]Alnair Labs Corporation, Japan.* We demonstrate for the first time, a passively mode-locked fiber with a net dispersion operating in both dissipative solitons and noise-like pulse regimes using a mode-locking mechanism of nonlinear amplifying loop mirror.

Hydrangea

10:30–12:15
ATh2B • SC 2 - Best Student Paper Competition Optoelectronic Integration, Devices, and Materials
Presider: Guang-Hua Duan; Alcatel-Thales III-V Laboratory, France

ATh2B.1 • 10:30
Tunable 4-Channel Ultra-Dense WDM Demultiplexer with III-V Photodiodes Integrated on Silicon-on-Insulator, Peter De Heyn[1], Steven Verstuyft[1], Shahram Keyvaninia[1], Andrea Trita[1], Dries Van Thourhout[1]; *[1]Univ. of Ghent, Belgium.* A tunable 4-channel ultra-dense WDM demultiplexer with 0.25nm channel spacing is demonstrated with III-V photodiodes integrated on Silicon-on-Insulator using rib waveguides. A possible application is an in-band label extractor for all-optical packet switching.

ATh2B.2 • 10:45
Simultaneous Multilevel RZ-to-NRZ Format Conversion for Two Tributaries of a PDM Signal, Hengyun Jiang[1], Lianshan Yan[1], ZhiYu Chen[1], Jia Ye[1], YingHui Guo[1], Anlin Yi[1]; *[1]Southwest Jiaotong Univ., China.* An all-optical multilevel RZ-to-NRZ format converter for two tributaries of a PDM signal is proposed using a polarization-maintaining-fiber inside a polarization-diversified-loop. A three-level format conversion in a 2×15.85-Gbit/s PDM system is experimentally demonstrated.

Chrysanthemum

10:30–12:15
ATh2C • SC 3 - Best Student Paper Competition Optical Transmission Systems, Subsystems, and Technologies
Presider: Naoya Wada; NICT, Japan

ATh2C.1 • 10:30
8×256 Gb/s WDM Transmission Over 2880 km of SSMF with 64 Gbaud DP-QPSK Signals, Qunbi Zhuge[1], Xian Xu[1], Mohammad E. Mousa-Pasandi[1], Mohamed Morsy-Osman[1], Ziad A. El-Sahn[1], Mathieu Chagnon[1], David V. Plant[1]; *[1]Department of Electrical and Computer Engineering, McGill Univ., Canada.* We demonstrate a transmission of 8×256 Gb/s WDM 64 Gbaud QPSK signals over 2880 km of standard single mode fiber (SSMF) with erbium doped fiber amplifier (EDFA)-only amplification and coherent detection.

ATh2C.2 • 10:45
Multi-service, Multi-band, and MIMO Data Distribution over 60-GHz RoF System for Gigabit Wireless Local Area Networks, Liang Zhang[1], Ming Zhu[2], Chenhui Ye[2], Cheng Liu[2], Xiaofeng Hu[1], Yikai Su[1], Geekung Chang[2]; *[1]Shanghai Jiao Tong Univ., China; [2]School of Electrical Engineering, Georgia Institute of Technology, USA.* We propose and experimentally demonstrate a 60-GHz RoF system to support 3M (multi-service, multiband and MIMO) data distribution. Spectral efficiency is improved and system capacity is doubled by using 2x2 MIMO spatial multiplexing.

Begonia

10:30–12:15
ATh2D • SC 4 - Best Student Paper Competition Network Architectures, Management, and Applications
Presider: Jing Wu; Communications Research Centre (CRC), Canada

ATh2D.1 • 10:30
Experimental Demonstration of High-Speed Full-Duplex Reconfigurable Free-Space Card-to-Card Optical Interconnects, KE WANG[1,2], Ampalavanapillai Nirmalathas[1,2], Christina Lim[2], Efstratios Skafidas[1,2], Kamal Alameh[3]; *[1]National ICT Australia-Victoria Research Laboratory (NICTA-VRL), Australia; [2]Department of Electrical and Electronic Engineering, The Univ. of Melbourne, Australia; [3]Centre of Excellence for MicroPhotonic Systems, Edith Cowan Univ., Australia.* A high-speed full-duplex free space based card-to-card optical interconnect architecture with flexibility and reconfigurablity is proposed and experimentally demonstrated. 3×3 10Gb/s data transmission for up to 30cm is achieved with receiver sensitivity better than -11.5dBm.

ATh2D.2 • 10:45
Efficient Routing Strategies for Interconnected Small Scale OXC Sub-System Networks, Yuto Iwai[1], Hiroshi Hasegawa[1], Ken-ichi Sato[1]; *[1]Department of Electrical Engineering and Computer Science, Nagoya Univ., Japan.* We describe two routing strategies for a node architecture that utilizes interconnected small-scale optical cross-connect (OXC). Simulation results indicated that these strategies achieve almost the same performance as that of the conventional OXC.

Hibiscus

10:30–12:15
ATh2E • SC 5 - Best Student Paper Competition Biophotonics and Optical Sensors
Presider: Juergen Popp; Friedrich-Schiller Univ. Jena, Germany

ATh2E.1 • 10:30
Generation and potential applications of white-light propelling beams, Drake Cannan[1], Peng Zhang[1,2], Zhigang Chen[1,3]; *[1]Physics and Astronomy, San Francisco State Univ., USA; [2]NSF Nanoscale Science and Engineering Center, Univ. of California, USA;[3]TEDA Applied Physics Schools, Nankai Univ., China.* We demonstrate experimentally the generation of white-light propelling beams by employing Moiré technique without mechanical movement or phase-sensitive interference. We discuss the possibility of using such incoherent beams for dynamic optical tweezing and micro-manipulation.

ATh2E.2 • 10:45
Whole-cell ROS rise in HepG2 cells induced by localized fs laser irradiation, zili ma[1], Siu Kai Kong[2], Kam Tai Chan[1]; *[1]EE department, CUHK, Hong Kong; [2]Basic Medical Department, CUHK, Hong Kong.* By using near infrared (NIR) femtosecond (fs) laser, we identify different redox sensitivities of subcellular structures and show the intracellular redox balance system influence the redox sensitivity and the behavior of intracellular ROS.

Marigold

10:30–12:15
ATh2F • SC 6 - Best Student Paper Competition LEDs, Photovoltaics, and Optoelectronics in Energy
Presider: Hongping Zhao; Case Western Reserve Univ., USA

ATh2F.1 • 10:30
Designing a Thin Film Blackbody Based on Plasmonic Anisotropic metamaterials, Yinyue Lin[1], Yanxia Cui[1,2], Kin Hung Fung[3], Yuying Hao[1], Sailing He[2], Nicholas X. Fang[3]; *[1]College of Physics and Optoelectronics, Taiyuan Univ. of Technology, China; [2]Centre for Optical and Electromagnetic Research, State Key Laboratory of Modern Optical Instrumentation,JORCEP, Zhejiang Univ., China; [3]Department of Mechanical, Massachusetts Institute of Technology, USA.* Based on a sawtooth-shaped plasmonic anisotropic metamaterial which comprises of alternating layers made of tungsten and titanium dioxide, we obtain a thin film blackbody working at the wavelength range from 200 nm to 4 μm.

ATh2F.2 • 10:45
Broadband and Polarization-Independent Solar Absorber based on Plasmonic Coaxial Tapered Holes, Lei Mo[1], Liu Yang[1], Sailing He[1]; *[1]Centre for Optical and Electromagnetic Research, Zhejiang Univ., China.* We proposed a novel solar absorber based on plasmonic coaxial tapered holes. Absorption of over 88% was obtained in a broad wavelength range without dependence on polarization. Absorption enhancement mechanisms were explained in detail.

Dahlia

10:30–12:15
ATh2G • Symposium on Novel Optical Materials II
Presider: Neil Collings; Univ. of Cambridge, UK

ATh2G.1 • 10:30 Invited
Advanced Photonics Materials with AIE Feature, Ben Tang[1]; *[1]The Hong Kong Univ. of Sicence and Technology, Hong Kong.* Tetraphenylethene-containing polyynes with aggregation-induced emission characteristics are synthesized. The polymers are highly transparent in the entire visible spectral region and show high refractive indices (n = 1.7787-1.6543) in a wide wavelength region of 400-1700 nm.

Camellia

10:30–12:15
ATh2H • SC 5 - Optical Sensors
Presider: Weidong Chen; Universite du Littoral France

ATh2H.1 • 10:30 Invited
Smart Sensors: Trends, Opportunities and Challenges for the Future, Koray Karakaya[1]; *[1]IMEC/Holst Centre, Netherlands.* In order to address the diversity in the applications and smart sensors solutions, a fundamental understanding of the individual technology layers from transducers to the complex sensor networks in a system perspective is essential. It is the system solution that transforms often relatively simple transducers in to smart sensor systems. An important challenge is that realizing viable technologies towards establishing sensor platforms. This brings an opportunity, and a challenge, for the optical sensor solutions, which are strong candidates for providing a complete system level solution.

Orchid

ATh2A.3 • 11:00
Simultaneous Strain and Temperature Measurement Using Compact Core-Offset Inter-Modal Interferometer With Embedded Fiber Bragg Grating, Tao Qi[1], Shilin Xiao[1], Jie Shi[1], Zhao Zhou[1], Meihua Bi[1], Pingqing Li[1]; *[1]State Key Laboratory of Advanced Optical Communication Systems and Networks, Shanghai Jiao Tong Univ., China.* A new sensor for simultaneous measurement of strain and temperature based on core-offset inter-modal interferometer with an embedded FBG is proposed. The strain and temperature resolutions are ± 23.76 με and ± 0.39 °C, respectively.

ATh2A.4 • 11:15
45°-TFG based in-fiber polarizer at 800nm by UV inscription, ADEDOTUN ADEBAYO[1], Zhijun Yan[1], Lin Zhang[1], David Robinson[2]; *[1]Aston Univ., UK; [2]Arden Photonics Limited, UK.* We show in-fiber polarizers at 800nm range with polarization extinction ratio (PER) up to 37dB, fabricated by UV-inscribing grating structures tilted at 45° in standard single mode fiber. The results show that the PER of such polarizers increases linearly with the grating length.

ATh2A.5 • 11:30
A Reconfigurable All-Optical Three-Input Logic Gate for Optical Frequency-Shift Keying Signals, Heng Zhou[1], Qiu Kun[1], Zhou Xingyu[1]; *[1]Key lab of optical fiber sensing and communication networks, Ministry of Education, UESTC, China.* A reconfigurable all-optical three-input logic gate for optical frequency shift keying signals is proposed based on four-wave mixing. Correct and clear waveforms are obtained in the experimental demonstration revealing its potential for practical application.

Hydrangea

ATh2B.3 • 11:00
High-speed silicon Mach-Zehnder modulator operating beyond 40 Gb/s, Jing Wang[1], Chao Qiu[1,2], Hao Li[1], Le Li[2], Albert Pang[2], Zhen Sheng[1], Aimin Wu[1], Xi Wang[1], Shichang Zou[1,2], Fuwan Gan[1]; *[1]State Key Laboratory of Functional Materials for Informatics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China; [2]Grace Semiconductor Manufacturing Corporation, China.* We report a carrier-depleted silicon-based Mach-Zehnder optical modulator operating beyond 40 Gb/s. The device has a V πL of 16 V*mm and an on-chip insertion loss as low as 6.2 dB.

ATh2B.4 • 11:15
Packaged Mode Multiplexer based on Silicon Photonics, Haoshuo Chen[1], Ton Koonen[1], Bradley Snyder[2], Xia Chen[3], Graham T. Reed[3]; *[1]COBRA Institute, Eindhoven Univ. of Technology, Netherlands; [2]Tyndall National Institute, Univ. College Cork, Ireland; [3]Optoelectronics Research Centre, Univ. of Southampton, UK.* A silicon photonics based mode multiplexer is proposed. Four chirped grating couplers structure can support all 6 channels in a two-mode fiber and realize LP01 and LP11 mode selective exciting. The packaged device is tested.

ATh2B.5 • 11:30
Narrow-Linewidth and Single-Mode 1.55 μm Laterally-Coupled Distributed Feedback Laser Fabricated By Standard I-Line Stepper Lithography, Kais Dridi[1], Abdessamad Benhsaien[1], Jessica Zhang[2], Trevor J. Hall[1]; *[1]Univ. of Ottawa, Canada; [2]CMC Microsystems, Canada.* We report on a fabricated laterally-coupled distributed feedback laser with narrow linewidth as low as 178 kHz. The device uses third-order surface gratings and shows stable single-mode operation at 1.55 μm.

Chrysanthemum

ATh2C.3 • 11:00
Joint-mode RF-pilot Aided Phase Estimation for Mode-division Multiplexed CO-OFDM Superchannel, Xi Chen[1], An Li[1,2], Jia Ye[1,3], Abdullah A. Amin[1], William Shieh[1,2]; *[1]The Univ. of Melbourne, Australia; [2]Centre for Energy- Efficient Telecommunications (CEET), Australia; [3]Center for Information Photonics & Communications, Southwest Jiaotong Univ., China.* We proposed a joint-mode RF-pilot aided phase estimation algorithm for mode-division multiplexed CO-OFDM superchannel. Experimental results show that by using the proposed approach, the phase estimation is robust against random modal coupling.

ATh2C.4 • 11:15
A Novel Large-Scale Wavelength Routing Switch Configuration Exploiting Small Arrayed Waveguide Gratings, Tomonobu Niwa[1], Hiroshi Hasegawa[1], Ken-ichi Sato[1], Toshio Watanabe[2], Hiroshi Takahashi[2]; *[1]Nagoya Univ., Japan; [2]NTT Photonics Laboratories, NTT Corporation, Japan.* We present a novel wavelength routing switch configuration that consists of interconnected small arrayed waveguide gratings (AWGs). We introduce an optimization method for AWG interconnection and fabricate a prototype. Transmission experiments verify its practical applicability.

ATh2C.5 • 11:30
Stabilize the Coupled Optoelectronic Oscillator by an Unpumped Erbium-Doped Fiber, Shuhong Cai[1,2], Shilong Pan[2,1], Dan Zhu[2], Xiangfei Chen[1]; *[1]Nanjing Univ., China; [2]Nanjing Univ Aeronautics & Astronautics, China.* The incorporation of the unpumped erbium-doped fiber in coupled optoelectronic oscillator improves significantly the stability and quality of the generated signal. The phase noise of a 10.664-GHz microwave signal is -120.58 dBc/Hz at 10 kHz.

Begonia

ATh2D.3 • 11:00
Planning and Provisioning of Elastic O-OFDM Networks with Fragmentation-Aware Routing and Spectrum Assignment (RSA) Algorithms, Mingyang Zhang[1], Wei Lu[1], Zuqing Zhu[1], Yawei Yin[2], Ben Yoo[2]; *[1]Univ. of Sci. & Tech.of China, China; [2]Univ. of California, Davis, USA.* We formulate fragmentation ratio to quantify bandwidth fragmentation, and propose two fragmentation-aware RSA algorithms to alleviating it in both static planning and dynamic provisioning of O-OFDM networks. Simulation results indicate that the proposed RSA algorithms outperform two existing ones.

ATh2D.4 • 11:15
Performance Evaluation of Large-Scale OXC Architecture Employing Wavelength Path Switching and Fiber Selection, Toshinori Ban[1], Hiroshi Hasegawa[1], Ken-ichi Sato[1]; *[1]Department of Electrical Engineering and Computer Science, Nagoya Univ., Japan.* We present a hardware scale analysis of our proposed large-scale OXC architecture that is based on dynamic wavelength grouping and fiber selection. Numerical experiments show that it significantly reduces the number of necessary WSSs.

ATh2D.5 • 11:30
Energy Consumption of Next-Generation Optical-Wireless Converged Networks, Chathurika Ranaweera[1], Christina Lim[1], Elaine Wong[1], Ampalavanapillai Nirmalathas[1], Chamil L. Jayasundara[1]; *[1]The Department of Electrical and Electronic Engineering, The Univ. of Melbourne, Australia.* We compare three different plausible architectures for next-generation optical-wireless convergence in energy conservation viewpoint. Our analysis provides insight into QoS rich optical-wireless converged network architectures that preserve energy efficiency.

Hibiscus

ATh2E.3 • 11:00
Active Control of Spectral and Polarization Properties of Light through Turbid Media, Jung-Hoon Park[1], Chunghyun Park[1], Hyunseung Yu[1], Yong-Hoon Cho[1], YongKeun Park[1]; [1]*Physics, KAIST, Republic of Korea.* We demonstrate the active control of spectral and polarization properties of light that has experienced multiple scattering through turbid media. The dispersive and vectorial properties of the transmission matrix are directly demonstrated.

ATh2E.4 • 11:15
Super-resolution Fluorescence Lifetime Imaging, Zhaotai Gu[1], Cuifang Kuang[1], Shuai Li[1], Yi Xue[1], Zhenrong Zheng[1], Xu Liu[1]; [1]*Zhejiang Univ., China.* We realized fluorescence lifetime imaging of a spatial resolution of 70nm by using continuous wave stimulated emission depletion microscopy. The overall fluorescence lifetimes were shortened by ~3ns in the presence of the continuous depletion beam.

ATh2E.5 • 11:30
Enabling ultramicroscopy with partly immersed SiO2 microspheres, Hao Cheng[1,2], Jun Qian[1,2], Fuhong Cai[1,2], Sailing He[1,2]; [1]*Centre for Optical and Electromagnetic Research, Zhejiang Univ., China;* [2]*Joint ResearchCentre of Photonics of the Royal Institute of Technology (Sweden), Lund Univ. (Sweden), and Zhejiang Univ., Zhejiang Univ., China.* We experimentally confirm that an irresolvable sample of sub-wavelength feature could be resolved by a microscope when partly immersed 6μm SiO2 microspheres are utilized. A detailed analysis is also given with the FDTD simulation.

Marigold

ATh2F.3 • 11:00
Optical Absorption Enhancement in Slanted Micro-Hole C-Si for Photovoltaic Applications, Md. Mosaddek H. Adib[1], Tahsin Uddin Mullick[1], Md Ibrahim Khalil[1], Arshad M. Chowdhury[1,2], Geekung Chang[2], Nowshad Amin[3]; [1]*Department of Electrical Engineering and Computer Science, North South Univ., Bangladesh;* [2]*School of Electrical and computer Engineering, Georgia Institute of Technology, USA;* [3]*3Department of Electrical, Electronic & Systems Engineering,Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, Malaysia.* We proposed and demonstrate simple and efficient absorption geometry using slanted micro-hole architecture for planer C-Si solar cell. Our analysis result found that the proposed architecture can enhance the absorbance and the ultimate efficiency is over 28%.

ATh2F.4 • 11:15
Remarkable Enhancement of the Photocurrent Response of Dye-Sensitized Solar Cells using CuInSe2 Nanocrystals, Ramy Nashed[1,3], Emad Girgis[2], Ahmed Shehata[3], Ahmed I. Abdel-Salam[3], Mona B. Mohamed[4]; [1]*Renewable Energy Laboratory, American Univ. in Cairo, Egypt;* [2]*Advanced Materials & Nanotechnology Lab, National Research Centre, Egypt;* [3]*Characterization Lab, Nanotech Egypt for Photo-Electronics, Egypt;* [4]*National Institute Laser Enhanced Science, Cairo Univ., Egypt*. The Effect of introducing CuInSe2 (CIS) Nanocrystals with the electrolyte on the photocurrent response of DSSCs was investigated showing great enhancement in optical switching and electrical stability of DSSCs by improving the electrolyte's reduction rate.

ATh2F.5 • 11:30
Plasma Power Detuned Synthesis of Si-QD doped Si-rich SiOx Thin Film for Multicolor Electroluminescent Diodes, Chih-Hsien Cheng[1], Yu-Chung Lien[1], Gong-Ru Lin[1]; [1]*Graduate Institute of Photonics and Optoelectronics, Department of Electrical Engineering, National Taiwan Univ., Taiwan.* The smaller Si-QDs result in a current endurance to operate the MOSLED at breakdown edge providing a record of maximum blue-light electroluminescent power at 59.9 μW/cm2 with highest external quantum efficiency of 2.4%.

Dahlia

ATh2G.2 • 11:00 Invited
Plasmonic- and Blue-Phase Liquid Crystalline Photonics Materials, Iam-Choon Khoo[1]; [1]*Pennsylvania State Univ., USA.* We present a critical review of recent work on novel liquid crystal cladded plasmonic nano-structures and Blue-Phase liquid crystals containing photosensitive molecules, including tunable metamaterials, reflective or transmission optics, large optical nonlinearities and random lasing action.

ATh2G.3 • 11:30 Invited
Towards the development of polymer optical interconnection systems, Toshikuni Kaino[1], Okihiro Sugihara[1]; [1]*Tohoku Universty, Japan.* High performance photonic polymers and related waveguide device will play important role for board level and chip level optical interconnection systems. Simple waveguide fabrication and assembly techniques are required for practical optical modules.

Camellia

ATh2H.2 • 11:00 Invited
Trace Gas Sensors Based On TDLAS and Their Application, Xiaoming Gao[1], Wang Lei[1], Tan Tu[1], Liu Kun[1], Yi Hongming[1], Wang Guishi[1], Chen Weidong[2]; [1]*Anhui Institute of Optics & Fine Mechanics, Chinese Academy of Sciences, China;* [2]*Laboratoire de Physicochimie del'Atmosphère, Université du Littoral Côte d'Opale, France.* We will present the new progress in development of new generation trace gas sensors based on TDLAS and their application, including natural gas pipeline leakage detectors and new configurations of QEPAS sensors.

ATh2H.3 • 11:30
Porous ceramic based multi-pass gas cell studies using absorption spectroscopy, Yuan Fu[1], Lin Yang[1], Chunsheng Yan[1]; [1]*Zhejiang Provincial Key Laboratory for Sensing Technologies, Centre for Optical and Electromagnetic Research, JORCEP [KTH-LU-ZJU Joint Research Center of Photonics], Zhejiang Univ., China.* We investigate the gas absorption properties of porous alumina ceramics with different porosities using gas in scattering media absorption spectroscopy (GASMAS). The gas exchange time for ceramics with 70% porosity is typically within 1 minute.

Orchid

ATh2A.6 • 11:45
Comparing investigation of optical sampling schemes using NOLM and degenerate FWM, Shinya Watanabe[1], Yuji Miyoshi[1], Masaharu Ohashi[1]; *[1]Osaka Prefecture Univ., Japan.* We investigate the performances of optical samplers using NOLM and FWM. The power consumption and temporal resolution can improve by using NOLM with the control pulse in anomalous dispersion region.

ATh2A.7 • 12:00
Local heating of individual droplets using photothermal effects of gold nanorods, Zhiyong Li[1], Pan Wang[1], Limin Tong[1], Lei Zhang[1,2]; *[1]Zhejiang Univ., China; [2]Georgia Institute of Technology and Emory Univ., USA.* We present an efficient method to locally heat individual microfluidic droplets using photothermal effects of gold nanorods. A nanoliter droplet was heated to over 80 oC under illumination of a 13.6 mW heating laser.

Hydrangea

ATh2B.6 • 11:45
Emission Dynamics of InAs/InP Quantum-Dash Laser, Mohammed Zahed M. Khan[1], Tien K. Ng[1], Chi S. Lee[2], Pallab K. Bhattacharya[2], Boon S. Ooi[1]; *[1]Photonics Laboratory, King Abdullah Univ. of Science and Technology (KAUST), Saudi Arabia; [2]Department of Electrical Engineering and Computer Science, Univ. of Michigan, USA.* The effect of current pulse width on the lasing spectra of chirp InAs/InP quantum-dash laser is presented. The spectra shows unusual splitting with increasing current injection which is correlated to the active region inhomogeneity

ATh2B.7 • 12:00
Single-Electrode-Controlled 14×200GHz Digitally Wavelength Switchable Half-wave Coupled Rectangular Ring-FP Semiconductor Laser, Lin Wu[1], Jianjun Meng[1], Jian-Jun He[1]; *[1]State Key Laboratory of Modern Optical Instrumentation, Center for Integrated Optoelectronics,Department of Optical Engineering, Zhejiang Univ., China.* we report our latest experimental results of the half-wave coupled rectangular ring-FP laser. Single-electrode-controlled wavelength switching over 14 channels with 200GHz spacing is demonstrated with side-mode-suppression-ratio (SMSR) up to 37dB. And the total device size is only 0.5×0.4 mm2.

Chrysanthemum

ATh2C.6 • 11:45
A 60GHz Wireless Access Scheme with Electrical LO Devices Free in Mobile Terminals and Base Stations, Chenhui Ye[1,2], Liang Zhang[2,3], Ming Zhu[2], Jianjun Yu[2], Sailing He[1,4], Geekung Chang[2]; *[1]Zhejiang Univ., China; [2]Georgia Institute of Technology, USA; [3]Shanghai Jiao Tong Univ., China;[4]Royal Institute of Technology, Sweden.* We propose a 60GHz wireless access network scheme with centralized LO service delivered to mobile terminals and base stations from the central office. Bidirectional transmission based on the scheme has been experimentally demonstrated.

ATh2C.7 • 12:00
Holographic beam steering a directly modulated two-electrode high brightness tapered laser diode for optical wireless communications, Feng Feng[1], Ian H. White[1], Timothy D. Wilkinson[1]; *[1]Univ. of Cambridge, UK.* An error-free free space communication link with 3 degree angular coverage and 1.25GHz modulation bandwidth is demonstrated by beam steering an ultra high modulation efficiency bright tapered laser diode using a Liquid Crystal Spatial Light Modulator.

Begonia

ATh2D.6 • 11:45
Modeling the Impact of ROADM Color and Directional Constraints on Optical Network Performance, Yongcheng Li[1], Li Gao[1], Limei Peng[1], Gangxiang Shen[1]; *[1]School of Electronic and Information Engineering, Soochow Univ., China.* We develop an analytical model for evaluating optical lightpath blocking performance under the color and directional add/drop constraints. Compared to the simulation results, the analytical model can accurately predict optical network performance.

ATh2D.7 • 12:00
Multi Layer Energy-Efficiency in IP over WDM Networks, Carlos Ribera[1], Cicek Cavdar[1], Aysegul Gencata[2], Lena Wosinska[1]; *[1]The Royal Institute of Technology KTH, Sweden; [2]Istanbul Technical Univ. ITU, Turkey.* We propose an energy-aware Internet Protocol (IP) traffic routing strategy together with a virtual topology adaptation approach to save energy in the IP over WDM networks by following a dynamic daily traffic profile.

12:15–13:45 Lunch Break

Hibiscus

ATh2E.6 • 11:45
Self-priming compartmentalization digital LAMP for single molecule detection, qiangyuan zhu[1], Lin Qiu[1]; [1]*Zhejiang Univ., China.* This paper describes a self-priming compartmentalization (SPC) microfluidic digital loop-mediated amplification (dLAMP) chip for performing single molecule detection, which is power-free, valve-free, isothermal, inexpensive, sensitive, economizing labor time and reagent.

ATh2E.7 • 12:00
Multilayered Gold Nanorods with Tunable SERS and Fluorescence Properties for In Vivo Imaging, Yuan Zhang[1], Jun Qian[1], Dan Wang[1], Yalun Wang[1], Sailing He[1]; [1]*Centre for Optical and Electromagnetic Research, Zhejiang Univ., China.* Gold nanorods were coated by a dye-doped silica-polymer multilayer, forming two tunable individual SERS and fluorescence channels. Such gold nanorods are stable inside living mice and can be used for multimodality imaging in vivo.

Marigold

ATh2F.6 • 11:45
High Uniformity of Remote Phosphor Structure by ZrO2 Nano-particles for White LEDs, Kuo-Ju Chen[1], Chen Hsin-Chu[1], Lin Chien-Chung[2], Wang Chao-Hsun[1], Tsai Hsin-Han[1], Chien Shih-Hsuan[1], Shih Min-Hsiung[3], Hao-chung Kuo[1]; [1]*Department of Photonics and Institute of Electro-Optical Engineering, National Chiao Tung Univ., Taiwan;* [2]*Institute of Photonic System, National Chiao Tung Univ., Taiwan;* [3]*Research Center for Applied Sciences, Taiwan.* High luminous efficiency and superior uniformity of angular-dependent correlated color temperature white light-emitting diodes have been investigated by ZrO2 nano-particales in remote phosphor structure due to the higher capability of light scattering.

ATh2F.7 • 12:00
Ultra-broadband near-infrared metamaterial absorber, Fei Ding[1], Yi Jin[1], Sailing He[1,2]; [1]*Centre for Optical and Electromagnetic Research, State Key Laboratory of Modern Optical Instrumentations, Zhejiang Univ., China;* [2]*Division of Electromagnetic Engineering, School of Electrical Engineering, Royal Institute of Technology, Sweden.* A near-infrared wide-band polarization-insensitive absorber is demonstrated. It is composed of two-dimensional titanium disk arrays and a gold plate. The absorption at normal incidence is above 90% in the range of 164.2THz to 345.2 THz.

Dahlia

ATh2G.4 • 12:00
Enhanced two-photon photoluminescence of light emitting polymers from a resonant waveguide grating structure, Chia Chen Hsu[1,3], Jian H. Lin[1], Yu Shiuan Lin[1], Ching-Ting Lee[2], Hung-Chih Kan[1]; [1]*Department of Physics, National Chung Cheng Univ., Taiwan;* [2]*Institute of Microelectronics, Department of Electrical Engineering, National Cheng Kung Univ., Taiwan;* [3]*Graduate Institute of Opto-Mechatronics, National Chung Cheng Univ., Taiwan.* We demonstrate that guided mode resonances enhanced two-photon photoluminescence (PL) in a resonant waveguide grating (RWG) structure. The enhancement factor for PL emission is 93 times compared to that of a sample without RWG effect.

Camellia

ATh2H.4 • 11:45
Application of scattering porous materials as multipass gas cells in multimode diode laser correlation spectroscopy, Xiutao Lou[1,2], Can Xu[2], Gabriel Somesfalean[2], Sune R. Svanberg[2]; [1]*Harbin Institute of Technology, China;* [2]*Lund Univ., Sweden.* Gas cells made of porous materials have been applied in multimode diode laser correlation spectroscopy measurements of oxygen. A pathlength enhancement of more than one order of magnitude compared with an open-air setup was achieved.

ATh2H.5 • 12:00
Optical Porosimetry in Wood Using Oxygen Absorption Spectroscopy and Frequency Domain Photon Migration, Liang Mei[1,2], Jim Larsson[1], Sune R. Svanberg[1,4], Gabriel Somesfalean[1,3]; [1]*Physics Department, Lund Univ., Sweden;* [2]*Centre for Optical and Electromagnetic Research, Zhejiang Univ., China;* [3]*Joint Research Center of Photonics, Zhejiang Univ.-Royal Institute of Technology-Lund Univ., Zhejiang Univ., China;* [4]*Centre for Optical and Electromagnetic Research, South China Normal Univ., China.* A method to assess the relative optical porosity in wood by a combination of gas in scattering media absorption spectroscopy (GASMAS) and frequency domain photon migration (FDPM) is presented. Samples of balsa and pine wood are studied.

12:15–13:45 Lunch Break

Orchid

13:45–15:30
ATh3A • SC 1 - Novel Fibers and Fiber-based Devices
Presider: Yunqi Liu; Shanghai Univ., China

ATh3A.1 • 13:45 Invited
Recent progress in random distributed fibre lasers, Sergei K. Turitsyn[1]; [1]*Aston Institute of Photonic Technologies, Aston Univ., UK.* I will overview our recent results and will discuss the concept of a fiber laser with an open cavity that operates using random distributed feedback provided by Rayleigh scattering amplified through the Raman effect - random distributed fibre lasers .

ATh3A.2 • 14:15 Invited
Progress in Bismuth-Doped Silica-Based Fiber Lasers and Amplifiers, Evgeny M. Dianov[1], Igor A. Bufetov[1]; [1]*Fiber Optics Research Center of RAS, Russian Federation.* It has been recently demonstrated that Bi-doped glass optical fibers are a promising active laser medium for 1150-1550 nm. The new results in the field of Bi-doped fiber lasers and optical amplifiers will be considered.

Hydrangea

13:45–15:30
ATh3B • SC 2 - Silicon Photonics II
Presider: Danxia Xu; National Research Council Canada, Canada

ATh3B.1 • 13:45 Invited
Coupling and Packaging Issues of Silicon Based Photonic Integrated Circuits, Christophe Kopp[1]; [1]*CEA Grenoble, France.* We review the two opposed challenges that fiber coupling of silicon photonic circuits has to deal with. The first is high performance with different requests for emitters and receivers. The second is packaging assembly tolerance.

ATh3B.2 • 14:15
Waveguide Grating coupler based on CMOS poly-silicon gate layer, Chao Qiu[1,2], Zhen Sheng[1], Le Li[2], Albert Pang[2], Aimin Wu[1], Xi Wang[1], Shichang Zou[1,2], Fuwan Gan[1]; [1]*State Key Laboratory of Functional Materials for Informatics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China;* [2]*Grace Semiconductor Manufacturing Corporation, China.* Grating couplers based on CMOS poly-silicon gate layer are experimentally demonstrated with coupling efficiency of ~40%. By adding full-etched trenches in the waveguide layer, the coupling efficiency can be further improved to ~70%.

ATh3B.3 • 14:30
Silicon mode-(de)multiplexer for a hybrid multiplexing system to achieve ultrahigh capacity photonic networks-on-chip with a single-wavelength-carrier light, Daoxin Dai[1]; [1]*Zhejiang Univ., China.* Hybrid multiplexing technology combining polarization multiplexing and mode multiplexing is presented to expand the capacity of photonic networks-on-chip. A novel low-loss and low crosstalk mode-(de)multiplexer is proposed with cascaded asymmetrical directional couplers.

Chrysanthemum

13:45–15:30
ATh3C • SC 3 - Future Access Networks
Presider: Ernesto Ciaramella; Scuola Superiore Sant Anna di Pisa; Italy

ATh3C.1 • 13:45 Invited
China Telecom FTTH deployment - lessons learnt and future plans, Bo Wang[1]; [1]*China Telecom, China.* Experiences and lessons of China Telecom are described, which facilitate the deployment the largest FTTx network in the world. Future plans are introduced, which will make China Telecom the world's largest FTTH operator.

ATh3C.2 • 14:15 Invited
Next Generation PON offering 40G or more bandwidth, Yuanqiu Luo[1], Xuejin Yan[1], Frank Effenberger[1]; [1]*Huawei Technologies USA, USA.* This paper reviews PON technologies with a rate of at least 40Gb/s for the next generation broadband access. The time and wavelength division multiplexed PON (TWDM-PON) is investigated as the primary solution for 40Gb/s access.

Begonia

13:45–15:30
ATh3D • SC 4 - Optical Access Networks I
Presider: Lena Wosinska; Kungliga Tekniska Hogskolan, Sweden

ATh3D.1 • 13:45 Invited
Complete cost analysis of Hybrid PON architectures for Next Generation Optical Access Networks, Carmen Mas Machuca[1]; [1]*Technische Univ. Munchen, Germany.* Hybrid PON solutions are considered as the best alternative to increase the bandwidth offered to users in a cost effective way. A detailed cost study on different areas will be presented.

ATh3D.2 • 14:15 Invited
Architectural Solutions for Open Access in Next-generation Passive Optical Networks (NG-PONs), Bart Lannoo[1], Abhishek Dixit[1], Didier Colle[1], Mario Pickavet[1]; [1]*INTEC Univ. of Gent, Belgium.* Opening next-generation optical access (NGOA) networks at various layers will lead to increased competition among network and service providers. We proposed various open access schemes, with a focus on opening the wavelength layer in NG-PONs.

Hibiscus

13:45–15:30
AThe3E • SC 5 - Raman-based Biophotonics
Presider: Kishan Dholakia; Univ. of St Andrews, UK

AThe3E.1 • 13:45 Invited
SERS Based Biosensors, Malini Olivio[1]; [1]*Singapore Bioimaging Consortium, Singapore.* This presentation will discuss SERS based biosensors.

AThe3E.2 • 14:15 Invited
A Fast Nanotechnology Platform to Detect/Capture Bacteria in Clinical Samples, Yuh-lin Wang[1,2]; [1]*Inst of Atomic and Molecular Science, Academia Sinica, Taiwan;* [2]*Physics, National Taiwan Univ., Taiwan.* Vancomycin coating of an array of Ag-nanoparticles provides label-free analysis of bacteria via surface enhanced Raman spectroscopy (SERS) and leads to huge increase in its capability to capture bacteria without introducing significant spectral interference.

Marigold

13:45–15:30
AThe3F • SC 6 - Novel Solar Technologies
Presider: TBA

AThe3F.1 • 13:45 Invited
III-Nitride Based Solar Hydrogen, Hongxing Jiang[1]; [1]*Texas Tech Univ., USA*. We will discuss III-Nitride based solar hydrogen.

AThe3F.2 • 14:15
Metamaterial-plasmonic Ultra-thin Absorbers for Thin Film Solar Cells, Yang Wang[1], Zhifeng Ren[2], Krzysztof Kempa[2]; [1]*South China Academy of Advanced optoelectronics, South China Normal Univ., China;* [2]*Physics, Boston College, USA*. We show that a planar structure consisting of an ultrathin semiconducting layer topped with a nanoscale perforated metallic film and then a dielectric film can become a platform for high-efficiency thin film solar cells.

AThe3F.3 • 14:30 Invited
Bonded Multijunction Photovoltaics to Improve Efficiency and Performance, John E. Bowers[1], Chieh-Ting Lin[1], W.E. McMahon[2], J.S. Ward[2], J.F. Geisz[2], M. W. Wanlass[2], J.J. Carapella[2], W. Olavarria[2], M. Young[2], M.A. Steiner[2], R. M. Frances[2], A.E. Kibbler[2], A. Duda[2], J.M. Olson[2], E.E. Perl[1], D.J. Friedman[2]; [1]*University of California at Santa Barbara, Santa Barbara, CA, USA;* [2]*National Renewable Energy Laboratory, Golden, CO, USA*. A novel bonding approach has been developed to enable a fully lattice-matched two-terminal four-junction device in which GaInP/GaAs tandem is bonded to a GaInAsP/GaInAs tandem. Prove of concept device, simulation and fabrication will be presented.

Dahlia

13:45–15:30
AThe3G • Symposium on Photosensitive and Photomobile Materials
Presider: Zhiwen Liu; Pennsylvania State Univ., USA

AThe3G.1 • 13:45 Invited
Photomobile Materials: Structures and Functions, Tomiki Ikeda[1]; [1]*Tokyo Institute of Technology, Japan.* Crosslinked liquid-crystalline polymers containing photochromic molecules show three-dimensional movements upon irradiation with light to cause photochemical reactions of photochromes. We will present on effectively fabricating these crosslinked photomobile materials on top of polymer substrates.

AThe3G.2 • 14:15 Invited
Azo dye doped liquid crystals: Physics and applications, Andy Y. Fuh[1,2], Ko-Ting Cheng[1], Tsung-Hsien Lin[3]; [1]*Department of Physics, National Cheng Kung Univ., Taiwan;* [2]*Institute of Electro-optical Science and Engineering, National Cheng Kung Univ., Taiwan;* [3]*Department of Photonics, National Sun Yat-Sen Univ., Taiwan.* The azo dye molecules doped in a LC cell undergo photo-refractive, and trans-cis isomerization effects after they are excited by suitable light. These effects induce the change of LC parameters, and/or the alignment, and allow us to fabricate various LC devices. Details are reported.

NOTES

Orchid

ATh3A.3 • 14:45
Nonlinear Polarization Rotation-based Linear Cavity Multi-wavelength Fiber Laser, Hongyun Meng[1], Wang Wei[1], Wu Xiaowei[1], Wang Wei[1], Xiong Rui[1], Xue Hongchao[1], Tan Chunhua[1], Huang Xuguang[1]; *[1]Laboratory of Nanophotonic Functional Materials and Devices, South China Normal Univ., China.* We propose a nonlinear polarization rotation-based linear cavity multi-wavelength fiber laser. By adjusting the polarization controllers, the proposed laser can generate up to 8 wavelengths and the number of the lasing lines can be adjusted.

ATh3A.4 • 15:00
Widely Tunable Multi-Wavelength Fiber Laser Based on Cascaded Stimulated Brillouin Scattering in a Compact Linear Cavity, Sichang Jiang[1], Yizhen Wei[1], Shiming Gao[1]; *[1]Zhejiang Univ., China.* A widely tunable multi-wavelength fiber laser (MWFL) is proposed based on cascaded generation of Brillouin Stokes lines. A wide tuning range from 1542 to 1570 nm and a maximum of 11 wavelength channels are achieved.

ATh3A.5 • 15:15
Demonstration of a Wavelength Tunable Q-Switched Fiber Laser, Manas Srivastava[1], Deepa Venkitesh[1], Balaji Srinivasan[1]; *[1]Electrical Engineering, Indian Institute of Technology Madras, India.* We have Q-switched an Erbium doped fiber laser cavity in the presence of a tunable band pass filter and have compared the results with those of a filter-less cavity.

Hydrangea

ATh3B.4 • 14:45
Polarization Dispersion Compensated AWG with Angled Star Couplers Based on Silica-on-Silicon, Xiang Xia[1], Jun Zou[1], Tingting Lang[2,1], Jian-Jun He[1]; *1State Key Laboratory of Modern Optical Instrumentation, Zhejiang Univ, China; [2]College of Optical and Electronic Technology, China Jiliang Univ, China.* A polarization compensated AWG with angled star couplers based on silica-on-silicon is demonstrated. Five AWGs with different polarization compensator parameter γ corresponding to different incident/diffraction angles are fabricated.The PDλ of the central channels is less than 0.02nm.

ATh3B.5 • 15:00 Invited
Silicon Photonics for Optical Fiber Communication Applications, Diedrik Vermeulen[1], Gunther Roelkens[2], Dries Van Thourhout[2], Christopher R. Doerr[1]; *[1]Acacia Communications Inc., USA; [2]Ghent Univ. , Belgium.* We will give an overview of the state-of-the-art in Silicon Photonics advancements focusing on the optical power budget and polarization requirements for applications in optical fiber communications.

Chrysanthemum

ATh3C.3 • 14:45
Wavelength-Offset Optical Filtering Induced Power Budget Improvements in End-to-End Real-Time Optical OFDM PON Systems, Jianming TANG[1]; *[1]Bangor Univ., UK.* Experimental and theoretical investigations show, for the first time, that wavelength-offset optical filtering improves optical power budgets by 1.4 dB in end-to-end real-time 11.25Gb/s optical OFDM 25km IMDD PON systems utilizing directly modulated DFB lasers.

ATh3C.4 • 15:00
Simultaneous Transmission of Baseband and UWB Signals in a WDM-PON Using Phase-Amplitude Hybrid Modulation, Pan Cao[1], Zhiming Zhuang[1], Xiaofeng Hu[1], Liang Zhang[1], Yikai Su[1]; *[1]Shanghai Jiao Tong Univ., China.* We propose and experimentally demonstrate a scheme to integrate UWB wireless signal transmission in a 10-Gb/s WDM-PON architecture. The UWB and 10-Gb/s baseband signals are simultaneously transmitted using phase-amplitude hybrid modulation.

ATh3C.5 • 15:15
A Re-Modulation Scheme in WDM-PON based on FP-LD and RSOA Cascaded Structure, Hanlin Feng[1], Shilin Xiao[1], Pei Yang[1], Zhao Zhou[1], Jie Shi[1]; *[1]Shanghai Jiao Tong Univ., China.* We demonstrate a cascaded re-modulation scheme in WDM-PON based on FP-LD and RSOA. Experimental results show that this scheme can successfully demodulate 10Gbit/s downstream DPSK signal and improve upstream transmission performance simultaneously.

Begonia

ATh3D.3 • 14:45
The Design Predictability Concern in Optical Network-on-Chip Design, Luca Ramini[1], Davide Bertozzi[1]; *[1]Engineering Department, Engineering Department of Ferrara, Italy.* Predictability is a well-known concern for electronic circuit design. This paper shows that it is a concern for optical network-on-chip design too. The gap between logic and physical topologies is used as a case study.

ATh3D.4 • 15:00
An MAC Protocol with High Throughput and Low Packet Delay for OFDMA PONs, Weizhi You[1], Lilin Yi[1], Wei Guo[1], Weisheng Hu[1]; *[1]State Key Lab of Advanced Optical Communication System and Networks,Department of Electronic Engineering, Shanghai Jiao Tong Univ., China.* An efficient MAC protocol has been proposed for OFDMA PONs. Simulation results illustrate the proposed MAC protocol obtains higher throughput performance and large network capacity, reduces average packer delay and improves bandwidth utilization efficiency.

ATh3D.5 • 15:15
100-Gb/s Multi-band OFDM-PON Based on Polarization Interleaving and Direct Detection, Bangjiang Lin[1], Juhao Li[1], Hui Yang[1], Yangsha Wan[1], Yuanbao Luo[1], Ping Zhang[1], Yongqi He[1], Zhangyuan Chen[1]; *[1]Peking Univ., China.* We demonstrate 100-Gb/s multi-band transmission for OFDM-PON based on polarization interleaving (PI) and direct detection. The bandwidth requirement of components is reduced using the PI and multi-band scheme, achieving high-speed transmission.

15:30–16:00 Tea Break, *3rd Floor Hallway (Near Exhibition Area)*

Hibiscus

ATh3E.3 • 14:45 Invited

The Many Facets of Raman Spectroscopy, Juergen Popp[1,2]; [1]*Institute of Physical Chemsitry and Abbe Center of Photonics, Friedrich-Schiller Univ. Jena, Germany;* [2]*Institute of Photonic Technology, Germany.* It will be shown that Raman based technologies are powerful tools to address a broad spectrum of biomedical problems like e.g. rapid pathogen identification, objective clinical cell and tissue characterization for disease diagnosis.

ATh3E.4 • 15:15

Raman enhancement of graphene oxide via reduced Ag nanoparticles on the suface, Dan Wang[1], Jun Qian[1], Fuhong Cai[1], Sailing He[1]; [1]*Centre for Optical and Electromagnetic Research, Zhejiang Provincial Key Laboratory for Sensing Technologies, State Key Laboratory of Modern Optical Instrumentations, Zhejiang Univ., China.* Graphene oxide sheets adsorbed with Ag nanoparticles were synthesized in a facile way. Raman spectra measured at different excitation wavelength were carried out. Efficient in vivo Raman detection experiments using GO-Ag nanoparticles were demonstrated.

Marigold

ATh3F.4 • 15:00 Invited

Efficient Polymer Solar Cells with an Power Conversion Efficiency Over 9%, Hongbin Wu[1], Zhicai He[1], Chengmei Zhong[1], Shijian Su[1], Miao Xu[1], Yong Cao[1]; [1]*Institute of Polymer Optoelectronic Materials and Devices, State Key Laboratory of Luminescent Materials and Devices, South China Univ. of Technology, China.* Polymer solar cells certified efficiency of 9.2% is realized through inverted structure, combining optimization on optical and electrical aspects. The new device structure simultaneously offers ohmic contact for photogenerated charge-carrier collection, allowing optimum photons harvest.

Dahlia

ATh3G.3 • 14:45 Invited

Active Plasmonic: from Random to Periodic, Cesare Umeton[1], Luciano De Sio[1], Roberto Caputo[1], Ugo Cataldi[1], Luigia Pezzi[1]; [1]*LICRYL Center of Excellence CEMIF.CAL and Department of Physics, Universita della Calabria, Italy.* Using self-organizing materials we have demonstrated "active plasmonics" materials/devices in which the plasmonic resonance, optical propagation and diffraction can be finely controlled by means of external perturbations such as electrical or optical field, temperature.

ATh3G.4 • 15:15

Analytical engineering of index maps for the design of all-dielectric metametarials, Eric CASSAN[1], Khanh Van Do[1]; [1]*Institut d'Electron Fondam (Univ. PSud), France.* An analytical method is proposed for the design of all-dielectric metamaterials at optical frequencies as an alternative to transformation optics, which is then applied to the design of broadband in-plane light trajectories like logarithmic spirals in the silicon on insulator photonics technology.

15:30–16:00 Tea Break, *3rd Floor Hallway (Near Exhibition Area)*

NOTES

Orchid

16:00–18:00
ATh4A • SC 1 - Fiber Devices I
Presider: Changxi Yang; Tsinghua Univ., China

ATh4A.1 • 16:00 Invited
All-Fiber Acousto-Optic Filters and Modulators, Byoung Yoon Kim[1]; [1]. Principles and implementation of all-fiber acousto-optic devices are presented including frequency shifter, tunable filter, modal coupler, polarization coupler and intensity modulator.

ATh4A.2 • 16:30 Invited
TBD, Alexander L. Gaeta[1], Moti Fridman[1]; [1]*Cornell Univ., USA.* Abstract not available.

Hydrangea

16:00–18:00
ATh4B • SC 2 - Silicon Photonics III
Presider: Ting Mei; South China Normal Univ., China

ATh4B.1 • 16:00 Invited
High speed silicon modulators and germanium detectors, Laurent Vivien[1], Delphine Marris-Morini[1], Melissa Ziebell[1], Gilles Rasigade[1], Leopold Virot[1,2], Jean-Michel Hartmann[2], Eric CASSAN[1], Paul Crozat[1], David Bouville[1], Charles Baudot[3], Frederic Boeuf[3], Jeam Marc Fedeli[2]; [1]*Univ. Paris sud - CNRS Inst d'Electronique Fondamentale, France;* [2]*CEA-Leti, France;* [3]*STMicroelectronics, France.* 40Gbit/s optical modulators based on carrier depletion effect and germanium photodetectors integrated in silicon waveguides have been demonstrated at a wavelength of 1.55μm.

ATh4B.2 • 16:30
Coupled-Resonator-Induced-Transparency in Cascaded Self-Coupled Optical Waveguide (SCOW) Resonators, Linjie Zhou[1], Jingya Xie[1], Liangjun Lu[1], Zhi Zou[1], Xiaomeng Sun[1], Jianping Chen[1]; [1]*Shanghai Jiao Tong Univ., China*. We experimentally demonstrate coupled-resonator-induced-transparency (CRIT) in cascaded self-coupled optical waveguide (SCOW) resonators. CRIT tuning is realized by heating the inter-cavity connection waveguide using an intrinsic thermal resistor.

ATh4B.3 • 16:45
Two-Channel Simultaneous Polarization Demultiplexing and Wavelength Conversion for Polarization-Multiplexing Signals in a SOI Waveguide, Yanqiao Xie[1], Shiming Gao[1], Sailing He[1]; [1]*Centre for Optical and Electromagnetic Research, State Key Laboratory of Modern Optical Instrumentation, Zhejiang Univ., China.* We demonstrate two-channel 10-Gb/s simultaneous polarization demultiplexing and wavelength conversion for a 20-Gb/s Pol-MUX NRZ-OOK signal using four-wave mixing in a SOI waveguide. The eye diagrams of the demultiplexed and converted signals are clearly observed.

Chrysanthemum

16:00–18:00
ATh4C • SC 3 - Coherent Systems
Presider: Xiaoxia Wu, JDSU, USA

ATh4C.1 • 16:00 Invited
100G Coherent transponder in MSA with advanced SD FEC, Benny Mikkelsen[1]; [1]*Acacia Communications, Inc., USA*. The paper discusses key technologies needed to implement 100G Coherent transceivers in an MSA form-factor. In particular, we discuss advantages and performance of SD-FEC. Finally, we present test results including transmission over 3750km SSMF (47 spans).

ATh4C.2 • 16:30 Invited
Colorless Coherent Reception, Chongjin Xie[1]; [1]*Alcatel-Lucent Bell Labs, USA*. We review recent studies on colorless reception of WDM channels using intradyne coherent receivers. The colorless reception performance of three different coherent receivers is compared and discussed.

Begonia

16:00–18:15
ATh4D • SC 4 - Network Survivability and Reconfiguration
Presider: Ori Gerstel; Cisco Systems, Inc., Israel

ATh4D.1 • 16:00 Invited
Recent Advances in (Optical) Network Survivability, Biswanath Mukherjee[1], Ferhat Dikbiyik[1]; [1]*Univ. of California Davis, USA*. Recent advances in (optical) network survivability is discussed such as disaster survivability, data protection for cloud services, the notion of degraded service/partial protection, exploiting multipath provisioning and excess capacity for improved robustness.

ATh4D.2 • 16:30 Invited
Flow Availability in Two-Layer Networks with Dedicated Path Protection, Jing Wu[1]; [1]*Communications Research Centre (CRC), Canada.* Traffic flows with protection can be disrupted in network failures that are beyond the protection capability. We analyze availability of upper-layer flows in two-layer networks with dedicated path protection at upper or lower layer.

Hibiscus

16:00–18:00
ATh4E • SC 5 - MIR Sensing
Presider: Jürgen Röpcke; Plasma Diagnostics, INP Greifswald, Germany

ATh4E.1 • 16:00 Invited
Mid-Infrared Semiconductor Laser Based Trace Gas Sensor Technologies: Recent Advances and Applications, Frank K. Tittel[1], Rafal Lewicki[1], Mohammad Jahjah[1], Yufei Ma[1], Przemyslaw Stefanski[1]; [1]*Rice Univ., USA*. Recent advances in the development of ultra-sensitive sensor technology based on mid -infrared semiconductor lasers for the detection of trace gas species and their application in industrial process control and environmental monitoring will be reported.

ATh4E.2 • 16:30 Invited
Recent Progress in Uncooled Photodetection of the Mid-infrared Radiation, Jozef Piotrowski[1]; [1]*VIGO System S.A., Poland.* Recent progress in sensitive and fast-response detection of the mid-infrared radiation with uncooled devices based on variable gap HgCdTe heterostructures. The devices show sub-nanosecond response time and performance approaching fundamental limits.

Marigold

16:00–18:00
ATh4F • SC 6 - Development and Production of High Performance LEDs
Presider: Boon Ooi; King Abdullah Univ. of Science & Technology, Saudi Arabia

ATh4F.1 • 16:00 Invited
Development of Solid State Lighting Technologies, Cees Ronda[1,2]; [1]*Philips, Research Laboratories, Netherlands;* [2]*COER, Zhejiang Univ., China.* An overview will be given about recent developments in Solid State Lighting Technologies, with an emphasis on inorganic LEDs. The paper will end with an outlook.

ATh4F.2 • 16:30 Invited
Production Technology of High Performance III-Nitride Devices, S. David Roh[1]; [1]*LG Innotek, Republic of Korea.* Large scale production of III-Nitride LEDs requires close attention to scalability and cost effectiveness of every technology adopted for production. Substrate diameter, material, and potential applicability to other III-N devices are important factors to consider.

Dahlia

16:00–18:00
ATh4G • Symposium on Advanced Photonics
Presider: Cesare Umeton; Universita della Calabria, Italy

ATh4G.1 • 16:00 Invited
Advanced Spatial Light Modulator Technology, Neil Collings[1]; [1]*Univ. of Cambridge, UK.* This paper will review the advances which have been made in both electrically and optically addressed spatial light modulators and coding algorithms, which bring the realization of advanced optical systems such as 3D display closer.

ATh4G.2 • 16:30 Invited
Nonlinear nanoprobes, Zhiwen Liu[1], Haifeng Li[1], Zhe Zhang[1], Perry S. Edwards[1], Yaoshun Jia[1], Baigang Zhang[1], Yong Xu[1]; [1]*Pennsylvania State Univ., USA.* A new class of nonlinear nanoprobe for probing ultrafast optical near fields is discussed, which consists of a fiber taper, a nanowire, and nonlinear nanoparticles or nanocrystals. Applications to characterizing ultrashort pulses will be discussed.

NOTES

Orchid

ATh4A.3 • 17:00
A Fiber-Based Slow-Light Laser Radar (SLIDAR), Zhimin Shi[1], Aaron Schweinsberg[1], Joseph E. Vornehm[1], Robert W. Boyd[1,2]; *[1]Univ. of Rochester, USA; [2]Dept. of Physics, Univ. of Ottawa, Canada.* We introduce the concept of multi-aperture slow-light laser radar (SLIDAR). Independent fiber-based techniques control group delay with optical phase locking. We demonstrate experimentally a proof-of-principle system which is capable of performing angular scanning in two orthogonal directions.

ATh4A.4 • 17:15
Efficiently Generation of Cascaded Fiber Four-Wave Mixing by Optical Feedback, Xiaosheng Xiao[1]; *[1]Tsinghua Univ., China.* A technique to efficiently generate cascaded fiber four-wave mixing (CFWM) by optical feedback is proposed and demonstrated. Results show that the number of CFWM products and the power of most CFWM products are both enhanced.

ATh4A.5 • 17:30
Electrically Tunable Delay for Trains of Optical Pulses, Santiago Tainta[1], María J. Erro[1], María J. Garde[1], Miguel Muriel[2]; *[1]Universidad Publica de Navarra, Spain; [2]Universidad Politécnica de Madrid, Spain.* A technique to implement an electrically tunable delay line with high bandwidth for trains of ultrashort optical pulses is presented. The system is based on the temporal self-imaging effect in fiber gratings and electrooptic modulation.

ATh4A.6 • 17:45
High-Degree Pulse Compression with a Convex Dispersion Profile, Qian Li[1,2], Jose Nathan Kutz[3], Ping Kong Wai[2]; *[1]Peking Univ. Shenzhen Graduate School, China; [2]The Hong Kong Polytechnic Univ., Hong Kong; [3]Univ. of Washington, USA.* We consider the non-adiabatic pulse compression of a cascaded third order soliton propagating in three consecutive optical fiber segments, each of which has a convex dispersion profile with two zero-dispersion wavelengths.

Hydrangea

ATh4B.4 • 17:00
Chirped Optical Pulse Compression Using a Silicon Channel Waveguide, Lizhong Cao[1], Shiming Gao[1]; *[1]Zhejiang Univ., China.* An integrated pulse compression method is proposed for chirped optical pulses based on silicon channel waveguides. A compression factor of about 0.05 is obtained by optimizing the waveguide dimensions.

ATh4B.5 • 17:15
Self-pulsation and excitability mechanism in silicon-on-insulator microrings, Thomas Van Vaerenbergh[1], Martin Fiers[1], Pauline Mechet[1], Thijs Spuesens[1], Rajesh Kumar[1], Geert Mortier[1], Kristof Vandoorne[1], Bendix Schneider[1], Benjamin Schrauwen[2], Joni Dambre[2], Peter Bienstman[1]; *[1]Photonic Research Group, UGent-IMEC, Belgium; [2]Electronics and information systems, UGent, Belgium.* In this paper, we demonstrate excitability in a silicon-on-insulator microring. Neglecting the fast light dynamics simplifies the calculation of the excitability onset. Excitable microrings will be useful as basic building block in all-optical neural networks.

ATh4B.6 • 17:30
Design and Fabrication of a High Performance Beam Splitter Based on the Silicon Nanowire Waveguide, Zhen Sheng[1], Zhiqi Wang[1], Chao Qiu[1,2], Le Li[2], Albert Pang[2], Aimin Wu[1], Xi Wang[1], Shichang Zou[1,2], Fuwan Gan[1]; *[1]Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China; [2]Grace Semiconductor Manufacturing Corporation, China.* We present the design, fabrication and measurement of a compact and low loss MMI-based optical beam splitter. The measured excess loss is less than 0.1dB at the wavelength of 1550nm.

ATh4B.7 • 17:45
Polarization Insensitive One-to-Six WDM Multicasting in a Silicon Nanowire, Minhao Pu[1], Hao Hu[1], Christophe Peucheret[1], Hua Ji[1], Michael Galili[1], Leif K. Oxenløwe[1], Palle Jeppesen[1], Jørn M. Hvam[1], Kresten Yvind[1]; *[1]Danmarks Tekniske Universitet, Denmark.* We present polarization insensitive one-to-six WDM multicasting based on non-degenerate four-wave mixing in a silicon nanowire with angled-pump scheme. Bit-error rate measurements are performed and error-free operation is achieved.

Chrysanthemum

ATh4C.3 • 17:00
Coherent Detected Secure Point-to-Point Optical Fiber Transmission using Ultra-Dense Optical Spectral Phase Coding (UD-SPC) and Multilevel BCJR Equalization, Xuezhi Hong[1,2], Yang Lu[2], Sailing He[1,2]; *[1]South China Normal Univ., China; [2]Zhejiang Univ., China.* A secure P2P optical fiber communication scheme based on ultra-dense optical spectral phase coding (UD-SPC) is proposed. The multi-code interference is suppressed by increasing the memory of the multilevel BCJR equalizer as shown by simulations.

ATh4C.4 • 17:15
Bandwidth-Efficient LDPC Coded CO-OFDM for 1-Tb/s Superchannel 8000-km SSMF Transmission, zhixue he[1]; *[1]State Key Laboratory of Optical Communication Technologies and Networks, Wuhan Research Institute of Post & Telecommunication, China.* We evaluate the 1-Tb/s CO-OFDM transmission performance using LDPC-coded 8-QAM and 8-PSK. Equipped with improvement in OSNR sensitivity, we successfully demonstrate 1 Tb/s CO-OFDM over 8000-km SSMF transmission at spectral efficiency of 3.3 bit/s/Hz

ATh4C.5 • 17:30 Invited
High stability time-frequency transmission over optical fiber, Jianping Chen[1], Weiwen Zou[1], Guiling Wu[1]; *[1]Shanghai Jiao Tong Univeristy, China.* The key issues and techniques of high stability time-frequency transmission over optical fiber, such as phase noise compensation, high precision measurement of phase noise, are discussed. Recent progress at Shanghai Jiao Tong Univ. is presented.

Begonia

ATh4D.3 • 17:00 Invited
A Framework of All-optical Restoration via Monitoring Trails (m-trails), Pin-Han Ho[1]; *[1]Univ. of Waterloo, Canada.* This presentation introduces a novel approach toward an all-optical and electronic signaling-free restoration process for general shared protection schemes via monitoring trails (m-trails).

ATh4D.4 • 17:30
Traffic Loss-Based Lightpath Reconfiguration in the Smart Grid Communication Network, Hongchuan Wang[1], Wei Guo[1], Weisheng Hu[1]; *[1]State Key Lab of Advanced Optical Communication Systems and Networks, Shanghai Jiao Tong Univ., China.* In order to reduce traffic loss during the lightpath reconfiguration process in the Smart Grid communication network, an Accumulative Traffic Loss (ATL) algorithm is proposed and simulation results show it can largely diminish traffic loss

ATh4D.5 • 17:45 Invited
High-Performance Optoelectronic Packet Switching Network for Data Center, Ken-ichi Kitayama[1]; *[1]Osaka Univ., Japan.* A five-year-long R&D program (2011~) funded by NICT, Japan will be outlined, which aims at developing optical packet switching (OPS) network for green data center (DC) accommodating huge number of servers. The consortium includes four institutes; NTT Laboratories, NEC Corp., Osaka University, and Kyushu University. In the intra-DC network, hybrid optoelectronic packet routers (HOERs) are interconnected with 100Gbps (25Gbps x 4 wavelengths) links. A novel "Express path" is proposed to enables the flow control.

Hibiscus

ATh4E.3 • 17:00 Invited

Optimisation of Fabrication and Specification of Quantum Cascade Lasers for Spectroscopic Applications, Antoine Muller[1]; [1]*Alpes Lasers, Switzerland.* Broad gain design concepts can be applied either to devices used as gain media in external cavity arrangements or to DFB single-mode devices. The trade-offs and opportunities of applying these concepts to optical spectroscopy are discussed.

ATh4E.4 • 17:30 Invited

4-11 μm Distributed Feedback Quantum Cascade Lasers for Environmental Monitoring, Industrial Process Control and Health Diagnostic Applications, Chung-En Zah[1], Feng Xie[1], Catherine Caneau[1], Lawrence C. Hughes[1], Herve P. LeBlanc[1], Sean Coleman[1], Ming-Tsung Ho[1]; [1]*Corning Incorporated, USA.* We present and review the state-of-the-art results from distributed feedback quantum cascade laser in the wavelength range from 4 to 11 μm for environmental monitoring, industrial process control and health diagnostic applications.

Marigold

ATh4F.3 • 17:00 Invited

Development of High Power LEDs, Schang J. Hon[1]; [1]*Epistar, Taiwan.* We will discuss high power LEDs.

ATh4F.4 • 17:30 Invited

Efficiency Droop in III-Nitride LEDs, Min-Ho Kim[1], Dong-Joon Kim[1], Young-Sun Kim[1], Sung-Tae Kim[1], Jaehee Cho[2], and E. Fred Schubert[2]; [1]*Samsung Electronics, South Korea;* [2]*Rensselaer Polytechnic Institute, USA.* The efficiency droop is the single most important challenge remaining in GaInN blue light-emitting diodes (LEDs) for solid-state lighting application. This presentation will review recent results on efficiency droop and thermal droop characteristics of III-nitride LEDs.

Dahlia

ATh4G.3 • 17:00

Tunable Ferrite based Triple-Band μ-Negative Metamaterial, Haibin Sun[1], Guangjun Wen[1], Yongjun Huang[1], Jingping Zhong[1], Weiren Zhu[2]; [1]*School of Communication and Information Engineering, Univ of Electronic Science & Tech China, China;*[2]*Department of Electrical and Computer Systems Engineering, Monash Univ., Australia.* We present a tunable triple-band μ-negative metamaterial composed of loop resonator and ferrite. The tunable triple-band-stop transmission spectrum is investigated numerically and the effective parameters are retrieved to illustrate the tunable μ-negative characteristic.

ATh4G.4 • 17:15

Efficient Development of Photorefractive Index Grating by Pico-second Pulse in the Presence of Magnetic Field, Sunayana Mahajan[1]; [1]*Northern India Engineering College, India.* Enhanced and fast photorefractive index grating is developed in compound semiconductor, when the two pico-second light pulses couple inside compound semiconductor crystal at 77 K under Voigt configuration, near the resonance condition in the presence of magnetic field.

ATh4G.5 • 17:30 Invited

Transmissions in zero-index materials, Yun Lai; *Wavefunctional Materials Lab, School of Physical Science and Technology, Soochow University, Suzhou, China.* Zero-index materials denote the artificial electromagnetic materials with effective zero permittivity or permeability components. Recent studies on such materials show that they have anomalous transmission properties and may lead to novel applications such as tunneling wave guides and bends, flux controller, etc. The physical mechanism lies in the "smart" power flow redistribution in the vertical direction by the evanescent or surface waves. Such materials can be fabricated by using metamaterials structures or photonic crystals.

NOTES

Orchid	Hydrangea	Chrysanthemum	Hibiscus
07:45–18:00 Registration Open			
08:30–10:05 AF1A • Plenary Session, *Convention Hall*			
10:05–10:30 Tea Break			
10:30–12:00 AF2A • Plenary Session, *Convention Hall*			
12:00–13:30 Lunch Break			

13:30–15:30
AF3A • SC 1 - Novel Fibers II
Presider: Aoxiang Lin; Xi'an Inst of Optics and Precision Mech, China

AF3A.1 • 13:30 Invited

Chalcogenide microstructured fibers for sensors and nonlinear applications, Johann Troles[1], Laurent Brilland[2], Perrine Toupin[1]; [1]*Univ. of Rennes, France;* [2]*PERFOS - Photonics Bretagne, France.* The recent optical improvements in the realization of chalcogenide microstructured fibers permit investigations in numerous fields of application such as, telecommunication functions, infrared wavelength conversions, infrared interferometry and sensors.

13:30–15:30
AF3B • SC 2 - Silicon Photonics Sources
Presider: Valery Tolstikhin; OneChip Photonics Inc., Canada

AF3B.1 • 13:30 Invited

Monolithic integration of an electrically pumped Ge laser on Silicon, Jurgen Michel[1]; [1]*Massachusetts Institute of Technology, USA.* On-chip integrated photonic networks lack the presents of an integrated light source that can drive on- and off-chip communication. We have developed a Ge laser that can be monolithically integrated into a CMOS process flow.

13:30–15:30
AF3C • SC 3 - PON
Presider: Josep Prat; Universitat Politecnica de Catalunya, Spain

AF3C.1 • 13:30 Invited

Uncooled dense WDM, Ian H. White[1], J. D. Ingham[1], S. H. Lee[1], Richard V. Penty[1]; [1]*Univ. of Cambridge, UK.* An uncooled dense WDM system is described using standard WDM components and receiver signal processing, with a different number of receivers to transmitters, to allow wide temperature drift of the transmitter lasers.

13:30–15:30
AF3D • SC 5 - Remote Sensing
Presider: Gabriel Somesfalean; Lund Univ., Sweden

AF3D.1 • 13:30 Invited

Remote Sensing of Atmospheric Compounds Using Backscattered Light from Nanosecond and Femtosecond Laser Light, Gregory David[1], Benjamin Thomas[1], Alain Miffre[1], Patrick Rairoux[1]; [1]*Universite Lyon 1 CNRS, France.* Polarization and spectrally resolved light scattering of laser light into the atmosphere allows remote evaluation of atmospheric particulate matter and trace gases by applying the lidar technique.

Begonia	Marigold	Lobby of Convention Hall
07:45–18:00 Registration Open		
08:30–10:05 AF1A • Plenary Session, *Convention Hall*		
10:05–10:30 Tea Break10:30–12:00 AF2A • Plenary Session, *Convention Hall*		
12:00–13:30 Lunch Break		

13:30–15:30
AF3E • SC 4 - Elastic Optical Networks I
Presider: Hiroshi Hasegawa; Nagoya University, Japan

AF3E.1 • 13:30 Invited

Adaptive DWDM - a New Dawn for Optical Networking?, Ori Gerstel[1]; [1]*Cisco, Israel.* Elastic DWDM holds a significant potential to increase network efficiency. But for it to be exploited to its fullest, the physical interface and the control and management planes for optical and client layers must change.

13:30–15:30
AF3F • SC 6 - Solar Cells and Thermoelectric Technologies
Presider: Nelson Tansu; Lehigh Univ., USA

AF3F.1 • 13:30

Coupling between radiation and internal modes: light trapping in thin film solar cells with periodic texture, Franz-Josef Haug[1], Ali Naqavi[1], Christophe Ballif[1]; [1]*Ecole Polytechnique Federale de Lausanne, Switzerland.* We present amorphous silicon solar cells on random and periodic back reflector geometries.

AF3F.2 • 13:45

Aluminum Nanoparticles for Efficient Light-trapping in Plasmonic Gallium Arsenide Solar Cells, Xiaofeng LI[1]; [1]*Soochow Univ., China.* Plasmonic GaAs solar cells with different metallic nanoparticles are investigated by a three-dimensional device simulation. Optimal nanoparticle index is obtained through Mie calculation and it shows that aluminum best suits the requirement for efficient light-trapping.

13:30–15:30
AF3G • SC 3 - Performance Monitoring
Presider: TBA

AF3G.1 • 13:30 Invited

Polarization dependent loss and polarization mode dispersion in coherent polarization multiplexed transmission, Mark Shtaif[1], Anton Andrusier[1]; [1]*School of Electrical Engineering, Tel Aviv Univ., Israel.* We discuss the modeling of the performance of modern polarization-multiplexed communications systems in the presence of polarization dependent loss (PDL) and polarization-mode dispersion (PMD). Ways of assessing system tolerance to PDL and methods for increasing this tolerance are discussed.

NOTES

Orchid

AF3A.2 • 14:00 Invited

Hybrid fibers: multimaterial nanophotonic devices in fiber form, Markus Schmidt[1], Ho Wai Lee[1], Patrick Uebel[1], Nicolai Granzow[1], Philip Russell[1]; [1]*Max Planck Institute for the Science of Light, Germany.* I will review our recent results related to nanophotonic hybrid fibers. I will discuss plasmonic hybridization inside fibers and the optical properties of highly nonlinear chalcogenide-silica waveguides and their application in infrared supercontinuum generation.

AF3A.3 • 14:30

Splicing Optical Microfibers via Polymer Nanowires, Zhifang Hu[1], Limin Tong[1]; [1]*Zhejiang Univ., China.* We demonstrate a general approach to splice microfibers via polymer nanowire. Mach-Zehnder interferometer assembled using this technique functions in air and water. The approach promises potential applications in micro-optics integration and sensing.

AF3A.4 • 14:45

Simple Technique for Measuring Cut-Off Wavelength of Multi-Core Fiber (MCF) and Its Definition, Masaharu Ohashi[1], Katsuhiro Takenaga[2], Shoichiro Matsuo[2], Yuji Miyoshi[1]; [1]*Osaka Prefecture Univ., Japan;* [2]*Fujikura Ltd., Japan.* We propose a cut-off wavelength definition of a multi-core fiber (MCF) and its simple measurement technique. The cutoff wavelength of MCF is successfully estimated by our proposed technique.

Hydrangea

AF3B.2 • 14:00 Invited

Multi-Channel and High-Density Hybrid Integrated Light Source on Silicon Optical Waveguide Platform, Takanori Shimizu[1,2], Makoto Okano[1,3], Nobuaki Hatori[1,2], Masashige Ishizaka[1,2], Yutaka Urino[1,2], Tsuyoshi Yamamoto[1,2], Masahiko Mori[1,3], Takahiro Nakamura[1,2], Yasuhiko Arakawa[1,4]; [1]*PECST, Japan;* [2]*PETRA, Japan;* [3]*AIST, Japan;* [4]*The Univ. of Tokyo, Japan.* A novel high-density hybrid integrated light source on a silicon waveguide platform was developed for interchip optical interconnection. The number of output ports was increased to over a hundred by using waveguide splitters and multichip bonding.

AF3B.3 • 14:30

Luminescent mechanisms of Si-rich SiOx analyzed by full-band time-resolved photoluminescence, Chung-Lun Wu[1], Gong-Ru Lin[1]; [1]*National Taiwan Univ., Taiwan.* Based on the finite potential well approximation and effective masses modification, the bandgap energy of Si-QD is derived as Eg(d)=1.12+5.83/d1.78 (eV). The luminescent mechanisms of SiOx have been differentiated by PL and TRPL measurements.

AF3B.4 • 14:45

Room temperature photoluminescence from tensile-strained germanium-on-insulator fabricated by a Ge condensation technique, Shihao Huang[1], Weifang Lu[1], Cheng Li[1], Wei Huang[1], Hongkai Lai[1], Songyan Chen[1]; [1]*Department of Physics, Semiconductor Photonics Research Center, Xiamen Univ., China.* We report a biaxial tensile strain as large as 0.60 % in an ultra-thin germanium-on-insulator fabricated by a Ge condensation technique. Room temperature direct band photoluminescence from the material is significantly enhanced.

Chrysanthemum

AF3C.2 • 14:00

FPGA Implementaion of FEC for 10G-EPON, Xicong Li[1], Yingying Cao[1], Xue Chen[1], Weidong Gao[2]; [1]*Information Photonics and Optical Communications, Beijing Univ. of Posts and Telecommunications, China;* [2]*GW Delight Technology Co. Ltd, China.* New parallel RS(255,223) encoder and decoder architectures for 10G EPON FEC are presented and realized in FPGA. The proposed architectures can operate at 156.25MHz to achieve the throughput of 10.3125Gbps with small hardware-complexity and low latency.

AF3C.3 • 14:15

An Improved FEC Scheme for 10G EPON Based on Channel Adaptation, Yingying Cao[1], Xue Chen[1], Xicong Li[1]; [1]*State Key Laboratory of Information Photonics and Optical Communication, Beijing Univ. of Posts and Telecommunications, Beijing, China.* To improve system capacity for 10G EPON, a channel-adaptive FEC scheme is proposed, which efficiently improves capacity performance by adopting the optimal code of each ONU and can be implemented with very low increment of complexity.

AF3C.4 • 14:30 Invited

Recent Progress in Coherent WDM PON Technology, Yun C. Chung[1]; [1]*KAIST, Republic of Korea.* We review the recent advancement of the WDM PON technology achieved at KAIST. In particular, we report the progresses in the long-reach high-speed WDM PON based on the RSOA and digital coherent detection technique.

Hibiscus

AF3D.2 • 14:00 Invited

Laser Remote Sensing - From Environmental to Medical Applications, Sune R. Svanberg[1,2]; [1]*Physics Department, Lunds Universitet, Sweden;* [2]*Center for Optical and Electromagnetic Research, South China Normal Univ., China.* Similar concepts of laser remote sensing can be applied on large and small spatial scales. Applications of spectroscopy in the time- and frequency domains are discussed in wide application areas ranging from environmental monitoring to medical diagnostics.

AF3D.3 • 14:30 Invited

Environmental monitoring with portable, tunable diode laser based gas analyzers, Hamish Adam[1]; [1]*Boreal Laser, Canada.* Applications described in this paper include: agricultural emissions of CH4 and NH3; CH4 and CO2 landfill emissions; CO2 leak detection in Carbon Capture and Storage; CH4 and H2S leak detection from natural gas production and transportation.

Begonia

AF3E.2 • 14:00
Split-spectrum channel scheme for future dynamic flexible grid optical networks, Zitian Zhang[1], Weiqiang Sun[1], Weisheng Hu[1]; *[1]State Key Laboratory of Advanced Optical Communication Systems and Networks, Shanghai Jiaotong Univ., China.* To reduce connection blocking caused by spectrum fragmentation in future elastic optical networks, we propose the split-spectrum channel scheme and a spectrum allocation algorithm. Simulations are done to show its remarkable performance.

AF3E.3 • 14:15
Multicast Routing and Spectrum Assignment in Elastic Optical Networks, Ziyan Yu[1], Yongli Zhao[1], Jie Zhang[1], Xiaosong Yu[1], Bowen Chen[1], Xuefeng Lin[2]; *[1]Beijing Univ of Posts & Telecom, China; [2]ZTE Corporation, China.* Modulation-Enabled node model is introduced in Elastic Optical Networks (EON), which describes the capability of changing Modulation Level (ML) dynamically. A novel multicast RSA algorithm is proposed and validated. Simulation results show its good performance.

AF3E.4 • 14:30
Service-oriented Spectrum Assignment Algorithms in Flexible Bandwidth Optical Networks, Kangjing Song[1], Jie Zhang[1], Yongli Zhao[1], Xiaosong Yu[1], Yiming Yu[1], Bowen Chen[1], Hui Yang[1]; *[1]BUPT, China.* We introduce a service-oriented spectrum assignment framework and propose two algorithms to solve the Routing and Spectrum Assignment (RSA) in flexible bandwidth optical networks. Numerical simulations demonstrate lower blocking probability than conventional RSA algorithms.

AF3E.5 • 14:45
Fragments-Minimum Spectrum Allocation Algorithm in Flexible Bandwidth Multi-Fiber Optical Networks, Xiaosong Yu[1], Yongli Zhao[1], Jie Zhang[1], Yue Yu[1], Jiawei Zhang[1], Xuefeng Lin[2], Xuping Cao[2]; *[1]Beijing Univ. of Posts and Telecommunications, China; [2]ZTE Corporation, China.* This paper introduces the concept of Spectrum Compactness to describe fragments in flexible bandwidth multi-fiber optical networks. To minimum fragments, three algorithms named AFFF, MSFF and BSF are proposed. Simulations show BSF performs the best.

Marigold

AF3F.3 • 14:00 Invited
High Performance Multi-Junction Solar Cells, Hui Yang[1]; *[1]Institute of Physics, Chinese Academy of Sciences, China.* We will present upon high performance multi-junction solar cells.

AF3F.4 • 14:30 Invited
III-Nitride Based Thermoelectric - Current Status and Future Potential, Jing Zhang[1], Hua Tong[1], Guangyu Liu[1], Nelson Tansu[1]; *[1]Lehigh Univ., USA.* The current status and future potential of III-Nitride semiconductors are reviewed for thermoelectric applications. Promising thermoelectric properties have been shown by the III-Nitride semiconductors both in theoretical and experimental aspects, which are of great importance for high power optoelectronic devices.

Lobby of Convention Hall

AF3G.2 • 14:00 Invited
Quality Metrics in Optical Modulation Analysis: EVM and its relation to Q-factor, OSNR, and BER, Bernd Nebendahl[1], Rene Schmogrow[2], Tasshi Dennis[5], Arne Josten[2], David Hillerkuss[2], Swen Koenig[2], Joachim Meyer[4], Michael Dreschmann[4], Markus Winter[2,6], Michael Huebener[4,7], Wolfgang Freude[2,3], Christian Koos[2,3], Juerg Leuthold[2,3]; *[1]Agilent Technologies, Germany; [2]Institute of Photonics and Quantum Electronics, Karlsruhe Institute of Technology, Germany; [3]Institute of Microstructure Technology, Karlsruhe Institute of Technology, Germany; [4]Institue of Information Processing, Karlsruhe Institute of Technology, Germany; [5]National Institute of Standards and Technology, USA; [6]Polytec, Germany; [7]Embedded Systems in Information Technology, Ruhr-Univ., Germany.* The quality of optical signals is a very important parameter in optical communications. Several metrics are in common use, like optical signal-to-noise power ratio (OSNR), Q-factor, error vector magnitude (EVM) and bit error ratio (BER).

AF3G.3 • 14:30 Invited
Optical Performance Monitoring: from direct detection to coherent optical communication systems, Chao Lu[1], Alan Pak Tao Lau[2], Qi Sui[2], Fasial Khan[3], Zhenhua Dong[2]; *[1]1The Photonics Research Center, Dept. of Electronic and Information Engineering, Hong Kong Polytechnic Univ., Hong Kong; [2]2The Photonics Research Center, Dept. of Electrical Engineering, Hong Kong Polytechnic Univ., Hong Kong; [3]School of Electrical and Electronic Engineering, Universiti Sains Malaysia, Malaysia.* We review techniques used for monitoring various signal parameters of direct detection optical communication systems and networks. Emerging optical performance monitoring (OPM) trends and challenges for coherent communication systems are discussed.

NOTES

Orchid

AF3A.5 • 15:00
Design of Two-Core Photonic Crystal Fiber to Eliminate Intermodal Dispersion, Min Liu[1], Kin S. Chiang[2]; *[1]Chongqing Univ., China; [2]City Univ. of Hong Kong, China.* A two-core photonic crystal fiber is proposed to eliminate intermodal dispersion. The fiber can be fabricated readily with the existing technology and is suitable for applications that involve ultrashort pulses.

AF3A.6 • 15:15
Suspended hollow core fiber for terahertz wave guiding, Xiaogang Jiang[1,2], Daru Chen[1,2], Gufeng Hu[1,2]; *[1]Zhejiang Normal Univ., China; [2]Joint Research Laboratory of Optics of Zhejiang Normal Univ. and Zhejiang Univ., Zhejiang Normal Univ., China.* A suspended hollow core fiber is proposed as a novel Terahertz waveguide with low loss property, and is investigated compared with a suspended solid core fiber.

Hydrangea

AF3B.5 • 15:00 Invited
Hybrid silicon lasers: progress and perspectives, Marco Fiorentino[1], Di Liang[1], Geza Kurczveil[1], Raymond G. Beausoleil[1]; *[1]Hewlett Packard Labs, USA.* We present our latest updates on hybrid microring lasers including an unidirectional ring lasers and lasers that use a thermal shunt to improve thermal performance.

Chrysanthemum

AF3C.5 • 15:00
10-Gbps RSOA-Based Upstream Transmission in WDM-PON with MZI-based Equalizers, TING SU[1]; *[1]State Key Laboratory of IPOC, BUPT, China.* Proposed and demonstrated in this paper is the 10-Gbps uplink transmission in WDM-PON, in which band-limited RSOAs are applied to colorless ONUs and Mach-Zehnder Interferometers (MZIs) are used as two-tap optical equalizers before the receivers.

AF3C.6 • 15:15
10Gbit/s Full-duplex Bidirectional RSOA-based WDM PON using Mach-Zehnder Interferometer and Forward Error Correction, Han Weiping[1]; *[1]Beijing Univ. of Posts and Telecommunications, State Key Lab of IPOC(BUPT), China.* 10Gbit/s full-duplex RSOA-based WDM PON using MZI and FEC is proposed. A 5dB power penalty reduction and ~-12.7dBm@BER=2.5×10-3 received sensitivity are obtained over 20km. An effective 10Gbit/s parallel algorithm is implemented to realize the FEC module.

Hibiscus

AF3D.4 • 15:00 Invited
Recent Progress in Photonic Sensing of Key Atmospheric Reactive Species, Weidong Chen[1]; *[1]Universite du Littoral, France.* We overview our recent progress in monitoring of HONO, NO2, NO3 and OH by using modern photonic sources (QCL, LED) in conjunction with high-sensitivity spectroscopic techniques, such as cavity enhanced absorption and Faraday rotation spectroscopies.

15:30–16:00 Tea Break, *3rd Floor Hallway (Near Exhibition Area)*

16:00–18:00 Postdeadline Papers

NOTES

Begonia

AF3E.6 • 15:00
Defragmentation of Flexible Optical Networks Based on Simulated Annealing, Yuchen Zeng[1], Nan Hua[1], Xiaoping Zheng[1], Hanyi Zhang[1], Bingkun Zhou[1], Yining Cao[2]; [1]*Department of Electronic Engineering, Tsinghua Univ., China;* [2]*Institute of China Electronic Equipment System Engineering Company, China.* We analyze the defragmentation problem of flexible optical networks and propose a defragmentation method based on simulated annealing. Compared with one-step defragmentation methods, the simulated-annealing-based method offers lower blocking probability and higher resource utilization efficiency.

AF3E.7 • 15:15
Span Restoration for CO-OFDM-based Elastic Optical Networks under Spectrum Conversion, Yue Wei[1], Gangxiang Shen[1], Shanhong You[1]; [1]*School of Electronic and Information Engineering, Soochow Univ., China.* We consider the span restoration (SR) technique for CO-OFDM-based elastic optical networks under spectrum conversion. We develop a mixed integer linear programming (MILP) model to minimize required spare capacity and maximize restored traffic flows.

Marigold

AF3F.5 • 15:00 Invited
Nanoparticle plasmonics for optoelectronics and photovoltaics, Michael Giersig[1], [1]*Dept. of Physics, Free Univ. Berlin, Germany.* The metallic nanoparticles can effectively confine the radiation to nanoscale in the proximity of the plasmon resonance, while the position of this resonance is controlled by the morphology of the nanostructures. I will discuss physical and chemical preparation methods of various nanostructures and their structural and optical characterization.

Lobby of Convention Hall

AF3G.4 • 15:00
Accurate BER Estimation for Coherent Optical Transmission Systems, Andrea Peracchi[1], Raffaele Corsini[1], Ernesto Ciaramella[1]; [1]*Scuola Superiore Sant'Anna, Italy.* We propose a bit error rate (BER) estimation technique based on the analysis of the statistical distribution of the constellation points after equalization. The method is successfully tested in presence of linear transmission impairments by both numerical simulations and experimental measurements.

AF3G.5 • 15:15
Non-line-of-sight Ultraviolet Channel Parameters Estimation in Turbulence Atmosphere, Houfei Xiao[1], Yong Zuo[1], Cheng Fan[1], Chaoye Wu[1], Jian Wu[1]; [1]*Beijing Univ of Posts & Telecom, China.* Based on various atmospheric conditions and transceiver system parameters, this article discusses estimation of various attenuations of non-line-of-sight (NLOS) ultraviolet (UV) communications in turbulence atmosphere and offers simulation results of theoretical calculations.

15:30–16:00 Tea Break, *3rd Floor Hallway (Near Exhibition Area)*

16:00–18:00 Postdeadline Papers

16:00–18:00 Postdeadline Papers

NOTES

Hydrangea, Chrysanthemum, and Hibiscus

15:30–18:30
AF4A • Poster Session I

AF4A.1
Hybrid-Integrated Coherent Receiver Using Chip-to-Chip Bonding Technology, Jong-Hoi Kim[1], Joong-Seon Choe[1], Kwang-Seong Choi[1], Chun Ju Youn[1], Duk-Jun Kim[1], Yong-Hwan Kwon[1], Eun-Soo Nam[1]; *[1]Photonics/Wireless Convergence Components Research, ETRI, Republic of Korea.* We present a hybrid-integrated coherent receiver module using a chip-to-chip bonding technology to integrate a spot-size converter integrated photodiode array chip and an optical hybrid chip using a silica-based PLC technology.

AF4A.2
All-Optical Triode Based on Cross Gain Modulation using InAs Quantum Dot Semiconductor Optical Amplifiers, Yoshinobu Maeda[1]; *[1]Kinki Univ., Japan.* It was designed active layer of 15 stacks of InAs quantum dots, AlGaAs/GaAs double heterostructure and fabricated semiconductor optical amplifiers for all-optical triode that can be used with a 1.3 μm band.

AF4A.3
Few-quantum-dot lasing in photonic crystal nanocavities, Jin Liu[1], Serkan Ates[1], Michael Lorke[1], Søren Stobbe[2], Lodahl Peter[2]; *[1]DTU Fotonik, Denmark; [2]Niels Bohr Institute, Denmark.* A very smooth lasing transition in photonic crystal nanocavities with embedded quantum dots is observed and compared to the theory. Decay rate measurements reveal that only a few quantum dots are feeding the cavity.

AF4A.4
On-chip CMOS-compatible optical signal processor, Ruiqiang Ji[1], Lei Zhang[1], Yonghui Tian[1], jianfeng ding[1], Lin Yang[1]; *[1]Institute of Semiconductors, CAS, China.* We propose and demonstrate an optical signal processor performing matrix-vector multiplication, which is composed of laser-modulator array, multiplexer, splitter, microring modulator matrix and photodetector array.

AF4A.5
Dual-electrode Tunable Asymmetric π Equivalent Phase Shift SBG Semiconductor Laser, Yating Zhou[1,2], Jie Hou[3], Xiangfei Chen[2]; *[1]Science school, Changzhou Institute of Technology, China; [2]Microwave-Photonics Technology Laboratory, Nanjing National Laboratory of Microstructures, Nanjing Univ., China; [3]Institute of Semiconductors, Chinese Academy of Sciences, China.* A dual-electrode tunable asymmetric π equivalent phase shift SBG semiconductor laser is experimentally investigated. The experimental results show that adjusting the two injected currents its lasing wavelength can be tuned up to 2.1 nm.

AF4A.6
Different Channel-Spacing DFB Laser Array Fabricated by SAG after Optimization, Can Zhang[1], Li Ma[1], Song Liang[1], Baojun Wang[1], Hongliang Zhu[1], Wei Wang[1]; *[1]Key Laboratory of Semiconductors Materials, Institute of Semiconductors, CAS, China.* Selective area growth has been performed to fabricate monolithically integrated DFB laser array with different channel spacings by adjusting the mask width and the thickness of waveguide layer. The DFB laser array with an average channel spacing 0.69nm and 1.50nm is demonstrated respectively.

AF4A.7
Critical Dimensions for Axial Double Heterostructure Nanowires Using Finite-Element Method, Hui Geng[1], Xin Yan[1], Xia Zhang[1], Junshuai Li[1], Yongqing Huang[1], Xiaomin Ren[1]; *[1]State Key Laboratory of Information Photonics and Optical Communications, Beijing Univ. of Posts and Telecommunications, China.* Critical dimensions for an axial double heterostructure nanowire are studied by using finite-element method based on the energy equilibrium criteria. The results are in good agreement with the experimental data.

AF4A.8
Micro-patterning replication of planar optical elements on silicone LED encapsulant film using imprinting technique, Lei Wan[1]; *[1]South China Normal Univ., China.* The aim of this study is to make micro-patterning replication of planar optical elements by imprinting technique based on excellent physical properties of silicone LED encapsulants such as good thermal stability and high optical transmittance.

AF4A.9
Polarization manipulation holographic lithography by single refracting prism, Man Wu[1]; *[1]South China Normal Univ., China.* We propose a simple but effective strategy for polarization manipulation holographic lithography by single refractive prism. By tuning the polarization of single laser beam, we simply obtain a pill shape interference pattern.

AF4A.11
Passivated Lead selenide Quantum Dots for Infrared Rradiation Detection, Ali Rostami[1,2], Mahboubeh Dolatyari[1], Mohammad Mahmudi[1], Hamed Baghban[1], Hasan Rasooli[1]; *[1]School of Engineering-Emerging Technologies, Univ. of Tabriz, Islamic Republic of Iran;[2]Photonics and Nanocrystal Research Lab. (PNRL), Faculty of Electrical and Computer Engineering, Univ. of Tabriz, Islamic Republic of Iran.* Photosensors based on passivated PbSe quantum dots has been fabricated successfully. The quantum dots were synthesized using Thermal decomposition method. The photo-responsivity of the fabricated detectors strongly depends on the size of synthesized PbSe nanocrystals.

AF4A.12
Bandgap Engineering of InGaAsP/InP Laser Structure by Argon Plasma Induced Point Defects, Mohammad Kaleem[1], Xin Zhang[1], Jian-Jun He[1]; *[1]Optical Engineering, Zhejiang Univ., China.* Blue shift of the bandgap in InGaAsP/InP quantum well structure is demonstrated experimentally. The technique depends upon generation of point defects via plasma induced damage during deposition of sputtered SiO2 followed by rapid thermal annealing.

AF4A.13
A compact triplexer using grating-assisted multimode interference coupler based on silicon nanowire waveguide, Wei Ling[1], Chao Qiu[1], Hao Li[1], Zhen Sheng[1], Aimin Wu[1], Xi Wang[1], Shichang Zou[1], Fuwan Gan[1]; *[1]State Key Laboratory of Functional Materials for Informatics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China.* A compact triplexer using grating-assisted multimode interference (MMI) coupler is demonstrated based on silicon nanowire waveguide. Asymmetric tapered ports are designed to meet the different bandwidth requirements for different channels.

AF4A.14
Design of a Hybrid Slot Plasmonic Waveguide with Nanoscale Light Confinement and Its Application for Ultrafast All-Optical Switching, Zhonglai Zhang[1], Jian Wang[1], Chao Xiang[1], Chengcheng Gui[1]; *[1]Wuhan National Laboratory for Optoelectronics, Huazhong Univ. of Science and Technology, China.* We design a novel hybrid slot plasmonic waveguide with a long propagation length of 1046μm and small effective mode area of 6.5×10-2μm2. We simulate and achieve ultra-fast all-optical switching using non-degenerate FWM in the waveguide.

AF4A.15
Full-Vectorial Analysis of Bending Silicon Wires by Using an Improved Finite-Difference Method, Jinbiao Xiao[1]; *[1]School of Electronic Science and Engineering, Southeast Univ. (China), China.* An improved finite-difference scheme in a local cylindrical coordinate system is proposed for full-vectorial analysis of bending silicon wires. Both the complex effective indexes and field distributions of the leaky modes are presented.

AF4A.16
A flattening gain Raman Amplifier involved only 2 cascaded FBG based multi-wavelength pumps, Zou Xiaohui[1], Bu Qinlian[1], Fu Chengpeng[1], Shi Wei[1], Yu Qi[1], Long Hao[1], Huang Xuanze[1], Hu Qianggao[1], Liu Shuihua[1]; *[1]Accelink Technologies Co.,Ltd, China.* A flattening gain of <0.4dB Raman amplifier for full C-band which used only 2 pumps with each contains 2 individual pump wavelengths is proposed and demonstrated for the first time.

AF4A.17
Study of an SPP mode with gain medium based on a hybrid plasmonic structure, Ning Zhu[1,2], Ting Mei[1,2]; *[1]Laboratory of Nanophotonic Functional Materials and Devices, South China Normal Univ., China; [2]Optoelectronic Material and Technology, South China Normal Univ., China.* We propose and study a hybrid plasmonic waveguide structure with gain medium. The structure is based on silicon with gain medium to be III-V compound semiconductor, which can be realized by bonding technology.

Hydrangea, Chrysanthemum, and Hibiscus

AF4A.18
Growth of Axial GaAs Nanowire PN and PIN Junctions, Junshuai Li[1], Xin Yan[1], Xia Zhang[1], Xiaolong Lv[1], Jiangong Cui[1], Xiaomin Ren[1]; [1]*BUPT, China.* Axial GaAs nanowire pn and pin junctions were grown on GaAs(111)B substrate by MOCVD. SEM and HRTEM were applied to inspect nanowire diameter, height and crystallography property. Impurities incorporation was confirmed by EDS scanning.

AF4A.19
Directly modulated AlGaInAs-InP Microcylinder Lasers, Xiao-Meng Lv[1], Heng LOng[1], Ling-xiu Zou[1], Qi-Feng Yao[1], Yong-Zhen Huang[1], JinLong Xiao[1], Yun Du[1]; [1]*Institute of Microelectronics of CAS, China.* We fabricate AlGaInAs-InP microcylinder lasers with an output waveguide surrounded by BCB. Single mode operation at continuous wave injection current is demonstrated. A small signal 3dB bandwidth of 4 GHz is achieved at 50 mA.

AF4A.20
Low Cost Wide Waveguide Gap Polarization Mode Converter, Lingjie Wang[1,2], Yanli Zhao[1], Tianhong Zhou[2], Zheng Chen[2], Yuanzhong Xu[1], Weidong Ma[2]; [1]*School of Optoelectronics Science and Engineering, Huazhong Univ. of Science and Technology, China;* [2]*R&D Department Three, Accelink Technologies Co., Ltd., China.* A new type of low cost polarization mode converter on basis of the segmented waveguide taper (SWT) has been proposed, which can reduce the excess loss drastically from 5dB to less than 1.5dB.

AF4A.21
A Proposal for Broadband Polarization-Insensitive Wavelength Conversion Using a SOI Waveguide, Shiming Gao[1], Yanqiao Xie[1], Ping Zhou[1], Xibin Li[1], Lizhong Cao[1], Sailing He[1]; [1]*Zhejiang Univ., China.* A broadband polarization-insensitive wavelength conversion is presented based on four-wave mixing in a silicon-on-insulator waveguide by optimizing the pump polarization angle and the waveguide geometries. A 1-dB polarization-insensitive bandwidth of 400 nm is achieved.

AF4A.22
8×8 Passive Noblocking Microring Resonator Crossbar for On-chip Interconnection Network, zhihua yu[1], Yabin Hu[1], Guangjun Wang[1], Guang Qi[1], Juan Zhao[1], Fengguang Luo[2]; [1]*China Univ. of Geosciences, China;* [2]*Wuhan National Laboratory for Optoelectronics, Huazhong Univ. of Science and Technolog, China.* We use the transfer matrix method to investigate a 8×8 noblocking microring resonator crossbar that can be used to route wavelength division multiplexing (WDM) signals across the chip.

AF4A.23
A wedge-to-wedge plasmonic waveguide for sub-wavelength confinement and long-range propagation, Mingzhao Song[1], Ran Hao[1], Jiaming Jin[1], Er-Ping Li[1]; [1]*Department of Information Science & Electronic Engineering, Zhejiang Univ., China.* We propose a novel surface plasmon-polariton waveguide constructed by a wedge-to-wedge structure. The waveguide is based on the metal-insulator-metal mechanism, which enables nanometer light confinement and keeps longer propagation length at the telecom wavelengths.

AF4A.24
Analysis and Experimented on Frequency Response Characteristics of RSOA based on Small Signal Analysis Method, Yueying Zhan[1], Min Zhang[1], Junyun Zhan[2], Lei Liu[1], Mintao Liu[1], Xue Chen[1]; [1]*State Key Lab. of Information Photonics and Optical Communications (Beijing Univ. of Posts & Telecom.), China;*[2]*Jinan Branch Shandong Ltd, China Mobile Group, China.* Frequency response characteristics of reflective semiconductor optical amplifier (RSOA) are analyzed by utilizing small signal analysis method. Performance of frequency response characteristic of the RSOA is analyzed and experimented.

AF4A.25
Ultra-broadband metamaterial absorber in terahertz regime, Zhaofeng Ma[1], Fei Ding[1]; [1]*Centre for Optical and Electromagnetic Research, State Key Laboratory of Modern Optical Instrumentations, Zhejiang Univ., China.* A broadband thin-film metematerial absorber composed of a periodic array of metal-dielectric multilayered pyramids is presented. Simulated results show that the absorbance is higher than 90% in the frequency range from 1.08 to 2.15 THz.

AF4A.26
24-Gbps DD-OFDM Transmission over 40-km SSMF based on 1310-nm EML, Wei Lin[1], Zhaohui Li[1], Yuan Bao[1], Jianping Li[1], Xinhuan Feng[1], Bai-ou Guan[1]; [1]*Institute of Photonics Technology, Jinan Univ., China.* Using selective subcarrier-filling and pre-emphasis techniques, we experimentally demonstrated 24-Gbps optical DD-OFDM signal transmitted over 40-km SSMF without using dispersion compensation and optical amplifiers based on a 1310nm EML. BER is lower than 2e-3.

AF4A.27
A new method for layout optimization of 1×N optical power splitters, Miao Zhang[1], Linjie Zhou[1], Xinwan Li[1], Jianping Chen[1]; [1]*shanghai jiaotong Univ., China.* A new method for layout optimization of 1×N power splitters is presented. A genetic algorithm is used to reduce the device footprint. Simulation results show that insertion loss and uniformity are improved.

AF4A.28
A Novel Scheme for Mode Division Multiplexed Transmission by Simultaneous Transmission of Local Lights, Tomoyasu Nishimori[1], Zhang Yang[1], Jyunya Matsushita[1], Katsushi Iwashita[1]; [1]*Kochi-Univ. of Technology, Japan.* We propose a novel Mode-Division Multiplexed transmission scheme to realize coherent detection resulting in successful MIMO processing by transmitting local lights with signals. The feasibility of the proposed scheme are confirmed by two channels experiment.

AF4A.29
A scalable metro-access integrated network system with reconfigurable WDM central ring and high-quality OFDMA access trees, Chen Chen[1], Chongfu Zhang[1], Qiongli Zhang[1], Qiu Kun[1]; [1]*Key lab of optical fiber sensing and communication networks, Ministry of Education, Univ. of Electronic Science and Technology of China, 611731, Chengdu, China, China.* We propose a scalable metro-access integrated network system enabled by reconfigurable wavelength-division multiplexing ring and high-quality orthogonal frequency-division multiple access trees. Simulation results successfully verify its feasibility.

AF4A.30
Adaptive Control of OFDM Data Rate for LED Visible Light Communications in Different Free Space Transmission Distances and Offsets, Y. F. Liu[1], C. Yeh[2], C W. Chow[1], Y. Liu[3]; [1]*National Chiao Tung Univ., Taiwan;* [2]*Industrial Technology Research Institute, Taiwan;* [3]*Hong Kong Productivity Council (HKPC), Hong Kong.* Using orthogonal-frequency-division-multiplexing (OFDM) for light-emitting-diode (LED) visible-light-communication (VLC) is a promising approach. Here we demonstrate an LED communication link with adaptive control of the OFDM data rate for different communication environments.

AF4A.31
All-Optical QPSK Signal Regeneration Based on XPM in Semiconductor Optical Amplifier, Yueying Zhan[1], Min Zhang[1], Mintao Liu[1], Lei Liu[1], Xue Chen[1]; [1]*State Key Lab. of Information Photonics and Optical Communications (Beijing Univ. of Posts & Telecom.), China.* A scheme of all-optical QPSK signal regeneration is proposed which based on XPM in SOA with subsequent an optical filter. A power penalty 2.3dB is improved after QPSK regeneration with the receiver sensitivity of -30.7dBm.

AF4A.32
Analysis and System Design of 100G and Beyond CO-OFDM Transmission Technologies, zheng yan[1], Xue Chen[1], Xing B. Wang[1], Ling Y. Chao[1]; [1]*BUPT, China.* In this paper, we first provide analysis of the optimal bit rate for long-haul transmission, and obtain the optimal system comparing different CO-OFDM technology program, finally show numerical simulation to identify its validity.

AF4A.33
Asymmetrical Transmitter and Receiver in High-Speed, Multi-band Optical OFDM Transmission Systems, Hongbo Zhang[1]; [1]*UESTC, China.* Asymmetrical transmitter and receiver are proposed and employed in Multi-band-OOFDM system. Compared with the all optical OFDM system, the proposed scheme using less single carrier coherent receivers could obtain the same OSNR tolerance.

AF4A.34
Blind Phase Recovery for QAM Modulations Using Constellation Link Statistics, Wu Liu[1], Cai Li[1]; [1]*Wuhan Research Institute of Post & Telecommunication, China.* A novel blind phase estimation method for general QAM constellations is proposed. The method using constellation link statistics and provides significantly improved performance than the maximum-likelihood (ML) method at medium and high SNRs.

Hydrangea, Chrysanthemum, and Hibiscus

AF4A.35
Dependence of Strength of Optical Injection Locking on the Size of Micro-Ring Laser, muhammad irfan memon[1], Habib Fathallah[1]; [1]*king Saud Univ., Saudi Arabia.* Strength of optical injection locking has been investigated theoretically using different sizes of micro ring laser. In the unidirectional regime, when smaller size micro ring laser is used the locking range becomes wider.

AF4A.36
Dynamic Range Expansion using Phase Diversity Detection in Phase-Noise Cancelled OFDR, Katsushi Iwashita[1], Shuta Hiramatsu[1], Keisuke Miyamoto[1]; [1]*Electronic and Photonic Systems Engineering, Kochi Univ. of Technology, Japan.* Dynamic range expansion using phase diversity detection is proposed to improve our proposed phase-noise cancelled OFDR method. Extended dynamic range and complete phase-noise cancellation is demonstrated by the 25km fiber measurement with high spatial resolution.

AF4A.37
Generation of Chaos Utilizing an Optically Injected Semiconductor Ring Laser, Xin Zhang[1], Guohui Yuan[1], Zhuoran Wang[1]; [1]*School of Optoelectronic Information, Univ. of Electronic Science and Technology of China, China.* Chaos generation scheme is demonstrated based on an optically injected semiconductor ring laser. Largest lyapunov exponent spectra are used to investigate chaotic evolutions with several adjustable parameters.

AF4A.38
Guiding electromagnetic energy with subwavelength dielectric particle chain, Hao Li[1,2], Aimin Wu[1], Chao Qiu[1,2], Junjie Du[1], Jing Wang[1,2], Zhiqi Wang[1,2], Zhen Sheng[1], Xi Wang[1], Shichang Zou[1], Fuwan Gan[1]; [1]*State Key Laboratory of Functional Materials for Informatics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China;* [2]*Graduate Univ. of Chinese Academy of Sciences, China.* We designed and experimentally demonstrated the electromagnetic energy transfer along a single layer of dielectric nanoparitlces at optical communication frequency. The ultracompact characteristic make it possible to be used in the integrated photonic circuits.

AF4A.39
High Speed Data Security Enabled by Stimulated Brillouin Scattering in Optical Fiber, Tao Zhang[1], Lilin Yi[1], Weisheng Hu[1]; [1]*State Key Lab of Advanced Optical Communication Systems and Networks, Department of Electronic Engineering,Shanghai Jiao Tong Univ., China.* We propose to use SBS effect to enable high speed data security. A 10.86-Gb/s NRZ -OOK data is encrypted by a SBS loss and decrypted by a corresponding SBS gain with 1-dB power penalty.

AF4A.40
Linear Analog Photonic Link Based on Cascaded Polarization Modulators, Haiting Zhang[1,2], Shilong Pan[2], Menghao Huang[2], Xiangfei Chen[1]; [1]*Nanjing National Laboratory of Microstructures, Nanjing Univ., China;* [2]*College of Electronic and Information Engineering, Nanjing Univ Aeronautics & Astronautics, China.* A novel APL with large SFDR based on cascaded PolMs is proposed. The IMD3 is reduced by 37.9 dB and the SFDR is improved by 13.2 dB as compared with the conventional intensity-modulated link.

AF4A.41
Modulation Instabilities in Birefringent Two-core Optical Fibers, Jin H. Li[1], Kin S. Chiang[2], Boris A. Malomed[3], Kwok W. Chow[1]; [1]*Mechanical Engineering, Univ. of Hong Kong, China;* [2]*Electronic Engineering, City Univ. of Hong Kong, China;*[3]*Physical Electronics, Tel Aviv Univ., Israel.* Modulation instabilities (MIs) of asymmetric continuous-wave states in birefringent two-core fibers with normal dispersion are analyzed. The properly scaled MI spectra are distinctly different from those of a zero-birefringence fiber, especially for the circular-birefringence case.

AF4A.42
Nonlinearity Impact on In-Band Crosstalk Penalties for 112-Gb/s PDM-CO-OFDM Transmission, Mingliang Deng[1], Xingwen Yi[1], Hongbo Zhang[1], Zhenyu Luo[1], Kun Qiu[1]; [1]*Univ. of Electronic Science and Technology of China, China.* The impact of fiber nonlinearity on in-band crosstalk-induced OSNR penalties for 112-Gb/s PDM-CO-OFDM transmission is investigated. The extensive simulation results demonstrate that the fiber nonlinearity aggravates the in-band crosstalk.

AF4A.43
On Timing Offset Estimation in Coherent Optical OFDM Systems with Low Optical Modulation Index, Lingchen Huang[1], Xuezhi Hong[1,2], Changjian Guo[2]; [1]*Zhejiang Univ., China;* [2]*South China Normal Univ., China.* A novel timing offset estimation method for coherent optical OFDM systems under low optical modulation index as modification to Minn's method is presented. Simulation results show that it has better synchronization acquisition performance.

AF4A.44
Optical OFDMA with dynamic sub-carrier allocation enabled flexible and scalable metro-access integrated networks, Qiongli Zhang[1], Chongfu Zhang[1], Chen Chen[1], Qiu Kun[1]; [1]*Key Lab of Optical Fiber Sensing and Communication Networks (Ministry of Education), and School of Communication and Information Engineering, Univ. of Electronic Science and Technology of China, China.* We demonstrate a novel OFDMA-based metro-access integrated network with dynamic subcarrier allocation. This system transparently integrates MAN and optical access network, implementing scalable ring network and on-demand resource allocation.

AF4A.45
Performance Analysis of Photonic-Assisted Multi-Channel Compressive Sampling, Ruiyue Li[1], Yunhua Liang[1], Hongwei Chen[1], Minghua Chen[1], Sigang Yang[1], Shizhong Xie[1]; [1]*Department of Electronic Engineering, Tsinghua Univ., China.* Photonic-assisted multi-channel compressive sampling is an effective approach to capture sparse signals in wideband. For the first time, the noise and interference performance of this scheme is measured and analyzed.

AF4A.46
Signal Generation and Transmission of 13-Gb/s OFDM Signal using RSOA in Carrier Distribution WDM-PON, C W. Chow[1], C. Yeh[2], Y. Lin[1], Y. Liu[3]; [1]*Department of Photonics, National Chiao Tung Univ., Taiwan;* [2]*Industrial Technology Research Institute (ITRI), Taiwan;* [3]*Hong Kong Productivity Council (HKPC), Hong Kong.* We demonstrate the 20km transmission of 13Gb/s orthogonal-frequency-division-multiplexed (OFDM) signal generated by using a 1.2GHz bandwidth RSOA based ONU. The bit-error-rate (BER) performance is within the forward-error-correction (FEC) threshold.

AF4A.47
Zero-Overhead Noise Compensation via Amplitude and Phase Equalization for Optical OFDM Transmission, Liu Lilong[1], Weisheng Hu[1], Xuelin Yang[1]; [1]*Shanghai Jiao Tong Univ., China.* We propose a zero-overhead amplitude and phase equalization scheme for OFDM transmission, which shows an improvement (~3dB) of the received OFDM signal in terms of the error vector magnitude (EVM) compared with conventional pilot-aided methods.

AF4A.48
Hybrid FRR/p-Cycle Link Pair Design for MPLS-TP Node Protection, Chang Cao[1,2], George N. Rouskas[3], Pei Zhang[4], Xiongyan Tang[4]; [1]*Key Laboratory of Information Photonics and Optical Communications, Beijing Univ. of Posts and Telecommunications, China;* [2]*China United Network Communications Co.,Ltd.,, China;* [3]*Computer Science, North Carolina State Univ., USA;* [4]*China Unicom Research Institute, China.* We present a link pair design scheme for MPLS-TP node protection, which combines p-cycle method with fast reroute (FRR) technology. Numerical results indicate that this approach is successful in combining advantages of p-cycle and FRR.

AF4A.49
Design of Optical Path Networks Employing Large-capacity WSS/WBSS-Combined Optical Cross-connects, Hai Chau Le[1], Hiroshi Hasegawa[1], Ken-ichi Sato[1]; [1]*Nagoya Univ., Japan.* We propose a network design algorithm that can make the best use of the developed WSS/WBSS-combined OXC architecture for cost-effective large-capacity optical networks. Simulation results verify that a significant network cost reduction can be obtained.

AF4A.50
Traffic partition grooming in the robust, reconfigurable and heterogeneous optical networks, Weigang Hou[1], Lei Guo[1]; [1]*Northeastern Univ. (China), China.* Our traffic partition grooming offers heterogeneous transportations for a wide range of granularities and self-reconfigures under various optimized objectives. Simulation results reveal the advantages of our robust design for both power efficiency and port expenditure.

Hydrangea, Chrysanthemum, and Hibiscus

AF4A.51
High-order QAM Transmission for OFDM-PON using Pre-compensation, Bangjiang Lin[1], Juhao Li[1], Man Jiang[1], Hui Yang[1], Yangsha Wan[1], Yuanbao Luo[1], Ping Zhang[1], Yongqi He[1], Zhangyuan Chen[1]; *[1]Peking Univ., China.* We experimentally demonstrate high-order QAM transmission for OFDM-PON based on pre-compensation. Both 20-Gb/s 64-QAM and 14-Gb/s 128-QAM are successfully transmitted with high spectral efficiency.

AF4A.52
Spectrum Sharing for Time-varying Traffic in OpenFlow-based Flexi-Grid Optical Networks, Caijun Xie[1]; *[1]State Key Laboratory of Information Photonics and Optical Communication, Beijing Univ. of Posts and Telecomm, China.* An OpenFlow-based control plane for elastic lightpath provisioning in Flexi-Grid optical networks has been introduced, based on which a Spectrum Sharing Algorithm (SSA) is proposed for time-varying traffic. Experimental results show its good performance.

AF4A.53
Nested PON: A Smooth Migrating Scheme from GPON to XG-PON, Xintian Hu[1], Xue Chen[1], Ruobin Zheng[2], Siyang Yu[1], Caili Du[1], Nan Zhang[1]; *[1]State Key Lab of Information Photonics and Optical Communications, Beijing Univ of Posts & Telecom, China;[2]Huawei Technologies, China.* Nested PON with higher bandwidth, extended coverage and protection of existing GPON investment is proposed in this article. Architecture of nested PON and core designs including framing, ranging and dynamic bandwidth assignment are presented.

AF4A.54
Partial defragmentation in flexible grid optical networks, Jie Luo[1], Zitian Zhang[1], Weiqiang Sun[1], Weisheng Hu[1]; *[1]State Key Laboratory of Advanced Optical Communication Systems and Networks, Shanghai Jiao Tong Univ., China.* We present partial defragmentation schemes for flexible grid optical networks to reduce the number of interruptions while maintaining the network performance. Simulation results show that the proposed schemes may reduce up to 50% service interruption.

AF4A.55
Best Fit Decreasing based Defragmentation Algorithm in Semi-dynamic Elastic Optical Path Networks, Jia Wang[1], Shanguo Huang[1], Weiguo Ju[1], Yongqi He[2], Hongxiang Wang[1], Jie Zhang[1], Wanyi Gu[1]; *[1]BUPT, China; [2]Peking Univ., China.* We propose a novel spectrum defragmentation algorithm in semi-dynamic elastic optical networks by introducing best fit decreasing strategy, numerical evaluation shows that the improvement of the blocking performance and small amount number of interrupted connections are achieved simultaneously.

AF4A.56
Ethernet Frame Aggregation at Optical Network Unit Mesh Point Portal (ONU-MPP) in Fiber Wireless (FiWi) Access Networks, Kailong Li[1], Wei Guo[1], Weisheng Hu[1]; *[1]State Key Laboratory of Advanced Optical Communication Systems and Networks, Shanghai Jiao Tong Univ., China.* Ethernet frame aggregation at ONU-MPP has been proposed to improve the overall frame efficiency in FiWi Access Networks. Analysis and simulation results confirm that this method can reduce the mean transmission delay.

AF4A.57
Design and Evaluation of a Resilient Protection Scheme For Hybrid WDM/TDM PON, Peng Xu[1], Zhang Zhiguo[1], Xue Chen[1], cao zhihui[1]; *[1]BUPT, China.* A protection scheme for hybrid WDM/TDM PON migrated from sparsely distributed TDM PON is proposed and evaluated. Simulation and performance analysis show a characteristics of high reliability and low bandwidth cost of the scheme.

AF4A.58
Improving Connections Provisioning in Hybrid Immediate/Advance Reservation WDM Networks, Ajmal Muhammad[1], Robert Forchheimer[1]; *[1]Electrical Engineering, Linköping Univ. sweden, Sweden.* We study a dynamic WDM network supporting applications with immediate and advance reservation (IR/AR) requirements. To diminish the adverse effect of AR on IR connection provisioning, we propose scheduling strategies able to significantly reduce IR blocking probability.

AF4A.59
RSVP-TE Fast Reservation for Large Scale Distributed Wavelength-Routed Network, Zhenzhen Xu[1], Shanguo Huang[1], Yongli Zhao[1], Min Zhang[1], Jie Zhang[1], Wanyi Gu[1]; *[1]State Key Laboratory of Information Photonics and Optical Communications, Beijing Univ. of Posts and Telecommunications, China.* This paper proposes a tree reservation model and four reservation schemes. Simulation results demonstrate the tree schemes improve the network performance, attaining a high reduction ratio of both the blocking probability and the setup delay.

AF4A.60
Harmonically Mode-Locked Fiber Ring Laser Using a Bismuth-Based Erbium-Doped Fiber and a Bismuth-Based Highly Nonlinear Fiber, Yutaka Fukuchi[1], Joji Maeda[1]; *[1]Department of Electrical Engineering, Tokyo Univ. of Science, Japan.* We report a 10GHz harmonically mode-locked short-cavity fiber laser using a bismuth-based erbium-doped fiber and a bismuth-based highly nonlinear fiber. Stable error-free operation is achieved for a 75nm wavelength tuning range covering the CL-band.

AF4A.61
Fourier domain mode-locked fiber laser based on dual-pump fiber optical parametric amplification, Bing Sun[1,2], Hongzhi Chen[1,2], Kai Hu[1,2], Ping Zhou[1,2], Daru Chen[3,4], Shiming Gao[1,2], Sailing He[1,2]; *[1]State Key Laboratory of Modern Optical Instrumentation, Zhejiang Univ., China; [2]Centre for Optical and Electromagnetic Researc, Zhejiang Univ., China; [3]Institute of Information Optics, Zhejiang Normal Univ., China; [4]Joint Research Laboratory of Optics of Zhejiang Normal Univ. and Zhejiang Univ., Zhejiang Univ., China.* A Fourier domain mode-locked fiber laser based on a dual-pump fiber optical parametric amplification is proposed. A comparison of the two FDML lasers based on dual-pump FOPA and one-pump FOPA, respectively, is also presented.

AF4A.62
Crosstalk Comparison of Multi-Core Fibers with α-index and Trench-Index Cores, Shuhei Yamamoto[1], Masaharu Ohashi[1], Yuji Miyoshi[1]; *[1]Osaka Prefecture Univ., Japan.* We investigate theoretically the crosstalk in multi-core fibers with α-index and trench-type α-index cores based on the two core model and compare their α dependence of crosstalk.

AF4A.63
Widely repetition- and wavelength-tunable soliton pulse generation pumped by an actively mode-locked fiber laser, Yizhen Wei[1,2], Kai Hu[1], Bing Sun[1], Tianshu Wang[2], Shiming Gao[1]; *[1]Zhejiang Univ., China; [2]Hangzhou Dianzi Univ., China.* By using soliton self-frequency shift in a single-mode fiber with an actively mode-locked fiber laser as the input source, we demonstrate an all-fiber, 1560 to 1700 nm wavelength-tunable, femtosecond source with arbitrary repetition rate.

AF4A.64
Transmission Characteristics of Multi-Core Fiber (MCF) with Trench-Index Cores, Ro Cho[1], Masaharu Ohashi[1], Yuji Miyoshi[1]; *[1]Osaka Prefecture Univ., Japan.* We clarify the effect of the inner cladding in trench type MCF on the crosstalk. We investigate the transmission characteristics of multi-core fiber with trench-index cores such as crosstalk, mode field diameter and cutoff wavelength.

AF4A.65
Stress and Hydraulic Pressure Sensor Based on a Dual-Core Photonic Crystal Fiber, Fei Xu[1], Gufeng Hu[1], Daru Chen[1], Baojin Peng[1], Zhengyong Liu[2], Hwayaw Tam[2]; *[1]Zhejiang Normal Univ., China; [2]Photonics Research Centre, Department of Electrical Engineering, The Hong Kong Polytechnic Univ., China.* A dual-core photonic crystal fiber (DC-PCF) sensor based on fiber Mach-Zehnder interferometer is proposed and demonstrated for stress sensing with a sensitivity of 1.4 pm/με and hydraulic pressure sensing with a sensitivity of -41 pm/MPa.

AF4A.66
Modeling of mid-infrared fiber optical parametric oscillator, Huihui Cheng[1], Zhengqian Luo[1], Chenchun Ye[1], Yizhong Huang[1], Chun Liu[1], Zhiping Cai[1]; *[1]Department of Electronic Engineering, Xiamen Univ., China.* We propose and numerically investigate mid-infrared fiber optical parametric oscillator (mid-IR FOPO) by the degenerated four-wave-mixing of photonic crystal fiber. Based on the modified coupled-wave equations, the operation characteristics of such mid-IR FOPO are discussed and optimized in detail.

Hydrangea, Chrysanthemum, and Hibiscus

AF4A.67
A proposal for coupling of terahertz pulse onto a subwavelength cylindrical waveguide using a polymer taper, Hongzhi Chen[1,2], Bing Sun[1,2], Daru Chen[3,4], Shiming Gao[1,2], Sailing He[1,2]; [1]*State Key Laboratory of Modern Optical Instrumentation, Zhejiang Univ., China;* [2]*Centre for Optical and Electromagnetic Research, Zhejiang Univ., China;* [3]*Joint Research Laboratory of Optics of Zhejiang Normal Univ. and Zhejiang Univ., Zhejiang Univ., China;* [4]*Institute of Information Optics, Zhejiang Normal Univ., China.* A polymer taper is proposed for coupling THz pulse onto a subwavelength dielectric waveguide. A coupling efficiency of 81.56% is achieved based on the optimization of the structural parameters of the polymer taper.

AF4A.68
Dynamical Evolution of Cascaded Four-Wave Mixing Processes in an Optical Fiber, Xiaosheng Xiao[1]; [1]*Tsinghua Univ., China.* The dynamical evolution of cascaded four-wave mixing (CFWM) processes in an optical fiber is investigated numerically and experimentally, and the influences of pump power and fiber length on the generated CFWM are analyzed.

AF4A.69
Dual-Pumped Fiber Optical Parametric Oscillator with Uniform Multi-wavelength Lasing, Kai Hu[1,2], Bing Sun[1,2], Yizhen Wei[1,2], Daru Chen[3,4], Shiming Gao[1,2], Sailing He[1,2]; [1]*State Key Laboratory of Modern Optical Instrumentation, Zhejiang Univ., China;* [2]*Centre for Optical and Electromagnetic Research, Zhejiang Univ., China;* [3]*Joint Research Laboratory of Optics of Zhejiang Normal Univ. and Zhejiang Univ., Zhejiang Univ., China;* [4]*Institute of Information Optics, Zhejiang Normal Univ., China.* We experimentally demonstrate a dual-pumped fiber optical parametric oscillator with uniform multi-wavelength lasing. 9 wavelengths lasing with a wavelength spacing of 0.8 nm and a ripple less than ±1.29 dB is achieved.

AF4A.70
Influence of Electrical Conditions on Silicon Pulse Shaping and Modelocking, Shiming Gao[1], Lizhong Cao[1], Bing Sun[1], Sichang Jiang[1], Kai Hu[1], Yizhen Wei[1,2]; [1]*Zhejiang Univ., China;* [2]*Hangzhou Dianzi Univ., China.* The silicon pulse shaping and modelocking laser is characterized by varying the input electrical conditions. A narrower output pulse can be obtained by increasing modulation depth, reducing duty cycle, and increasing driving current of amplifier.

AF4A.71
Rescue Monitoring System in Coal Mine Disaster Based on Distributed Fiber Vibration Sensing Technique, Churui Li[1], Qian Xiao[1], Chao Wang[1]; [1]*Department of Material Science, fudan Univ., China.* A rescue monitoring system based on distributed fiber vibration sensing technique is designed to resolve the problem about the high death rate of mine disasters. It provides the important information, survivors' location, to rescue operation.

AF4A.72
Refractive index sensitivity characteristics of fiber taper long-period grating, Zhaohui Yin[1], Xiaobei Zhang[1], Yunqi Liu[1], Fufei Pang[1], Tingyun Wang[1]; [1]*Shanghai Univ., China.* In this paper, numerical simulations and experimental demonstrations of refractive index sensitivity characteristics of CO2-laser-writing long-period grating in fiber taper are presented, with a high sensitivity about 2733.28nm/RIU in the external RI range of 1.4490-1.4537.

AF4A.73
Optimization of tapered optical fiber probe for evanescent wave sensor, zhonghuan zhang[1], Xiaosheng Xiao[1]; [1]*Tsinghua Univ., China.* Geometries of tapered fiber probe are optimized to achieve large evanescent wave penetration depth for the throughout probe, providing a sufficient sensing region capable of covering microbes in fiber-based evanescent wave sensors.

AF4A.74
The effect of ASE on XPM employed all optical OOK to Multi-level modulation format conversion, Guoxiu Huang[1], Yuji Miyoshi[1], Akihiro Maruta[1], Ken-ichi Kitayama[2]; [1]*Graduate School of Engineering, Osaka Univ., Japan;* [2]*Graduate School of Engineering, Osaka Prefecture Univ., Japan.* In the XPM employed all-optical OOK to Multi-level modulation format conversion system, the ASE from the amplifier reduce the quality of the converted phase for amplitude-to-phase-noise conversion. The effect of ASE was theoretically discussed.

AF4A.75
Investigation of a cladding-etched thin-core fiber modal interferometer and its application for refractive index sensing, Guofeng Yan[1,2], A.Ping Zhang[1,2], Guiying Ma[1,2], Sailing He[1,2]; [1]*Centre for Optical and Electromagnetic Research, Zhejiang Provincial Key Laboratory for Sensing Technologies, Zhejiang Univ., China;* [2]*Joint Research Laboratory of Optics of Zhejiang Normal Univ. and Zhejiang Univ., Zhejiang Univ., China.* A cladding-etched thin-core fiber modal interferometer is proposed and theoretically investigated. Numerical simulations of the light propagation performance are carried out. The results render this structure as an unltrasensitive refractive index sensor.

AF4A.76
Numerical investigation of polarization rotation locking of vector solitons in a fiber ring laser, Dongbiao Zeng[1], HE-PING LI[1], Shangjian Zhang[1], Xionggui Tang[1], Jinkun Liao[1], Rongguo Lu[1]; [1]*Univ of Electronic Science & Tech China, China.* Polarization rotation of vector solitons are numerically investigated in a fiber ring laser mode-locked with SESAM. The results show that the polarization rotation locked vector solitons can be formed in the fiber laser.

AF4A.77
High Sensitivity Long-Period Fiber Gratings Written in Tapered Fibers by CO2 Laser, Zhaodi Wu[1], Yunqi Liu[1], Yuchen Zhao[1], Qiang Guo[1], Xiaobei Zhang[1], Na Chen[1], Fufei Pang[1], Tingyun Wang[1]; [1]*School of Communication and Information Engineering, Shanghai Univ., China.* We demonstrated the fabrication of long-period fiber gratings in the tapered fibers using CO2 laser. The sensing response of the gratings was investigated experimentally. Highly sensitive wavelength tuning was achieved with the polymer packaged grating.

Lobby of Convention Hall

15:30–18:30
AF4B • Poster Session II

AF4B.1
Acceleration of the Monte Carlo method for photon migration in turbid media, Zefei Guo[1,2], Fuhong Cai[1,3], Sailing He[1,2]; [1]*Centre for Optical and Electromagnetic Research, Zhejiang Univ., China;* [2]*Zhejiang Provincial Key Laboratory for Sensing Technologies, China;*[3]*JORCEP [Joint Research Centre of Photonics of the Royal Institute of Technology (Sweden), Lund Univ. (Sweden), and Zhejiang Univ., China.* A three-step Monte Carlo method has been proposed to describe the photon migration in turbid medium. By storing the valuable photon, we can avoid a lot of unnecessary computation which can accelerate the simulation greatly.

AF4B.2
Acceleration of the Acquisition of the Jacobian Matrix in Diffuse Optical Tomography, fuhong cai[1], Sailing He[1]; [1]*Zhejiang Univ., China.* In our study, we use Perturbation Monte Carlo to generate the Jacobian matrix of diffuse optical tomography. Based on the absorption kernel, the time for calculating the Jacobian matrix is significantly reduced.

AF4B.3
Venous Oxygenation Mapping with a CCD Camera, Jun Li[1,2], Barbrina Dunmire[1], Daniel Leotta[1]; [1]*South China Normal Univ., China;* [2]*Univ. of Washington, USA.* A CCD camera is used to image skin of human lower legs illuminated alternately by a red and an infrared LED light source. The images are then converted to venous oxygen saturation maps.

AF4B.4
Plasmon Excitation on a Metal Grating and its Phase Detection Based Biosensor Application, Ziqian Luo[1], Taikei Suyama[2], Yoichi OKuno[2]; [1]*Centre for Optical and Electromagnetic Research, South China Normal Univ., China;* [2]*Graduate School of Science of Technology, Kumamoto Univ., Japan.* A grating-based biosensor via phase detection is stated. The resolution will be 10-7 RIU in the state-of-the-art today. The workspace can be shifted in a large range while the sensor resolution can remain in a high level by only changing the incident angle.

AF4B.5
A Novel Digital Signal Processing System for Open-loop Fiber Optic Gyroscope, Qin Wang[1], Chuanchuan Yang[1], Ziyu Wang[1]; [1]*Peking Univ., China.* A novel all digital signal processing system for open-loop fiber optic gyroscope is proposed. The effect of the fluctuation of laser power and the variation of modulation depth is eliminated in this proposed system.

AF4B.6
Biological sample measurement using a 10° tilted fiber grating sensing probe, Fu Liu[1], Tuan Guo[1], Xiaoyang Zhu[2], Libin Shang[1], Zhaochuan Zhang[1], Fa Du[1], Bai-Ou Guan[1], Yu Liu[2], Jacques Albert[3]; [1]*Institute of Photonics Technology, Jinan Univ., China;* [2]*Department of Biochemistry, Medical School, Jinan Univ., China;* [3]*Department of Electronics, Carleton Univ., Canada.* Using a 10° TFBG sensing probe, human acute leukemia cells with different intracellular densities were clearly discriminated by identifying their slight refraction index perturbations in range from 1.3342 to 1.3344, combining with a temperature self-calibration property.

AF4B.7
High sensitivity refractive index sensor based on multi-mode fiber coated with an axisymmetric metal grating layer, Youqiao Ma[1], Gerald Farrell[1], Yuliya Semenova[1], Andy H P Chan[2], Qiang Wu[1]; [1]*Photonics Research Centre, Dublin Institute of Technology, Ireland;* [2]*Electronics Engineering, City Univ. of Hong Kong, Hong Kong.* This paper reports on a novel fiber surface plasmon-based sensor with a metal grating layer. Simulation results show that the sensor can achieve a maximum sensitivity of 13000nm/RIU in the refractive index range from 1.3 to 1.4.

AF4B.8
Method to suppress bias drift and improve the accuracy of north finding with fiber optic gyroscopes, Changhong He[1], Chuanchuan Yang[1], Ziyu Wang[1]; [1]*State Key Laboratory on Advanced Optical Communication Systems and Networks,Department of Electronics, Peking Univ., China.* This paper presents a new (N+1)-position method based on a difference scheme and an optimized measurement order of all the positions to effectively improve the accuracy of north finding with fiber optic gyroscopes.

AF4B.9
Enhance the Resolution of STED by Fluorescent Lifetime Subtractive Imaging, Xiang Hao[1], Cuifang Kuang[1], Zhaotai Gu[1], Shuai Li[1], Yifan Wang[1], Xu Liu[1]; [1]*Zhejiang Univ., China.* By the time-gated detection technique, combined with the principle of virtual adaptable aperture based subtractive imaging, we achieve a horizontal resolution below 80 nm with the incident power of continuous-wave STED beam equaling 50 mW.

AF4B.10
The localized surface plasmon resonance sensor based on tapered optical fiber modified with gold nanoparticles, Hsiang-Chen Chui[1], Hsing-Ying Lin[2], Chen-Han Huang[2], Cheng-Wen Huang[1], Nan-Kuang Chen[3], Chia-Ling Cheng[3]; [1]*National Cheng Kung Univ., Taiwan;* [2]*Center for Nano Bio-detection, National Chung Cheng Univ., Taiwan;* [3]*Department of Electro-optical Engineering, National United Univ., Taiwan.* LSPR sensor based on tapered optical fiber for refractive index sensing has been analyzed. The result of index sensitivity is about 5x10-5 RIU. Such sensor resolution is comparable to those of the current LSPR sensor.

AF4B.11
Fano Resonance in Metallic Ring-Ellipse Nanostructures, jiao lin[1]; [1]*Zhejiang Univ., China.* we investigate the Fano resonance in a silver ring-ellipse nanostructure.By changing the structure parameters, we study the variation of the optical resonance of the proposed structure.

AF4B.12
Raman Spectroscopy/PCA Based Molecule Mechanism Detection of K562 Cell Apoptosis Induced by Adriamycin, Tao Tao[1], Xiaoxu Lu[1], Liyun Zhong[1,2]; [1]*Laboratory of Nanophotonic Functional Materials and Devices, South China Normal Univ., China;* [2]*Medical College, Jinan Univ., China.* Based on combination Raman spectroscopy with Principal component analysis (PCA), a novel detection approach for molecule mechanism of cell apoptosis is proposed and employed to research the molecule mechanism of K562 cell apoptosis.

AF4B.13
Using micrograting for real-time detecting surfactants at aqueous/liquid crystal interfaces, Hsu-Yi Huang[1], Yuan-Chang Li[1], Chao-Yu Yang[1], Fu-Wei Chao[1], Shug-June Hwang[1]; [1]*Department of Electro-Optical Engineering, National United Univ., Taiwan.* A label-free detection of surfactants at interfaces between aqueous phases and liquid crystals (LC) is proposed. The micro-grating structure was applied to monitor the influence of different concentration of surfactants solution on the orientational response of the LC molecules.

AF4B.14
White-light Fresnel Incoherent Correlation Holography, yingchen Liu[1], Liyun Zhong[1], Xiaoxu Lu[1]; [1]*Laboratory of Nanophotonic Functional Materials and Devices, South China Normal Univ., China.* Based on the theoretical and simulation research, the recording and reconstruction of Fresnel Incoherent Correlation Holography is presented. The results show that 3D information of the object with high resolution can be reconstructed easily.

AF4B.15
Phase Reconstruction of Biological Cells by Digital Microscopic Image Plane Holography, Desi Zhang[1], Liyun Zhong[1], Xiaoxu Lu[1]; [1]*Laboratory of Nanophotonic Functional Materials and Devices, South China Normal Univ., China.* In digital holographic microscopy, the phase distribution of the object is covered with the aberration induced by the microscope objective. To recover the phase of the cell, Zernike polynomials is used to eliminate the aberration.

AF4B.16
Polarization-fluctuation Induced Drift in Resonator Micro Optic Gyro, Yuchao Yan[1], Yan Chen[1], Huilian Ma[1], Zhonghe Jin[1]; [1]*Zhejiang Univ., China.* The polarization-fluctuation induced drift in resonator micro gyro was tested at different temperatures. The results of simulation and experiment show that the long-term stability of the gyro can be improved by setting an appropriate temperature.

Lobby of Convention Hall

AF4B.17
Quantitative phase imaging and spectroscopy techniques for the study of sickle cell diseases, YongKeun Park[1]; [1]*KAIST, Republic of Korea.* We report the characterization of all the relevant biomechanical properties of individual red blood cells with sickle cell disease using non-invasive quantitative phase imaging and spectroscopy techniques with a previously-validated RBC membrane model.

AF4B.18
Fiber-Optic Catalytic Hydrogen Sensor Based on Thin-core Fiber Modal Interferometer, Jing Liu[1,2], Zhang Yebin[1,2], A.Ping Zhang[1,2], Hua Tian[3], Quanfu An[3]; [1]*Centre for Optical and Electromagnetic Research, Zhejiang Provincial Key Laboratory for Sensing Technologies, Zhejiang Univ., China;* [2]*Joint Research Laboratory of Optics of Zhejiang Normal Univ. and Zhejiang Univ., Zhejiang Univ., Zhejiang Normal, China;* [3]*Dept Polymer Sci & Engn, Key Lab Macromol Synth & Functionalizat, Minist Educ, Zhejiang Univ., China.* We present a fiber-optic hydrogen sensor based on a thin-core fiber modal interferometer. The sensor is coated with a catalytic combustible thin-layer made of Pt doped WO3, on which hydrogen can initiate an exothermic reaction.

AF4B.19
Lateral resolution enhancement in confocal microscopy with a higher SNR, Cuifang Kuang[1], Yifan Wang[1], Zhaotai Gu[1], Shuai Li[1], Xu Liu[1]; [1]*Zhejiang Univ., China.* A method based on the subtraction of images under different pinhole sizes is proposed to improve the lateral resolution in confocal microscopy. An enhanced lateral resolution and a higher SNR are shown by experimental results.

AF4B.20
Magnetic Rotation Spectroscopy for Oxygen Detection, Junnan Wang[1], Chunsheng Yan[1]; [1]*Zhejiang Provincial Key Laboratory for Sensing Technologies, Centre for optical and Electromagnetic Research, JORCEP [KTH-LU-ZJU Joint Research Center of Photonics], Zhejiang Univ., China.* Magnetic Rotation Spectroscopy (MRS) has great potential in detecting paramagnetic molecules. By optimizing the polarizer offset angle, we develop a MRS system based on DC magnetic field. We analyze MRS of oxygen gas in comparison with absorption spectrum.

AF4B.21
Implantable Antenna for Visual Prostheses, Shawn P. Casey[1], Wu Kaijie[1], Lei Xuping[1], Ren Qiushi[2,1]; [1]*School of Life Science and Biotechnology, Institute for Laser Medicine and Biophotonics, Shanghai Jiao Tong Univ., China;*[2]*College of Engineering, Department of Biomedical Engineering, Peking Univ., China.* Inductively coupled implants receiving both power and data, for use in humans or animals are disclosed. Nickel Titanium (Nitinol) with other materials, forms an antenna, reducing noise while increasing ease of implantation, efficiency and biocompatibility.

AF4B.22
The algebraic reconstruction of SD-OCT based on compressed senssing theory, Xiqing Lu[1], Zhihua Ding[1], Weihao Wu[1], Lijun Chen[1]; [1]*State Key Lab of modern Optical Instrumentation, Zhejiang Univ., China.* We explore the possibility of extending the theory of compressed sensing (CS) to spectral domain optical coherence tomography (SD-OCT). The result shows that CS algebraic can achieve reconstruction with low sampling rate.

AF4B.23
Using of the gas absorption spectrum as band-stop filter in a EDFA fiber loop laser, Kaikai Guo[1,2], Cheng Guo[4], Chunsheng Yan[2,3]; [1]*Zhejiang Provincial Key Laboratory for Sensing Technologies, China;* [2]*Centre for optical and Electromagnetic Research, China;* [3]*JORCEP [KTH-LU-ZJU Joint Research Center of Photonics], China;* [4]*Zhejiang Univ., China.* Using the gas absorption spectrum as band-stop filter in an EDFA fiber loop laser, we gain the 0.2nm wavelength shift as the gas concentration changes from 10% to 90% and a dual wavelength laser emitting.

AF4B.24
Fiber Laser Sensor for Load Measurement Based on Beat Frequency Demodulation Technique, Lin Chen[1], Long Huang[1], Liang Gao[1], Xiangfei Chen[1]; [1]*College of Engineering and Applied Sciences and National Laboratory of Solid State Microstructures, Nanjing Univ., China.* A novel fiber laser load sensor based on beat frequency demodulation technique is presented. Four different beat frequency signals are studied in the load measurement experimentally. The sensitivities are -12.63kHz/kg, -27.80kHz/kg, -41.29kHz/kg, and -53.88kHz/kg, respectively.

AF4B.25
Depletion Characteristics of Brillouin Gain Spectrum in Fiber Brillouin Amplifiers, Shahna M. Haneef[1], Deepa Venkitesh[1], Balaji Srinivasan[1]; [1]*Electrical Engineering, Indian Institute of Technology, Madras, India.* We study the Brillouin gain depletion as the probe frequency is tuned across the gain spectrum. A broadening of the Brillouin gain spectrum is observed as the probe is tuned to the edges of the spectrum.

AF4B.26
Measuring the high temperature distribution of a Molybdenum bar with an un-cooled color CCD sensor, Chunsheng Yan[1], Binhao Wang[1]; [1]*Zhejiang Univ., China.* A mathematical model and an experimental system are constructed to measure the high temperature with a CCD sensor. An experiential formula is found and the temperature distribution around the Molybdenum bar is obtained.

AF4B.27
Multilongitudinal mode fiber laser sensor for temperature measurement, long huang[1], Lei Qian[1], Lin Chen[1], Liang Gao[1], Xiangfei Chen[1]; [1]*College of Engineering and Applied Sciences and National Laboratory of Solid State Microstructures, Nanjing Univ., China.* A multilongitudinal mode fiber laser sensor for temperature measurement is proposed and experimentally demonstrated.The beat frequency signal between any two modes varies linearly with the temperature.In the experiment, two different beat frequency signals are studied.

AF4B.28
Second harmonic microscopic imaging and spectroscopic characterization in pathological prostate tissue, Zhengfei Zhuang[1], Zhouyi Guo[1], Hanping Liu[1], Biying Yu[2], Xiaoyuan Deng[1]; [1]*Soutih China Normal Univ., China;* [2]*Key Laboratory of Optoelect ronic Science and Technology for Medicine , Minist ry of Education , Fujian Normal Univ., China.* Second harmonic generation in benign prostatic hyperplasia (BPH) and prostate carcinoma (PC) in mouse model have been reported. Excitated samples with different wavelength laser from 780-850nm a different wavelength sensitivity was observed in this experiment.

AF4B.29
Three-dimensional Orientation Sensors by Defocused Imaging of Gold Nanorods in the near IR region, Pei Xu[1]; [1]*South China Normal Univ., China.* Gold nanorods(AuNRs) excited at 800 nm produced strong two-photon luminescence intensities anisotropy,which correlate with their three-dimensional spatial orientations. Here we report a novel orientation sensor by defocused imaging of single AuNR through an ordinary wide-field optical microscope.

AF4B.30
Polarization Modulated of Second Harmonic Generation on a line-aligned Molecular Scatterers, Zhengfei Zhuang[1], Zhouyi Guo[1], Songhao Liu[1]; [1]*Soutih China Normal Univ., China.* We set up a model for quantitatively second harmonic generation polarization modulated at a molecular level. when the polarization direction rotates on x-y plane, we can obtain the second harmonic generation power in this model.

AF4B.31
Glycerol diffusion in skin at glucose impact on tissue, Daria Tuchina[1], Alexey N. Bashkatov[1], Elina Genina[1], Valery V. Tuchin[1,2]; [1]*Saratov State Univ., Russian Federation;* [2]*Institute of Precise Mechanics and Control RAS, Russian Federation.* In this paper we present results of experimental study of glucose impact on skin tissue by testing tissue structure alteration at glycerol diffusivity.

AF4B.32
"S-shaped" Photoluminescence Emission Shift in Cu(In,Ga)Se2 Thin Films, Yu-Kuang Liao[1,2], Shou-Yi Kuo[4], Fang-I Lai[5], Woei-Tyng Lin[5], Dan-Hua Hsieh[1], Ding-Wen Chiu[3], Hao-chung Kuo[1]; [1]*Department of Photonic & Institute of Electro-Optical Engineering, National Chiao Tung Univ., Taiwan;* [2]*Department of Electrophysics, National Chiao Tung Univ., Taiwan;* [3]*Compound Semiconductor Solar Cell Department, Next Generation Solar Cell Division, Green Energy and Environment Research Laboratories, Industrial Technology Research Institute, Taiwan;* [4]*Department of Electronic Engineering, Chang Gung Univ., Taiwan;*[5]*Department of Photonic Engineering, Yuang Ze Univ., Taiwan.* We have utilized photoluminescence (PL) measurement to investigate carrier recombination mechanism in Cu(In,Ga)Se2 thin films and observed an S-shaped emission shift revealed from the corresponding PL peak of near band edge transition.

Lobby of Convention Hall

AF4B.33
Novel Nanostructures for Solar Energy Harvesting, Tianyi Sun[1], Chuanfei Guo[1], Yang Wang[2], Krzysztof Kempa[1], Zhifeng Ren[1]; *[1]Department of physics, Boston College, USA; [2]Institute for Advanced Materials, Academy of Advanced Optoelectronics, South China Normal Univ., China.* Three novel nanostructures for solar energy harvesting are proposed: a nanocoax a-Si solar cell, a metamaterial-plasmonic absorber structure for an ultra-thin solar cell and a three-level engineered conductive black silicon surface.

AF4B.34
Electrochemically prepared black silicon for improved photon-to-electron conversion efficiency, xianyu ao[1]; *[1]South China Normal Univ., China.* Black silicon with multiscale texture was prepared by electrochemical etching. To confirm the benefits, we coated it with TiO2 and used it as the photoanode in water splitting, and observed 45% enhancement in photocurrent density.

AF4B.35
Influence of annealing temperature on properties of RF sputtered InxSy buffer layers in Cu(In,Ga)Se2 solar cells, Jingping Lu[1], Yuandong Li[1]; *[1]Zhejiang Univ., China.* Sputtered InxSy layers were deposited on glass at post-annealing temperature ranging from 623 to 723K. Investigation of the properties indicated decreased optical band-gap and changes in microstructure with increasing annealing temperature.

AF4B.36
Optimization of GaAs nanowire array for solar cells, YU HU[1]; *[1]optical engineering, ZHE JIANG UNIV., China.* The reflectance, transmittance and absorptance of GaAs nanowire (NW) arrays are calculated by solving Maxwell's equations using the finite element method.

AF4B.37
High Performance of Double-layer Quantum Dots with PDMS Film for Novel GaAs Solar Cells, Chen Hsin-Chu[1], Lin Chien-Chung[2], Hau-Vei Han[1], Kuo-Ju Chen[1], Tsai Yu-Lin[1], Yi-An Chang[3], Shih Min-Hsiung[1,4], Hao-chung Kuo[1], Peichen Yu[1]; *[1]Department of Photonics and Institute of Electro-Optical Engineering, National Chiao Tung Univ., Taiwan; [2]Institute of Photonic System, National Chiao Tung Univ., Taiwan; [3]Millennium Communication Co., Ltd., Taiwan;[4]Research Center for Applied Sciences, Taiwan.* This study demonstrates the high performance of GaAs solar cells with double-layer quantum dots carried by flexible PDMS film. Several parameters were enhanced. Different concentrations of QDs were also applied to test the optimal combination.

AF4B.38
Effects of DC sputtering power on the properties of AZO films deposited at room temperature for CIGS photovoltaics, Yuandong Li[1], Demiao Wang[1], Jingping Lu[1], Hao Jin[1], Jian Zhou[1]; *[1]Information Science and Electronic Engineering, Zhejiang Univ., China.* Al:ZnO(AZO) films were deposited on glass substrate at different sputtering power. Effects of sputtering power on the properties of AZO films were investigated. And the electro-optical property of the AZO films gets optimum at 330W.

AF4B.39
Highly efficient CdS-quantum-dot-sensitized InGaN multiple quantum well solar cells, Yu Lin Tsai[1], Hsin Chu Chen[1], Lin Chien-Chung[2], Hau-Vei Han[1], Peichen Yu[1], Hao-chung Kuo[1]; *[1]Department of Photonic & Institute of Electro-Optical Engineering, National Chiao Tung Univ., Taiwan; [2]Institute of Photonic System, College of Photonics, National Chiao Tung Univ., Taiwan.* We demonstrate a hybrid design of InGaN/GaN MQWs solar cells combined with colloidal CdS quantum dots. With anti-reflective feature at long wavelength and down-conversion at UV regime, the overall power conversion efficiency enhancement is 7.2% .

AF4B.40
The resolution of the Maxwell's fish eye lens, Fei Sun[1], Sailing He[1,2]; *[1]Zhejiang Univ., China; [2]Royal Institute of Technology (KTH), Sweden.* In recent years, a heated debate on whether the Maxwell's fish eye lens (MFL) can make a perfect imaging with an unlimited resolution has been going on among scholars. We review some recent studies and analyze the resolution of the MFL.

AF4B.41
Growth and characterization of GaAs/InxGa1-xAs/GaAs axial heterostructure nanowires by MOCVD, Xiaolong Lv[1]; *[1]State Key Laboratory of Information Photonics & Optical Communications, Beijing Univ. of Posts, China.* We report on the Au-assisted growth of GaAs/InxGa1-xAs/GaAs axial double-heterostructure nanowires via metalorganic chemical vapor deposition. The experimental results were related with the composition characteristic of the catalyst as well as the Vapor-Liquid-Solid growth mechanism.

19:00–21:00 Conference Banquet, *Convention Hall*

Orchid	Hydrangea	Chrysanthemum	Begonia
07:45–18:00 Registration Open			

08:00–09:45
AS1A • SC 1 - Fiber Amplifiers and Lasers
Presider: Markus Schmidt; Max-Planck-OInst. Physik des Lichts, Germany

AS1A.1 • 08:00 Invited

Photonic and Optoelectronic Applications of Carbon Nanotube and Graphene, Shinji Yamashita[1]; [1]*Department of Electrical Engineering and Information Systems, The Univ. of Tokyo, Japan.* We review photonic and optoelectronic applications of carbon nanotube (CNT) and graphene to such as light emitting, nonlinear, photovoltaic, modulating, and transparently conducting devices. We also present our works on application to short-pulse fiber lasers.

AS1A.2 • 08:30

Passively Q-switched erbium-doped fiber laser using a graphene saturable absorber, Zhenzhen Dong[1], HE-PING LI[1], Handing Xia[1], Yong Liu[1], Zegao Wang[2], Yuanfu Chen[2]; [1]*Univ of Electronic Science & Tech China, China;* [2]*State Key Lab of ETFID, UESTC, China.* We demonstrate a graphene-based passively Q-switched erbium-doped fiber laser. The laser produces stable pulses with a typical pulse width of ~ 9.0 μs at a pulse repetition rate ranging from 8.3 to 12.5 kHz.

08:00–09:45
AS1B • SC 2 - Plasmonic and Nonlinear Effects I
Presider: Gong-Ru Lin; National Taiwan Univ., Taiwan

AS1B.1 • 08:00 Invited

Deep-subwavelength Integrated Optoelectronics, Xiaobo Yin[1],Renmin Ma[1], Ming Liu[1], Erick Ulin-Avila[1], Rupert Oulton[1], Volker Sorger[1], Thomas Zentgraf[1], Xiang Zhang[1]; [1]*Univ. of California Berkeley, USA.* To mitigate the ever worsening bandwidth crisis of current data communication architectures, here we present nanoscale integrated optoelectronics devices including multiplexed nanolasers and high speed graphene optical modulators for future photonic integrations with high density.

AS1B.2 • 08:30

Metallodielectric Hybrid Optical Antennas for Ultrabright and Directional Single Photon Emission, Xuewen Chen[1,2], Mario Agio[3], Vahid Sandoghdar[1,2]; [1]*Max-Planck-Inst Physik des Lichts, Germany;* [2]*Department of Physics, Friedrich-Alexander Univ. Erlangen-Nürnberg, Germany;*[3]*National Institute of Optics (INO-CNR) and European Laboratory for Nonlinear Spectroscopy (LENS), Italy.* We exploit concepts from plasmonics and cavity quantum electrodynamics to devise new optical antennas for producing ultrabright single-photon streams. In combination with planar dielectric antenna, nearly every emitted single photon can be collected.

08:00–09:45
AS1C • SC 3 - Long Distance Transmission Systems
Presider: Robert Killey; Univ. College London, UK

AS1C.1 • 08:00 Invited

Ultra-high Capacity Optical Transmission Technologies for 100 Tb/s and Beyond, Akihide Sano[1]; [1]*NTT Network Innovation Laboratories, Japan.* This presentation reviews recent advances in 100-Tb/s-class ultra-high capacity transmission systems with 400-Gb/s channel rates focusing on spectrally-efficient higher-order multi-level modulation and single-carrier frequency-division multiplexing techniques.

AS1C.2 • 08:30

Analysis of Carrier Phase Extraction Methods in 112-Gbit/s NRZ-PDM-QPSK Coherent Transmission System, Tianhua Xu[1,2], Gunnar Jacobsen[2], Sergei Popov[1], Jie Li[2], Sergey Sergeyev[4], Yimo Zhang[3]; [1]*School of Information and Communication Technology, Royal Institute of Technology, Sweden;* [2]*Netlab, Acreo AB, Sweden;* [3]*College of Precision Instrument and Opto-electronics Engineering, Tianjin Univ., China;* [4]*Aston Institute of Photonic Technologies, Aston Univ., UK.* We present a comparative analysis on three carrier phase extraction approaches, including a one-tap normalized least mean square method, a block-average method, and a Viterbi-Viterbi method, in coherent transmission system considering equalization enhanced phase noise.

08:00–09:45
AS1D • SC 4 - Optical Access Networks II
Presider: Luca Valcarenghi; Scuola Superiore Sant Anna di Pisa, Italy

AS1D.1 • 08:00 Invited

Adjustable Gain-Clamped Semiconductor Optical Amplifiers (AGC-SOA), Craig Michie[1], Tony Kelly[2], Lin Liu[1], Ivan Andonovic[1]; [1]*Univ. of Strathclyde, UK;* [2]*Univ. of Glasgow, UK.* We will describe the design and performance of adjustable gain-clamped semiconductor optical amplifier (AGC-SOA) designed to maximize output saturated power while adjusting gain across a dynamic range. This device modulates gain at rates that are compatible with packet to packet equalisation.

AS1D.2 • 08:30 Invited

Reducing the impact of failures in Next-Generation Optical Access Networks, Jiajia Chen[1]; [1]*KTH, Sweden.* This paper evaluates reliability performance in next generation optical access (NGOA) networks which offer high bandwidth and large service coverage. A comprehensive view into the way to reduce impact of failures in NGOA is presented.

Hibiscus	Marigold	Dahlia	Camellia

07:45–18:00 Registration Open

08:00–09:45
AS1E • SC 5 - Optical Sensors and Trace Gas Sensing
Presider: Bai-ou Guan; Jinan Univ., China

AS1E.1 • 08:00 Invited

From gases in glass to ultra-high temperature stable optical fibre grating sensors, John Canning[1]; [1]*iPL, The Univ. of Sydney, Australia.* Gas-loading is essential for regeneration and its role in producing ultra-high temperature stable gratings. Recent work with He confirms a physical relaxation mechanism. Here the process and applications are reviewed.

AS1E.2 • 08:30 Invited

Development of Nano-Strain-Resolution Fiber Optic Static Strain Sensor for Crustal Deformation Monitoring, Zuyuan He[1,2], Qingwen Liu[1,2], Tomochika Tokunaga[3]; [1]*State Key Laboratory of Advanced Optical Communication Systems and Networks, Shanghai Jiao Tong Univ., China;* [2]*Department of Electrical Engineering and Information Systems, Univ. of Tokyo, Japan;* [3]*Department of Environment Systems, Univ. of Tokyo, Japan.* The first realization of nano-strain-resolution fiber optic static strain sensor is introduced. Theoretical analysis and experimental demonstration are reviewed. With this sensor, crustal deformations induced by oceanic tide and by earthquake were clearly observed.

08:00–09:45
AS1F • SC 6 - Approaches for High Efficiency and White LEDs
Presider: S. David Roh; LG Innotek, South Korea

AS1F.1 • 08:00 Invited

Controlled Integration of Silica Nanospheres in A-plane GaN on R-plane Sapphire, Sun Hyun Park[1], Euijoon Yoon[1]; [1]*Seoul National Univ., Republic of Korea.* Nano-scale silica nanospheres were selectively integrated in three-dimensional a-plane GaN buffer. We attribute the improved efficiency of the a-plane GaN LEDs to the improved crystal quality and increased extraction efficiency by imbedded silica nanospheres.

AS1F.2 • 08:30 Invited

InGaN / GaN Nanostructures for Efficient LEDs, P. Daniel Dapkus[1], Ting Wei Yeh[1], Yenting Lin[1]; [1]*School of Engineering, Univ. of Southern California, USA.* GaN nanorods and nanosheets with non-polar facets are used as templates to form InGaN QW active regions for LEDs on the nonpolar facets. Uniform, narrow spectra light emitting regions are formed on the nonpolar facets.

08:00–09:45
AS1G • SC 3 - Innovative Subsystems
Presider: Ian White; Univ. of Cambridge, UK

AS1G.1 • 08:00

Cascadability of Silicon Microring Resonators for 40-Gbit/s OOK and DPSK Optical Signals, Oskars Ozolins[1,2], Yi An[2], Zohreh Lali-Dastjerdi[2], Yunhong Ding[2], Vjaceslavs Bobrovs[1], Girts Ivanovs[1], Christophe Peucheret[2]; [1]*Telecommunications Institute, Riga Technical Univ., Latvia;*[2]*Department of Photonics Engineering, Technical Univ. of Denmark, Denmark.* The cascadability of a single silicon micro-ring resonator for CSRZ-OOK and CSRZ-DPSK signals is experimentally demonstrated at 40 Gbit/s for the first time. Error-free performance is obtained for both modulation formats after 5 cascaded resonators.

AS1G.2 • 08:15

Multiband Bandpass Microwave Photonic Filter By Utilizing Wide-band Optical Source Slicing, Yang Jiang[1], Jing Xu[1], Zhuya Zhou[1], Hengwen Li[1], Shunyan Wang[1]; [1]*Guizhou Univ., China.* A multiple-passband bandpass microwave photonic filter whose passband number and resonance frequencies can be selected is analyzed and experimentally demonstrated. The proposed scheme shows good flexibility, high spectrum efficiency and great extension potential.

AS1G.3 • 08:30 Invited

Next Generation ROADM Architectures, Winston I. Way[1]; [1]*R&D, NEOPhotonics Corp, USA.* Next generation multi-degree ROADM architectures, including CDC (colorless, directionless, and contentionless) and CD (colorless and directionless) ROADMs are reviewed.

08:00–09:45
AS1H • SC 2 - Quantum Well and Quantum Dot Structures
Presider: Jian-Jun He; Zhejiang Univ., China

AS1H.1 • 08:00 Invited

Improving Photonic Hardware and Software for Quantum Information, Xiao-Qi Zhou[1]; Pruet Kalasuwan[1], Timothy C. Ralph[3], Alberto Peruzzo[1], Mian Zhang[1], Jeremy O'Brien[1]; [1]*University of Bristol, UK;* [2]*University of Queensland, Australia.* We improved the photonic hardware for quantum information by using integrated photonic waveguides and the photonic software by simplifying the quantum gates through accessing higher dimensional Hilbert space.

AS1H.2 • 08:30

Tensile-strained InGaAsP-InP quantum-well laser with coupled disks emitting at 1.5μm, Yong-Zhen Huang[1], Qi-Feng Yao[1], Yun Du[1], Xiao-Meng Lv[1], Ling-xiu Zou[1], Heng LOng[1]; [1]*Institute of Microelectronics of CAS, China.* We fabricate a tensile-strained InGaAsP-InP quantum-well laser with coupled two disks, emitting at 1.5μm. For a microdisk with radius of 10μm and a 2-μm-wide output waveguide, a continuous-wave threshold current is 24mA at room temperature.

Orchid

AS1A.3 • 08:45
Modeling of graphene-based passively Q-switched Tm3+-doped fiber laser, chun liu[1], Chenchun Ye[1], Yonglong Zheng[1], Zhen Liu[1], Zhengqian Luo[1], Huihui Cheng[1]; [1]*Xiamen Univ., China.* A theoretical model of graphene-based saturable absorber is proposed and used to numerically investigate graphene-based Q-switched Tm3+-doped fiber lasers (GQ-TDFLs). The numerical results are in excellent agreement with those reported experimental results of the GQ-TDFLs.

AS1A.4 • 09:00
Intermodal-beating mode-locking: toward higher-order harmonic mode-locking of Raman laser, Zhengqian Luo[1], Huihui Cheng[1], Hongyan Fu[1], Chenchun Ye[1], Huiying Xu[1], Zhiping Cai[1]; [1]*Department of Electronic Engineering, Xiamen Univ., China.* We demonstrate a new mode-locking technique (i.e. intermodal-beating mode-locking, IBML) in Raman fiber lasers to develop high-order harmonic mode-locking. By satisfying the harmonic frequency-matched condition of IBML, the harmonic of mode-locking as high as 680th-order is successfully achieved.

AS1A.5 • 09:15
Generation of Efficient High-Energy Domain-Wall Pulse in a Long-Cavity Fiber Ring Laser, Ai-Ping Luo[1], Zhen-Bin Lin[1], Peng-Fei Zhu[1], Xiao-Bo Xing[2], Zhi-Chao Luo[1], Wen-Cheng Xu[1]; [1]*School of Information and Optoelectronic Science and Engineering, South China Normal Univ., China;* [2]*MOE Key Laboratory of Laser Life Science & Institute of Laser Life Science, South China Normal Univ., China.* A high-energy pulse fiber laser with long-cavity length based on domain-wall theory was proposed and demonstrated. At a maximum pump power of 200 mW, 56.3 nJ pulse with 79.98 kHz repetition ration was efficiently generated.

Hydrangea

AS1B.3 • 08:45
Linear and Nonlinear Optical Absorption of on-chip Silicon-on-insulator Nanowires with Graphene, Longhai Yu[1], Yang Xu[2], Yaocheng Shi[1], Daoxin Dai[1]; [1]*Centre for Optical and Electromagnetic Research, State Key Laboratory for Modern Optical Instrumentation, Zhejiang Provincial Key Laboratory for Sensing Technologies, Zhejiang Univ., China;* [2]*Department of Information Science and Electronic Engineering, Zhejiang Univ., China.* Silicon-on-insulator (SOI) nanowires with a single-layer graphene are fabricated and characterized. The propagation losses of TE- and TM-polarization modes are measured. Nonlinear absorption effect introduced by the graphene is also observed.

AS1B.4 • 09:00
Directed optical half-adder based on microring-resonator-based optical switches, Yonghui Tian[1], Lin Yang[1], Lei Zhang[1], Ruiqiang Ji[1], Jianfeng Ding[1], Ping Zhou[1], Weiwei Zhu[1], Yangyang Lu[1]; [1]*Chinese Academy of Sciences, Institute of Semiconductors, China.* We fabricate a directed optical logic circuit on silicon-on-insulator platform which can implement the addition of two bits. For proof of concept, a thermo-optic switch effect is employed with an operation speed of 10kbps.

AS1B.5 • 09:15
All-optical Membrane INP Switch on Silicon for Access Applications, Oded Raz[2], Martijn Tassaert[1], Gunther Roelkens[1,2], Harm Dorren[2]; [1]*INTEC, Universiteit Gent, Belgium;* [2]*ECO, Eindhoven Univ. of Technology, Netherlands.* Using an integrated membrane switch on SOI, optical clock distribution is achieved while all-optical switching of datapackets is maintained. Transmission through 25km SMF is demonstrated with 1.5dB penalty, limited by signal OSNR and pump extinction.

Chrysanthemum

AS1C.3 • 08:45
Influence of Digital Dispersion Equalization on Phase Noise Enhancement in Coherent Optical System, Tianhua Xu[1,2], Gunnar Jacobsen[2], Sergei Popov[1], Jie Li[2], Sergey Sergeyev[4], Yimo Zhang[3]; [1]*School of Information and Communication Technology, Royal Institute of Technology, Sweden;* [2]*Netlab, Acreo AB, Sweden;* [3]*College of Precision Instrument and Opto-electronics Engineering, Tianjin Univ., China;* [4]*Aston Institute of Photonic Technologies, Aston Univ., UK.* The phase noise enhancement due to digital dispersion equalization is investigated, which indicates that the phase noise from transmitter laser can also interact with the dispersion depending on the choice of digital dispersion compensation methods.

AS1C.4 • 09:00
Low Complexity Blind Level Discrimination Carrier Phase Recovery Algorithm in Optical Coherent Receiver, Md. Ibrahim Khalil[1], Md. Mosaddek H. Adib[1], Arshad M. Chowdhury[1,2], Md. Saifuddin Faruk[3], Geekung Chang[2]; [1]*Department of Electrical Engineering and Computer Science, North South Univ., Bangladesh;* [2]*School of Electrical and computer Engineering, Georgia Institute of Technology, USA;* [3]*Department of Electrical and Electronic Engineering, Dhaka Univ. of Engineering and Technology, Bangladesh.* We propose and demonstrate a low complexity blind Level Discrimination Carrier Recovery Algorithm (LD-CRA) for optical coherent receivers. Through optimization of step size parameter we found that LD-CRA has below 2 dB OSNR penalty for 14Gbaud 16-QAM signal for 600 kHz linewidth laser.

AS1C.5 • 09:15 Invited
Advanced DSP for optical transmission impairment mitigation, Robert Killey[1], Sean Kilmurray[1], Polina Bayvel[1]; [1]*Univ. College London, UK.* We investigated the performance, through simulations, of multi-channel digital back-propagation-based nonlinearity compensation (NLC) for digital Nyquist WDM transmission over uncompensated standard SMF links. We also review recently developed approaches to reduce NLC algorithm complexity.

Begonia

AS1D.3 • 09:00
An Efficiency-Improved MAC Protocol for Asynchronous ONUs in OFDMA PONs, Lilong Liu[1], Xuelin Yang[1], Weisheng Hu[1]; [1]*Shanghai Jiao Tong Univ., China.* We propose an efficiency-improved MAC protocol for OFDMA PONs that dynamically assigns control subcarriers to eliminate synchronization need and exploit statistical multiplexing gain among traffic of ONUs for high performance in delay and throughput.

AS1D.4 • 09:15
Delivery of VoD services on PONs using Local Storages: Analysis of QoS, Sandu Abeywickrama[1], Elaine Wong[1,2]; [1]*National ICT Australia, Australia;* [2]*Centre for Energy-Efficient Telecommunications, Australia.* For the first time, we conduct packet level simulations of Video-on-Demand over Passive Optical Networks with local storages. We propose that strategic placement of a local storage can enable the services to be delivered with improved Quality-of-Service to the end user.

Hibiscus

AS1E.3 • 09:00 Invited

Applications of MIR-Laser Systems for Plasma Diagnostics and Trace Gas Detection in Basic Research and Industry, Jürgen Röpcke[1]; [1]*Plasma Diagnostics, INP Greifswald, Germany.* The aim of the present contribution is to review recent achievements using mid infrared absorption spectroscopy based on quantum cascade lasers (QCLAS) for plasma diagnostics and trace gas monitoring in basic research and industry.

Marigold

AS1F.3 • 09:00

Light extraction enhancement of light-emitting diode with two-dimensional circular photonic crystals, Jian H. Lin[1], Bing Chang Guo[1], Ta-Hsin Chou[2], Hung-Yi Lin[2], Hung-Chih Kan[1], Chia Chen Hsu[1,3]; [1]*Department of Physics, National Chung Cheng Univ., Taiwan;* [2]*Mechanical and System Research Laboratories, Industrial Technology Research Institute, Taiwan;* [3]*Graduate Institute of Opto-Mechatronics, National Chung Cheng Univ., Taiwan.* We demonstrate the enhancement of light extraction efficiency of GaN light-emitting diodes (LEDs) with circular photonic crystal (CPC). The enhancement of photoluminescence intensity of CPC LED is 8.6 times, compared to a normal LED.

AS1F.4 • 09:15 Invited

Light Extraction Efficiency in III-Nitride LEDs, Shoou-Jinn Chang[1]; [1]*National Cheng Kung Univ., Taiwan.* Light extraction efficiency (LEE) of GaN-based LEDs is limits mainly by the high refractive index of GaN. We will introduce methods proposed previously and present new methods to further enhance LEE of GaN-based LEDs.

Dahlia

AS1G.4 • 09:00

A Simple Photonic Method of Quasi-High-Order Ultra-Wideband Pulse Generation with Adjustable Shape, Jinyang Liu[1], Kun Zhu[1], Hongyan Fu[2], Chenhui Ye[1]; [1]*Centre for Optical and Electromagnetic Research, State Key Laboratory of Modern Optical Instrumentation, Zhejiang Univ., China;*[2]*Department of Electronic Engineering, Xiamen Univ., China.* A novel photonic method for quasi-high-order ultra-wideband (UWB) pulse generation is proposed, analyzed, and experimentally demonstrated. Switchable quasi-fourth-order and quasi-high-order UWB pulses are achieved and the present scheme is simple, reconfigurable, and shape-controllable.

AS1G.5 • 09:15

RF-IF Downconversion and Linearization of an Analog Photonic Link Based on Digital Signal Post-Compensation, Ran Shi[1], Pengxiao Li[1], Minghua Chen[1], Sigang Yang[1], Hongwei Chen[1], Shizhong Xie[1]; [1]*Electronic Engineering, Tsinghua Univ., China.* A novel analog photonic link for RF-IF downconversion is proposed. Nonlinear distortions components are significantly suppressed by 27 dB using DSP-based post-compensation method. An SFDR of 125dB-Hz2/3 is achieved, which is improved by 15 dB.

Camellia

AS1H.3 • 08:45

Structural and optical characterization of highly-strained BInGaAs/GaAs quantum wells, Zhigang Jia[1], Qi Wang[1], Xiaomin Ren[1], Yingce Yan[1], Shiwei Cai[1], Xia Zhang[1], Yongqing Huang[1], Xiaofeng Duan[1]; [1]*State Key Laboratory of Information Photonics and Optical Communications (Beijing Univ. of Posts and Telecommunications), China.* Highly-strained BInGaAs/GaAs quantum wells have been grown at low temperature by incorporating boron element into InGaAs/GaAs quantum wells. The effects of boron incorporation on the structural and optical properties of highly-strained InGaAs/GaAs QWs been investigated.

AS1H.4 • 09:00

Fabrication of PbS-PEG Hybrid Nanocomposite Infrared Detectors, Ali Rostami[1,2], Mahboubeh Dolatyari[1], Somayeh Miri[1], Hemayat Shekari[3], Hamed Baghban[1], Hasan Rasooli[1]; [1]*aSchool of Engineering-Emerging Technologies, Univ. of Tabriz, Islamic Republic of Iran;* [2]*Photonics and Nanocrystal Research Lab. (PNRL), Faculty of Electrical and Computer Engineering, Univ. of Tabriz, Islamic Republic of Iran;* [3]*Department of Physical Chemistry, Faculty of Chemistry, Univ. of Tabriz, Islamic Republic of Iran.* Novel infrared photodetectors based on PbS-PEG hybrid nanocomposite has been successfully fabricated. The fabricated device indicates high photosensitivity and responsivity rather than bare PbS detectors by a factor of ~ 46 and ~26 respectively.

AS1H.5 • 09:15 Invited

GaSb-Based Laser, Monolithically Grown on Silicon Substrate, Emitting at 1.55 m at Room Temperature, Eric Tournie[1], J. R. Reboul[1], K. Madiomanana[1], L. Cerutti[1], J. B. Rodriguez[1]; [1]*University de Montpellier, Montpellier, France.* We will present cw operation of GaSb-based devices allow covering the whole near- to mid-IR wavelength range. We will present our results in developing 1.55 μm lasers and their direct integration onto Si substrates.

Orchid

AS1A.6 • 09:30
Numerical investigation of dissipative soliton generation in an all-fiber thulium-doped fiber ring laser, Handing Xia[1], HE-PING LI[1], Xiaoxia Zhang[1], Shangjian Zhang[1], Xionggui Tang[1], Yong Liu[1]; *[1]Univ of Electronic Science & Tech China, China.* We numerically demonstrate the dissipative soliton generation in an all-fiber mode-locked thulium-doped fiber ring laser. It is shown that dissipative solitons could be formed with a SESAM acting as a mode-locker and a filtering-equivalent component.

Hydrangea

AS1B.6 • 09:30
Dual-band Metamaterial Absorber based on Asymmetrical Snowflake-Shaped Resonators, Haibin Sun[1], Guangjun Wen[1], Yongjun Huang[1], Jingping Zhong[1], Weiren Zhu[2]; *[1]School of Communication and Information Engineering, Univ of Electronic Science & Tech China, China;[2]Department of Electrical and Computer Systems Engineering, Monash Univ., Australia.* A dual-band metamaterial absorber based on asymmetrical snowflake-shaped resonators is presented. The absorption bands can be controlled by adjusting the branch lengths of resonators. Simulation and experiment are employed to demonstrate the proposed dual-band absorption characteristics.

Chrysanthemum

Begonia

AS1D.5 • 09:30
Optimizing Backup Resource Configuration in Survivable Fiber-Wireless Access Network Considering Failure Probability, Yejun Liu[1], Lei Guo[1], Lincong Zhang[1]; *[1]Northeastern Univ. (China), China.* This paper focuses on the survivability of FiWi access network. A protection scheme is proposed to tolerate multiple-segments failure considering failure probability. Simulation results demonstrate that the proposed scheme is effective in optimizing backup resource.

09:45–10:15 Tea Break, *3rd Floor Hallway (Near Exhibition Area)*

10:15–12:00 AS2A • SC 1 - Fiber Devices II

Presider: Yunqi Liu;Shanghai Univ., China

AS2A.1 • 10:15 Invited
Nano-wire Fibers, Limin Tong[1]; *[1]Zhejiang Univ., China.* We will discuss recent research on microfibers and devices.

10:15–12:00 AS2B • SC 2 - Plasmonic and Nonlinear Effects II

Presider: Laurent Vivien; UP Inst d'Electronique Fondamentale, France

AS2B.1 • 10:15 Invited
Single-particle Plasmon-resonance Spectroscopy and Transformation Optics Applications in Nanoplasmonics, Dangyuan Lei[1,2]; *[1]Physics Department, Imperial College London, UK; [2]Applied Physics Department, The Hong Kong Polytechnic Univ., China.* In this invited talk, I will introduce a novel spectroscopic technique based on single-particle plasmon resonance and its applications in nanomaterial studies, and a powerful theoretical approach based on transformation optics for designing plasmonic nanostructures.

10:15–12:00 AS2C • SC 3 - Advanced Subsystems

Presider: Lianshan Yan; Southwest Jiaotong Univ., China

AS2C.1 • 10:15
RF Down-Conversion Based on Optically Injection-locked VCSEL, Peng Guo[1], Cheng Zhang[1], Weijian Yang[2], Devang Parekh[2], Connie J. Chang-Hasnain[2], Weiwei Hu[1], Anshi Xu[1], Zhangyuan Chen[1]; *[1]Peking Univ., China; [2]Univ. of California at Berkeley, USA.* All-optical frequency down-conversion of microwave signals is proposed by directly modulated optically injection-locked VCSEL. Two tone 5 GHz RF signals are down-converted to 100 MHz IF signals with 0.0 dB OIL RF down-conversion gain.

AS2C.2 • 10:30
Burst-Mode Receiver using DQPSK, Runhong Tang[1], Huadong Li[1], Zhengfeng Qian[1], Kwok Wai Cheung[1]; *[1]Department of Information Engineering, The Chinese Univ. of Hong Kong, Hong Kong.* A burst-mode receiver using DQPSK is proposed. Non-zero threshold is needed to differentiate the gap times between transmissions from the actual packets and there is an inherent power penalty associated with a large dynamic range.

10:15–12:00 AS2D • SC 4 - Optical Transport Networks

Presider: Paolo Monti; The Royal Institute of Technology, Sweden

AS2D.1 • 10:15 Invited
Service-aware transport networks, Huiying Xu[1]; *[1]Xiamen Univ., China.* We will discuss service-aware transport networks.

Hibiscus

AS1E.4 • 09:30
Power-referenced and self-calibrated PM-FBG vibroscope, Libin Shang[1], Tuan Guo[1], Fu Liu[1], Fa Du[1], Zhaochuan Zhang[1], Bai-Ou Guan[1], Hwayaw Tam[2], Jacques Albert[3]; [1]*Institute of Photonics Technology, Jinan Univ., China;* [2]*Photonics Research Center, Department of Electrical Engineering, The Hong Kong Polytechnic Univ., Hong Kong;* [3]*Department of Electronics, Carleton Univ., Canada.* A compact vibration sensing probe, i.e. SMF-PMF-FBG configuration, is demonstrated. Two groups of well-defined resonances with ~ 7 nm wavelength separation have been achieved in reflection. High sensitive and power-referenced vibration measurement has been achieved.

Marigold

Dahlia

AS1G.6 • 09:30
Generation Method of Optical 64QAM Signal Using Electrical Binary Drive Signals, Hyeon Y. Choi[1], Takehiro Tsuritani[1], Itsuro Morita[1]; [1]*KDDI R&D Labs, Japan.* We propose a new method of generating 64QAM using electrical binary drive signals. The proposed technique has a potential to achieve the high symbol rate since it does not require the multilevel drive signals.

Camellia

09:45–10:15 Tea Break, *3rd Floor Hallway (Near Exhibition Area)*

10:15–12:00
AS2E • SC 5 - Clinical Biophotonics
Presider: Peter Andersen; Danmarks Tekniske Universitet, Denmark

AS2E.1 • 10:15 Invited
Laser Detection of Tumors, Francesco S. Pavone[1]; [1]*European Lab for Non-Linear Spectroscopy, Italy.* An overview on the applications of laser tumor detection in different fields, from urology to gastrointestinal surgery, dermatology and brain surgery, will be shown.

10:15–12:15
AS2F • SC 6 - White LEDs and III-Nitride Solar Technologies
Presider: Euijoon Yoon; Seoul National Univ., South Korea

AS2F.1 • 10:15 Invited
Nanocrystal Optoelectronics for High Quality Semiconductor Lighting, Hilmi Volkan Demir[1]; [1]*Bilkent Univ., Turkey.* We will discuss nanocrystal Optoelectronics.

10:15–12:00
AS2G • SC 3 - Optical Processing I
Presider: Peter Andrekson; Chalmers Tekniska Hogskola, Sweden

AS2G.1 • 10:15 Invited
Optical Signal Processing for Multi-Level Modulation Formats, Jian Wang[1]; [1]*Wuhan National Laboratory for Optoelectronics, Huazhong Univ. of Science and Technology, China.* We review recent works on optical signal processing for multi-level modulation formats using degenerate/non-degenerate four-wave mixing in highly nonlinear fibers. Data exchange, optical computing (quaternary/octal/hexadecimal addition/subtraction), and hexadecimal coding/decoding are demonstrated.

10:15–12:00
AS2H • SC 2 - Plasmonic Nanostructures
Presider:Jesper Moerk; Danmarks Tekniske Universitet, Germany

AS2H.1 • 10:15 Invited
Plasmonic Nanostructures: Tailoring Light-matter Interaction, Sanshui Xiao[1]; [1]*DTU Fotonik, Denmark.* The flow of light can be molded by plasmonic structures within the nanoscale. In this talk, plasmonic nanostructures for suppressing light transmission, improving light absorption and enhancing photoemissions are to be presented.

Orchid

AS2A.2 • 10:45 Invited

Photonic Crystal Fiber Devices, Wei Jin[1], H. L. Ho[1]; [1]*Hong Kong Polytechnic Univ., Hong Kong.* The properties of photonic crystal fibers can be radically modified by deforming, enlarging and selective filling of the air-holes. Such post-processing would allow useful fiber devices such as polarizers, polarization controllers, in-fiber interferometers, and etc.

AS2A.3 • 11:15

Cascaded Long-period Fiber Gratings on All-solid Photonic Bandgap Fiber, Shuo Li[1], Zhi Wang[1], Yan-ge Liu[1], Boyin Tai[1], Tingting Han[1], Zhifang Wu[1]; [1]*Institute of Modern Optics, Nankai Univ., China.* We investigate the fabrication of cascaded long-period fiber grating (LPFG) and cascaded chirped LPFGs on all-solid silica bandgap fiber. Coupling mechanism and polarization property are demonstrated and a tunable multi-wavelength fiber laser based on the cascaded chirped LPFGs has been proposed.

Hydrangea

AS2B.2 • 10:45

Frequency-Domain Analysis of High-Speed All-Optical SOA-based Turbo-Switches, Gang Wang[1], Cen Wu[1], Xuelin Yang[1], Weisheng Hu[1]; [1]*Shanghai Jiao Tong Univ., China.* A frequency-domain model is presented for all-optical turbo-switch incorporating two SOAs. The analysis shows the 3 dB cut-off frequency can reach up to ~300 GHz, if a delayed interferometer is placed between the two SOAs.

AS2B.3 • 11:00

All Optical Format Conversion from 16QAM to QPSK Based on Four-Wave Mixing in Semiconductor Optical Amplifier, Yueying Zhan[1], Min Zhang[1], Mintao Liu[1], Lei Liu[1], Xue Chen[1]; [1]*State Key Lab. of Information Photonics and Optical Communications (Beijing Univ. of Posts & Telecom.), China.* A scheme of format conversion from optical 16QAM to QPSK signal based on FWM in SOAs is proposed. Theoretical analysis and experiments of the scheme are conducted to validate the feasibility of the proposal.

AS2B.4 • 11:15

Optical bistability of a high-Q race-track-resonator based on air-cladded SU-8 optical ridge waveguides, Li Jin[1], Xin Fu[1], Bo Yang[1], Liu Yang[1], Yaocheng Shi[1], Daoxin Dai[1]; [1]*Optical Engineering, Zhejiang Univ., Centre for Optical and Electromagnetic Research, State Key Laboratory for Modern Optical Instrumentation, Zhejiang Provincial Key Laboratory for Sensing Technologies, China.* We demonstrate optical bistability on a small SU-8 race-track-resonator with a Q-value as high as 30000.

Chrysanthemum

AS2C.3 • 10:45 Invited

Few-mode Compatible Optical Add/Drop Multiplexer, Chen Xi[1], An Li[1], Jia Ye[1], Abdullah A. Amin[1], William Shieh[1]; [1]*Univ. of Melbourne, Australia.* We present few-mode compatible optical add/drop multiplexer which can perform add/drop functionalities for mode-division-multiplexed signals. The OADM consists of two thin-film filters with 5° incident angle. The OSNR penalty for add/drop/through channels are 2.6/2.4/0.7 dB.

AS2C.4 • 11:15

Impact of Linear Mode Coupling on the Nonlinear Transmission Performance of Few-mode Fibers, An Li[1], Jia Ye[1], Xi Chen[1], William Shieh[1]; [1]*Electrical & Electronic Engineering, The Univ. of Melbourne, Australia.* We present a nonlinear propagation model for the few-mode fiber based transmission systems. Simulation results show that for 16QAM-CO-OFDM over 10x100km bi-modal fiber link, the Q factor can be improved by 5.3dB (DMD = 1ps/nm).

Begonia

AS2D.2 • 10:45

On Cost Optimized Routing for Scheduled Traffic in Multi-layer Optical Transport Networks, Hui Ding[1,2], Byrav Ramamurthy[2], Pan Yi[2]; [1]*State Key Lab. of Information Photonics and Optical Communication, Beijing Univ. of Post and Telecommunications, China;* [2]*Computer Science and Engineering, Univ. of Nebraska Lincoln, USA.* We propose a cost-optimized routing for scheduled traffic demands in multi-layer optical network. The results show 50% cost saving with multi-layer routing compared to single layer approach and additional 5% saving is achieved with transponder/regenerator reuse.

AS2D.3 • 11:00

Light-Tree Establishment for Optical Multicasting in Flexible Optical WDM (FWDM) Networks, Ankitkumar Patel[1], Philip N. Ji[1], Jason P. Jue[2], Ting Wang[1]; [1]*Optical Networking, NEC Laboratories of America, Inc., USA;* [2]*The Univ. of Texas at Dallas, USA.* Multicast-enabled FWDM network architecture is introduced and a naturally-inspired algorithm is proposed for the light-tree establishment problem. The algorithm improves spectral efficiency by at least 22% and 17% compared to fixed and flexible-grid solutions respectively.

AS2D.4 • 11:15

Quasi-Scheduled Optical Path Routing and Wavelength Assignment That Uses Expected Traffic Variation, Naoaki Osawa[1], Hiroshi Hasegawa[1], Ken-ichi Sato[1]; [1]*Nagoya Univ., Japan.* We propose a novel dynamic optical network control scheme that consists of an initial design stage based on predicted traffic variation and a successive dynamic control stage for adaptation to prediction error.

Hibiscus

AS2E.2 • 10:45 Invited

Tissue Enhanced Optical Imaging and Monitoring of Drug Delivery, Valery V. Tuchin[1,2]; *[1]Saratov State Univ., Russian Federation; [2]Univ. of Oulu, Finland.* Tissue optical clearing technology in application to enhanced optical imaging and monitoring of drug delivery will be presented. OCT, speckle and digital video enhanced imaging of human and animal tissues will be analyzed. OCAs and delivery techniques will be discussed.

AS2E.3 • 11:15

Wide-bandwidth diffused optical spectroscopy for pharmaceutical characterization, Dmitry Khoptyar[1], Arman Ahamed Subash[1], Muhammad Saleem[2], Stefan Andersson-Engels[1]; *[1]Department of Physics, Lund Univ., Sweden; [2]National Institute of Lasers and Optronics, Pakistan.* We report on considerable improvement in measurements precision of the ultra broadband photon time of flight absorption/scattering spectrometer. We illustrate outstanding performance of the instrument by performing highly precise evaluation of the chemical composition of pharmaceuticals.

Marigold

AS2F.2 • 10:45 Invited

Simulataneous Formation of InGaN Nanostructures with Varying Shapes for White Light Source Applications, A. Gasim[1], D. Cha[2], Tien K. Ng[1], Pallab K. Bhattacharya[3], Boon S. Ooi[1]; *[1]Photonics Laboratory, King Abdullah Univ. of Science & Technol, Saudi Arabia; [2]2Advanced Nanofabrication, Imaging and Characterization Core Laboratory, King Abdullah Univ. of Science & Technol, Saudi Arabia; [3]3Department of Electrical Engineering and Computer Science, Univ. of Michigan, USA.* Varying shapes of InGaN nanostructures were simultaneously formed on silicon epitaxially. The nanowires and nanomushrooms emit violet-blue light, and broad yellow-orange-red luminescence, respectively. The combination of which is promising for white light emission.

AS2F.3 • 11:15

Plasmonics for Efficient Sunlight Harvesting and Photovoltaic Solar Cells, Liu Yang; *Centre for Optical and Electromagnetic Research, State Key Laboratory of Modern Optical Instrumentations, Zhejiang University, Hangzhou 310058, People's Republic of China.* Plasmonic nanotechnology enables sunlight to be efficiently harvested and manipulated in a nanoscale region, from which photovoltaic solar cells will benefit with enhanced efficiency and reduced cost. Our recent advances on it are reported here.

Dahlia

AS2G.2 • 10:45

90-Tone Stable Optical Frequency Comb Generation Using a Recirculating Frequency Shifter, Ying Yu[1], Cheng Lei[1], Minghua Chen[1], Hongwei Chen[1], Sigang Yang[1], Shibao Wu[2], Shizhong Xie[1]; *[1]Department of Electronic Engineering, Tsinghua Univ., China; [2]Key Laboratory of Special Fiber Optics and Optical Access Network, Shanghai Univ., China.* A 90-tone optical frequency comb with 4.26dB peak-to-peak power fluctuation and 19.17dB tone-to-noise ratio is realized using a recirculating frequency shifter. The relationship between tone-to-noise ratio and the number of tones is also studied.

AS2G.3 • 11:00

Experimental Observation of Quantum Talbot Effects, Xiangdong Zhang[1]; *[1]Physics, Beijing Institute of Technology, China.* We report the first experimental observation of quantum Talbot effects with single photons and entangled photon pairs. They exhibit unique properties, which are different from the case of previous proof-of-principle quantum lithography experiments.

AS2G.4 • 11:15 Invited

High-Speed Optical Signal Processing for Terabit/Second Optical Networks, Xiaoxia Wu[1]; *[1]JDSU, USA.* Recent advances of high-speed optical signal processing functionalities for Tbit/s optical networks will be presented. A briefly discussion of the trends and challenges of all-optical signal processing will also be given.

Camellia

AS2H.2 • 10:45

Photonic devices based on silicon hybrid plasmonic waveguides, Fei Lou[1], Zhechao Wang[2], Daoxin Dai[3,4], Lars Thylen[1,4], Lech Wosinski[1,4]; *[1]Royal Institute of Technology, Sweden; [2]Ghent Univ., Belgium; [3]Joint research Center of Photonics of the Royal Institute of Technology (KTH) and Zhejiang Univ., China; [4]Zhejiang Univ., China.* A 170 nm wide hybrid plasmonic waveguide with a loss of 0.08 dB/μm is demonstrated experimentally. Directional couplers with different gaps and microdisks with 0.5 μm radius based on such waveguides are also presented.

AS2H.3 • 11:00

Novel silicon hybrid plasmonic waveguide with an inverted metal nano-rib for a nanoscale light confinement, Qiangsheng Huang[1], Fanglin Bao[1], Yaocheng Shi[1], Daoxin Dai[1], Sailing He[1]; *[1]Zhejiang Univ., China.* A novel silicon hybrid plasmonic waveguide with an inverted metal nano-rib separated from a silicon-on-insulator by a low-index material. The silicon hybrid plasmonic waveguide enables a mode area of ~10^-5λ^2 and a 3μm-long propagation distance.

AS2H.4 • 11:15

Ultrasmall Directional Coupler and Disk-resonantor Based on Nano-scale Silicon Hybrid Plasmonic Waveguides, Xiaowei Guan[1], Pengxin Chen[1], Xiaokun Wang[1], Lech Wosinski[2,3], Yaocheng Shi[1,2], Daoxin Dai[1,2]; *[1]Centre for Optical and Electromagnetic Research, State Key Laboratory for Modern Optical Instrumentation, Zhejiang Provincial Key Laboratory for Sensing Technologies, Zhejiang Univ., China; [2]JORCEP (Joint Research Center of Photonics of the Royal Institute of Technology (KTH) and Zhejiang Univ.), China; [3]Laboratory of Photonics and Microwave Engineering, Royal Institute of Technology (KTH), Sweden.* Nanophotonic integrated devices based on nano-scale silicon hybrid plasmonic waveguides have been demonstrated experimentally, including directional couplers and disk-resonators. The temperature-dependence of the hybrid plasmonic disk-resonators is also characterized.

Orchid

AS2A.4 • 11:30
Magneto-optical Tunability of Microstructured Optical Fiber Filled with Ferrofluid, Miao Yinping[1]; [1]*Nankai Univ., China.* all air holes of microstructured optical fiber were filled with magnetic fluid by means of the well-known capillarity effect. Magnetic-field response including guidance characteristic and transmission of mode in fiber were investigated.

AS2A.5 • 11:45
Nonlinear-fiber-grating-pair based low-power all-optical switches, Chunfei Li[1]; [1]*Department of Physics, Harbin Institute of Technology, China.* Two kinds of fiber-grating-pair all-optical switches are proposed. They consist of two silica gratings (FBG and LPFG) connected with a nonlinear fiber. The switching powers of these two switches are few milliwatt.

Hydrangea

AS2B.5 • 11:30
Thermal Analysis and Design Optimization of SOI-Integrated Microdisk Lasers, Zhiqi Wang[1], Zhen Sheng[1], Hao Li[1], Chao Qiu[1], Aimin Wu[1], Xi Wang[1], Shichang Zou[1], Fuwan Gan[1]; [1]*State Key Laboratory of Functional Materials for Informatics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China.* A static thermal analysis of the hybrid InP-based microdisk laser and a thermal optimal structure are reported. The optimal structure reduces the thermal resistance by 64%, and lowers the threshold current remarkably.

AS2B.6 • 11:45
Propagation Characteristics of LN Photonic Wires, Emi Saitoh[1], Kunimasa Saitoh[1], Masanori Koshiba[1]; [1]*Hokkaido Univ., Japan.* We investigate single-mode condition, coupling and bending characteristics of LiNbO3 (LN) photonic wires. We show bending losses of single-mode LN wires, allowable bend radius with negligible bending losses, and polarization-independent couplers.

Chrysanthemum

AS2C.5 • 11:30 Invited
Large-scale space division multiplexed transmission through multi-core fiber, Jun Sakaguchi[1], Benjamin J. Puttnam[1], Werner Klaus[1], Yoshinari Awaji[1], Naoya Wada[1], Atsushi Kanno[1], Tstsuya Kawanishi[1]; [1]*Photonic Network Research Institute, NICT, Japan.* Rapid progress in multi-core fibers and space division multiplexing technologies has enabled large-capacity transmission exceeding the conventional single-core fiber capacity limit of approximately 100 Tb/s. In this invited paper, we review such progress and achievements.

Begonia

AS2D.5 • 11:30 Invited
TBD, Renaud Larsen[1]; [1]*Juniper Networks Inc., USA.* Abstract not available.

12:00–13:30 Lunch Break

NOTES

Hibiscus

AS2E.4 • 11:30
Theoretical Validation of the Optimal Wavelength Sets used for the Capillary/Vessel Density Spatial Pattern Detection, Rajesh V. Kanawade[1,2], Florian Stelzle[1,3], Michael Schmidt[1,2, 4]; [1]*Clinical Photonics Lab, Erlangen Graduate School in Advanced Optical Technologies (SAOT), Germany;* [2]*Chair of Photonics Technologies, Germany;* [3]*Dept. of Oral and Maxillofacial Surgery, Univ. Hospital Erlangen, Friedrich-Alexander , Univ. of Erlangen-Neremberg, Germany*; [4]*Bavarian Laser Center, Germany.* Clinical shock can be detected by monitoring the capillary/vessel density spatial pattern and blood oxygenation. In this paper, theoretical validation of the experimentally obtained optimum wavelength sets for best capillary/vessel spatial pattern monitoring is discussed.

AS2E.5 • 11:45
Three-Dimensional Magnetic Field Vector Measurement Using Fiber Mounted Magneto-optic Probe, Jun Zhu[1], Shilie Zheng[1], Xiaofeng Jin[1], Hao Chi[1], Xianmin Zhang[1]; [1]*Department of Information Science and Electronic Engineering, Zhejiang Univ., China.* A scheme for three-dimensional magnetic field vector measurement using a fiber mounted magneto-optic probe is proposed, which can detect the intensity and direction simultaneously. A theoretical analysis is performed and the system is investigated numerically.

Marigold

AS2F.4 • 11:30 Invited
III-nitride Photovoltaics, Jonathan Wierer[1]; [1]*Sandia National Laboratories, USA.* III-nitride solar cells comprised of planar and core-shell nanowire arrays are demonstrated. The nanowire architecture enables advantages such as elastic strain relief within the InGaN shell and increased absorption by nanowire light scattering.

Dahlia

AS2G.5 • 11:45
100-GHz All-optical Clock Recovery with Fabry-Perot Cavity and Semiconductor Optical Amplifier, Li Huo[1], Dong Wang[1], Qiang Wang[1], Caiyun Lou[1]; [1]*Tsinghua Univ., China.* we demonstrated 100-GHz clock recovery from 100-Gb/s RZ-OOK optical signal. Fabry-Perot cavity was used as primary clock recovery stage, SOA and optical filter was deployed to reduce the amplitude fluctuation from 46% to 12%.

Camellia

AS2H.5 • 11:30 Invited
Manipulating Light Scattering with Plasmonic Nanostructures, Won Park[1]; [1]*Electrical, Computer & Energy Engineering, Univ. of Colorado, USA.* This talk will present experimental demonstration of a novel cloaking scheme based on scattering cancellation by plasmonic metamaterial coating. It will also discuss the mechanical tuning and symmetry lowering of Fano resonance in plasmonic nanostructures.

12:00–13:30 Lunch Break

NOTES

Orchid

13:30–15:30
AS3A • SC 4 - Optical and Radio-over-Fiber Transmission
Presider: Ivan Andonovic; Univ. of Strathclyde, UK

AS3A.1 • 13:30 Invited
Advanced performance measurements using 40G coherent systems, Christine Tremblay[1], Andrew Cassidy[1,2], Aurélien Mortelette[1], Marc Lyonnais[2], Thomas Tam[3], Michel P. Bélanger[2]; [1]*Ecole de technologie superieure, Canada;* [2]*Ciena Corp., Canada;* [3]*CANARIE, Canada.* This presentation discusses the use of 40G coherent transponders as optical performance monitors through recent long-term field measurements of polarization and performance fluctuations in a 230-km optical link of CANARIE network carrying live 10G traffic.

AS3A.2 • 14:00 Invited
Hybrid Multidimensional Dynamic Optical Networking Based on Adaptive LDPC-Coded Mode-Multiplexed CO-OFDM, Ivan B. Djordjevic[1,2], Ding Zou[1], Milorad Cvijetic[2]; [1]*ECE Dept., College of Engineering, Univ. of Arizona, USA;* [2]*College of Optical Sciences, Univ. of Arizona, USA.* Spatial-MIMO and multiband-OFDM will lead to significant improvement in aggregate throughput of optical networks. In this paper, we describe how spatial-spectral domains can be used to enable hybrid-multidimensional-dynamic optical-networking based on adaptive-LDPC-coded mode-multiplexed-CO-OFDM.

Hydrangea

13:30–15:30
AS3B • SC 2 - Silicon Modulators
Presider: Haisheng Rong; Intel Corporation USA

AS3B.1 • 13:30 Invited
Low power consumption Ge/SiGe Quantum well optical modulator, Delphine Marris-Morini[1], Papichaya Chaisakul[1], Mohamed-Saïd Rouifed[1], Giovanni Isella[2], Daniel Chrastina[2], Jacopo Frigerio[2], Xavier Le Roux[1], Samson Edmond[1], Jean-René Coudevylle[1], Laurent Vivien[1]; [1]*Institut d'Electronique Fondamentale, Université Paris Sud, France;* [2]*Dipartimento di Fisica del Politecnico di Milano, L-Ness, Italy.* Ge/SiGe quantum well waveguide modulator is demonstrated, working with 1V bias swing, and energy consumption as low as 108 fJ per bit. The modulator shows a 3dB bandwidth of 23 GHz.

AS3B.2 • 14:00
Design of Traveling Wave Electrode for High-speed Silicon Modulators, Zhou Yanyang[1], Zhou Linjie[1], Sun Xiaomeng[1], Jianping Chen[1]; [1]*Department of Electronic Engineering, Shanghai Jiaotong Univ., China.* We design a traveling wave electrode to drive carrier-depletion-based silicon modulators. By optimizing the electrode and the connection transmission line, the impedance can be matched to 50 Ohm.The 3-dB bandwidth of the modulator can be up to 40 GHz, mainly limited by the velocity mismatch.

Chrysanthemum

13:30–15:30
AS3C • SC 3 - Access & Indoor Systems
Presider: Jian Wang; Huazhong Univ. of Science and Technology, China

AS3C.1 • 13:30
30-Gbit/s OFDM Intensity Modulation of 1550-nm VCSEL, Cheng Zhang[1], Peng Guo[1], Qing Yin[1], Devang Parekh[2], Werner Hofmann[3], Michael Mueller[3], Connie J. Chang-Hasnain[2], Markus C. Amann[3], Hongbin Li[1], Hequan Wu[1], Weiwei Hu[1], Zhangyuan Chen[1];[1]*State Key Laboratory on Advanced Optical Communication Systems & Networks, Peking Univ., China;* [2]*Univ. of California, Berkeley, USA;* [3]*Walter Schottky Institute, Technical Univ. of Munich, Germany.* We experimentally demonstrate 30-Gbit/s (24.7-Gbit/s net) OFDM intensity modulation of a low-cost 1550-nm VCSEL. The optical OFDM signals transmission over 7-km G.655 SMF is also realized successfully.

AS3C.2 • 13:45
Long Distance Indoor High Speed Visible Light Communication System Based on RGB LEDs, Giulio Cossu[1], Amir Masood Khalid[1], Pallab Choudhury[1], Raffaele Corsini[1], Ernesto Ciaramella[1]; [1]*TeCIP, Scuola Superiore Sant'Anna, Italy.* A visible light communication system is experimentally demonstrated by employing RGB LEDs directly modulated with DMT signal. Data rate of 780 Mbit/s is achieved for the first time at 2.5 m, common indoor ceiling-desk distance.

AS3C.3 • 14:00 Invited
MIMO transmission through few mode fiber, Ezra Ip[1]; [1]*NEC Laboratories America Inc, USA.* This paper will review MIMO transmission through few mode fibers.

Begonia

13:30–15:30
AS3D • SC 4 - Network Design and Energy Efficiency
Presider: Bart Lannoo; iMinds, Belgium

AS3D.1 • 13:30 Tutorial
Green optical networks: power savings vs. network performance, Paolo Monti[1]; [1]*The Royal Institute of Technology, Sweden.* Nowadays, targeting energy usage only while optimizing power consumption is not sufficient anymore. This talk addresses a number of tradeoffs among network performance metrics that come into play when devising energy-efficient strategies for optical networks.

Dr. Paolo Monti received a Laurea degree in Electrical Engineering (2001) from the Politecnico di Torino, Italy, and a Ph.D. in Electrical Engineering (2005) from the University of Texas at Dallas (UTD). From 2006 to 2008 he worked as a Research Associate of the Open Networking Advance Research (OpNeAR) Lab at UTD. He joined the Royal Institute of Technology (KTH) in September 2008 where he is currently an Assistant Professor in the School of Information and Communication Technology (ICT-COS) and a member of the Optical Networks Laboratory (ONLab). He co-authored more than sixty papers published in international journals and presented in leading international conferences. Dr. Monti is one of the Guest Editors of the Special Issue on "Green Networking and Computing" of the Journal of High Speed Networks and he is serving on the editorial board of the Springer Networking and Electronic Commerce Journal. He participated in several TPCs including IEEE Globecom and ICC where he also co-Chaired two workshops, one on "New Dimensions in Optical Network Survivability" and one on "Green Broadband access: energy efficient wireless and wired network solutions". His research

Hibiscus

13:30–15:30
AS3E • SC 5 - Nanoparticle-based Biophotonics
Presider: TBA

AS3E.1 • 13:30 Invited
Upconverting Fluorescent Nanoparticles for Bioimaging and Therapy, Yong Zhang[1]; [1]*Bioengineering, National Univ. of Singapore, Singapore.* Upconverting nanoparticles present a new technology for light based imaging/detection and therapy. They can be used for ultrasensitive interference-free biodetection because most biomolecules do not have upconversion properties. They are also useful for photodynamic therapy.

AS3E.2 • 14:00
In vivo Luminescence Imaging and Tomography using Upconverting Nanoparticles as Contrast Agents, Stefan Andersson-Engels[1], Haichun Liu[1], Can Xu[1], Pontus Svenmarker[1], Anna Gisselsson[2], Pontus Kjellman[2], Linda Andersson[2], Rene in't Zandt[2], Fredrik Olsson[2], Sarah Fredriksson[2]; [1]*Department of Physics, Lund Univ., Sweden;* [2]*Genovis AB, Sweden.* Upconverting nanoparticles have recently drawn increasingly attention as contrast agents for optical bioimaging. They enable autofluorescence-free imaging within the tissue optical window, and improved spatial resolution as compared to conventional fluorescence- based contrast agents.

Marigold

13:30–15:30
AS3F • SC 6 - Physics and Devices for High Efficiency LEDs
Presider: Hao-chung Kuo; National Chiao Tung Univ., Taiwan

AS3F.1 • 13:30 Invited
Physics of High-Efficiency III-Nitride Quantum Wells Light-Emitting Diodes, Nelson Tansu[1], Jing Zhang[1], Guangyu Liu[1], Hongping Zhao[2], Chee-Keong Tan[1], Peifen Zhu[1]; [1]*Lehigh Univ., USA;* [2]*Department of Electrical Engineering and Computer Sciences, Case Western Reserve Univ., USA.* The review of the approaches to achieve high efficiency III-Nitride based visible and UV light-emitting diodes will be presented. The engineering from nanoscale, microscale, and macroscale in devices will be elaborated for high efficiency devices.

AS3F.2 • 14:00 Invited
Simulation and Design of High Efficient LED, Chenglin Xu[1], Bahl Mayank[1], Robert Scarmozzino[1]; [1]*Optical Solution Group, Synopsys, Inc., USA.* This paper presents the basic methodology in details for simulation of incoherent LEDs with coherent FDTD method. Design example will be given to demonstrate how to achieve high extraction efficiency by optimizing the optical structure.

Dahlia

13:30–15:30
AS3G • SC 3 - Optical Processing II
Presider: Ezra Ip; NEC Laboratories, USA

AS3G.1 • 13:30 Tutorial
Phase-sensitive Fiber-optic Parametric Amplifiers and their Applications, Peter A. Andrekson[1]; [1]*Chalmers Tekniska Hogskola, Sweden.* The basics and recent progress in nonlinear fiber-based phase-sensitive parametric amplifiers is discussed. In addition, their potential use as in-line amplifiers, resulting in significant link performance improvement potential, is highlighted.

Peter Andrekson received his Ph.D. from Chalmers University of Technology, Sweden, in 1988. After about three years with AT&T Bell Laboratories, Murray Hill, N.J., he returned to Chalmers where he is now a full professor at the Department of Microtechnology and Nanoscience. He was Director of Research at Cenix Inc. in Allentown, PA, USA, during 2000 – 2003 and with the newly established Center for Optical Technologies at Lehigh University, Bethlehem, PA, during 2003 – 2004. His research interests include nearly all aspects of fiber communications such as optical amplifiers, nonlinear pulse propagation, all-optical functionalities, and high spectral efficiency transmission. He is co-founder of the optical test & measurement company Picosolve Inc., now part of EXFO where Andrekson is Director of EXFO Sweden AB. Andrekson is a Fellow of the Optical Society of America and of the IEEE. He is the author of about three hundred fifty scientific publications and conference papers in the area of optical communications, including two tutorials at the Optical Fiber Communication Conference (OFC) in 2004 and 2011. He is an elected member of the Board of Governors for the IEEE Photonics Society and is or has served on several techni-

Camellia

13:30–15:30
AS3H • SC 2 - Slow Light
Presider: Daoxin Dai; Zhejiang Univ., China

AS3H.1 • 13:30 Invited
Integrated Photonics Enabled by Slow Light, Jesper Moerk[1], Y. Chen[1], S. Ek[1], T. Suhr Skovgaard[1], M. Heuck[1], Kresten Yvind[1]; [1]*Danmarks Tekniske Universitet, Denmark.* In this talk we will discuss the physics of slow light in semiconductor materials and in particular the possibilities offered for integrated photonics. This includes ultra-compact slow light enabled optical amplifiers, lasers and pulse sources.

AS3H.2 • 14:00
Experimental evidence for the mirage effect and giant dispersive phenomena in graded photonic crystals, Eric CASSAN[1], Khanh Van Do[1], Jean Dellinger[2], Xavier Le Roux[1], Benoit Cluzel[2], Frédérique De Fornel[2]; [1]*Institut d'Electron Fondam (Univ. PSud), France;* [2]*Laboratoire Interdisciplinaire Carnot de Bourgogne, CNRS, France.* We report the design, fabrication, and characterization of a gradual photonic crystal in the silicon on insulator photonics. Unusual light propagation phenomena are directly evidenced using an original scanning near-field technique and giant dispersion properties around 0.25μm/nm are reported.

Orchid

AS3A.3 • 14:30 Invited

High Performance Fiber-Radio Link: Digitized Radio-over-Fiber Transport, Christina Lim[1]; [1]*Univ. of Melbourne, Australia.* In this paper, we review our recent work on digitized RF transport to improve the dynamic range and performance of fiber-radio link which is traditionally based on analog signal transport.

Hydrangea

AS3B.3 • 14:15

High speed silicon Mach-Zehnder modulator with circuit model analysis, Hao Xu[1], Xi Xiao[1], Xianyao Li[1], Yingtao Hu[1], Zhiyong Li[1], Tao Chu[1], Yude Yu[1], Jinzhong Yu[1]; [1]*Institute of semiconductors,CAS, China.* We report a 40 Gbit/s traveling-wave silicon Mach-Zehnder modulator fabricated in a commercial 0.18 μm CMOS process. A distributed circuit model is proposed to characterize the bandwidth performance of this modulator.

AS3B.4 • 14:30

Mach-Zehnder based optical sitches in silicon-on-insulator, Wanjun Wang[1], Yong Zhao[1], Ting Hu[1], Huiye Qiu[1], Jiangyi Yang[1], Minghua Wang[1], Xiaoqing Jiang[1]; [1]*Department of Information Science and Electronics Engineering, Zhejiang Univ., China.* In this paper, we experimentally demonstrated a series of Mach-Zehnder optical switches in silicon-on-insulator, including the 2×2, 1×3 electro-optical switch, 3×3 thermo-optical switch using a single combined phase shifter, four-port broadband electro-optical routing switch.

AS3B.5 • 14:45

Low-power-consumption, 40-Gb/s Mach-Zehnder silicon optical modulator, Jianfeng Ding[1], Ruiqiang Ji[1], Lei Zhang[1], Lin Yang[1]; [1]*Institute of Semiconductors, Chinese Academy of Sciences, China.* We demonstrate a 2-mm-long carrier-depletion modulator which can work at a speed of 40 Gbps under a differential voltage of 0.36 V with no reverse bias. The power efficiency could be 32.4 fJ/bit.

Chrysanthemum

AS3C.4 • 14:30

Bi-directional Multi Dimension CAP Transmission for Smart Grid Communication Services, Xu Zhang[1,2], Maisara B. Othman[2], Xiaodan Pang[2], Jesper Bevensee Jensen[2], Idelfonso Tafur Monroy[2]; [1]*Tianjin Electric Power Corporation, State Grid Corporation of China, China;* [2]*Technical Univ. of Denmark, Denmark.* We experimentally demonstrate bi-directional multi dimension carrierless amplitude and phase (CAP) transmission for smart grid communication services based on optical fiber networks. The proposed system is able to support multi-Gb/s transmission with high spectral efficiency.

AS3C.5 • 14:45

Using CAP Dimensionality for Service and User Allocation for Optical Access Networks, Maisara B. Othman[1,2], Xu Zhang[1], Jesper Bevensee Jensen[1], Idelfonso Tafur Monroy[1]; [1]*Denmark Technical Univ., Denmark;* [2]*Universiti Tun Hussein Onn Malaysia, Malaysia.* The usability of carrierless amplitude and phase (CAP) modulation dimensions for service and user allocation for WDM optical access is experimentally demonstrated in a 2X2D-ODMA configuration.

Begonia

interests include: network planning, protocol design, performance evaluation, energy efficiency, and optimization techniques for both optical and wireless networks.

AS3D.2 • 14:30 Invited

Scalable Traffic Grooming in Optical Networks, Hui Wang[1], Zeyu Liu[1], George N. Rouskas[1]; [1]*North Carolina State Univ., USA.* We develop a new solution approach for the traffic grooming problem by decomposing it into a virtual topology and traffic routing (VTTR) subproblem, and the RWA subproblem. We solve the VTTR subproblem with a new partial LP relaxation technique.

Hibiscus

AS3E.3 • 14:15

Multi-photon evanescent wave (MPEW) excited lanthanide-doped upconverting nanoparticles (UCNPs) for fast single particles tracking and live cell membrane imaging, Qiuqiang Zhan[1,2], Hao Cheng[2], Jun Qian[2], Sailing He[1,2]; [1]*ZJU-SCNU Joint Research Center of Photonics, South China Normal Univ., China;* [2]*Centre for Optical and Electromagnetic Research, Zhejiang Univ., China.* We propose a novel multi-photon evanescent wave (MPEW) excitation modality for upconverting nanoparticles (UCNPs) based microscopy. Experimental results show this new imaging method for UCNPs is nonscanning, ultrahigh contrast and high spatiotemporal resolution.

AS3E.4 • 14:30 Invited

From Combinatorial Chemistry to Nanocarriers for Cancer Therapy and Imaging, Kit S. Lam[1]; [1]*Department of Biochemistry & Molecular Medicine, Univ. of California Davis, USA.* The enabling one-bead-one-compound combinatorial library method allows us to rapidly develop optical probes and cancer targeting agents for cell surface receptors. The targeting agents can be incorporated into the novel nanocarriers for delivery of theranostic agents against cancer.

Marigold

AS3F.3 • 14:30

Study of Blue InGaN Multiple Quantum wells Lightemitting Diodes with P-type Quantum Barriers, CHAO LIU[1], Taiping Lu[1], Zhiwei Ren[1], Xin Chen[1], Bijun Zhao[1], Yian Yin[1], Jinhui Tong[1], Shuti Li[1]; [1]*South China Normal Univ., China.* Blue light-emitting diodes with p-GaN and p-AlGaN barriers have been numerically studied. The results show that when the traditional p-GaN barriers were replaced by p-AlGaN barriers, improved light output power and efficiency droop were observed.

AS3F.4 • 14:45 Invited

Improvement in Efficiency Droop of GaN-based Light-emitting Diodes by Optimization of Active Regions, Hao-chung Kuo[1], Da-Wei Lin[1], Wang Chao-Hsun[1], Shih-Pang Chang[1], Ching-Hsueh Chiu[1], Yu-Pin Lan[1], Zhen-Yu Li[1], Jin-Chai Li[1], Tien-Chang Lu[1], Shing-Chung Wang[1]; [1]*Department of Photonics and Institute of Electro-Optical Engineering, National Chiao Tung Univ., Taiwan.* In this paper, we propose several methods to improve the efficiency droop of GaN-based light-emitting diodes by optimization of active regions, such as alternative substrates, semi-polar MQWs, insertion layer, graded-thickness MQWs, and graded-composition EBL.

Dahlia

cal program committees, and has also twice served as an expert for the evaluation of the Nobel Prize in Physics. He was an associate editor for IEEE Photonics Technology Letters during 2003-2007. In 1993 he was awarded a price from the Swedish government research committee for outstanding work performed by young scientists, and in 2000 he was awarded the Telenor Nordic research award for his contribution to optical technologies. Currently he holds an ERC Advanced Grant for work on phase-sensitive optical amplifiers.

AS3G.2 • 14:30

A Scheme of Advanced Modulation Formats Generation Based on XPM in SOA-MZI, Yueying Zhan[1], Min Zhang[1], Mintao Liu[1], Lei Liu[1], Xue Chen[1]; [1]*State Key Lab. of Information Photonics and Optical Communications (Beijing Univ. of Posts & Telecom.), China.* A scheme of optical QPSK and 16QAM signal generation based on XPM in SOA-MZI is proposed. The receiver sensitivity of the generated QPSK and 16QAM signal are -27.5dBm and -24dBm at BER of 10-9.

AS3G.3 • 14:45

All-Optical Simultaneous 160-Gbit/s Data Selector and Fredkin Gate Using Twin Four-Wave Mixing Processes in Si-nc Slot Waveguides, Chengcheng Gui[1], Jian Wang[1], Chao Xiang[1], Yonghao Liu[1], Shuhui Li[1]; [1]*Wuhan National Laboratory for Optoelectr, China.* We design Silicon nanocrystal slot waveguides enabling light confinement and enhanced nonlinearity. By exploiting twin FWM processes in waveguides, we simulate and implement simultaneous 160-Gbit/s data selector and Fredkin gate. Extinction ratio, Q-factor and eye opening are evaluated.

Camellia

AS3H.3 • 14:15

Dispersion engineered wide slot photonic crystal waveguides by Bragg-like corrugation of the slot to a comb, Charles Caer[1], Xavier Le Roux[1,2], Eric CASSAN[1]; [1]*Institut d'Electronique Fondamentale, Univ. Paris-Sud, France;* [2]*CNRS, France.* We report slow light measurements in comb photonic crystal waveguides. Group indices higher than 100 are experimentally reported using an integrated Mach-Zehnder Interferometer. This waveguide geometry offers opportunities to achieve ultra-high light confinement.

AS3H.4 • 14:30

A Tunable Bragg Grating Optical Delay Line Based on Chirp Dynamic Tuning, Sun Lili[1], Linjie Zhou[1], Zhi Zou[1], Tong Ye[1], Jianping Chen[1]; [1]*Shanghai Jiaotong Univ., China.* A novel tunable optical delay line based on dynamic chirp tuning in a Bragg grating is proposed. The chirp is actively tuned by a linearly-varied p-i-n diode or a p-i-p thermal resistor. Numerical simulations are performed to characterize the optical performances.

AS3H.5 • 14:45

Compact and spectrally selective asymmetric co-directional coupler using slow light photonic crystal waveguide, Eric CASSAN[1], Anatole Lupu[1]; [1]*Institut d'Electron Fondam (Univ. PSud), France.* The design of a co-directional coupler based on the coupling between fast and slow waves in the silicon photonic technology is reported. The related length×bandwidth merit factor is 0.055nm×mm, which represents an in improvement by a factor of 70 with respect to the present state-of-the-art.

Orchid

AS3A.4 • 15:00
Engineering 400G in Metro/Regional Networks, Richard Younce[1], Julia Larikova[1], Yajun Wang[1]; *[1]Tellabs, USA.* Network and nodal architectural alternatives are considered for 400G+ transmission based on 100Gb/s and 200Gb/s subchannels in super-band transmission. Reach results are derived for practical metro/regional networks. The results provide clear direction for architectural decisions.

AS3A.5 • 15:15
Long Term Monitoring of Chromatic Dispersion Fluctuations in a Buried Fiber Cable in a Tropical Climate, Kok H. Fong[1], Zainuddin Lambak[1], Kharina Khairi[1], Muhamad Najib Abdul Rahman[1], Zulkifli Hamzah[1], Mohd Ismail Abdan[1]; *[1]Telekom Research & Development Sdn Bhd, Malaysia.* We investigate chromatic dispersion fluctuations of 120 km of deployed fibers by long term monitoring and theoretical analysis. We discussed the implications to the deployment of high speed transmission systems in tropical climates.

Hydrangea

AS3B.6 • 15:00 Invited
Silicon on insulator modulator structures for data rates of 40 Gb/s and above, Frederic Y. Gardes[1], Dave J. Thomson[1], Graham T. Reed[1], Jeam Marc Fedeli[2], L. O'Faolain[3], Kapil Debnath3[3], Thomas Krauss[3], Leon Lever[4], Z. Ikonic[4], R. W. Kelsall[4]; *[1]ORC, Univ. of Southampton, UK; [2]CEA-Leti, France; [3]School of Physics & Astronomy,, Univ. of St Andrews, UK; [4]Institute of Microwaves and Photonics, Univ. of Leeds, UK.* In this work we describe carrier depletion MZI and ring modulators, cavity structures for modulation enhancement and QCSE modulators, all of which are under development as part of the UK Silicon Photonics project and the European HELIOS project.

Chrysanthemum

AS3C.6 • 15:00
Multi-band QPSK Signal Transmission Implemented with Remote Up-Conversion and Schottky Diode RF Detectors in a 60-GHz Mm-Wave RoF system, Jie Liu; *Hong Kong Polytech University, Hong Kong.* A simple optical remote up-conversion technique and aSchottky diode RF detectorhave been implemented in a 60 GHz ROF system to demonstrate multi-band QPSK signal over 50-km fiber and 4-meter wireless transmission.

Begonia

AS3D.3 • 15:00
Optimal Port Grouping for Maximal Router Card Sleeping, Yunlei Lui[1], Gangxiang Shen[1], Weidong Shao[1]; *[1]School of Electronic and Information Engineering, Soochow Univ., China.* To save energy consumption of IP over WDM networks, we develop an MILP model and an efficient heuristic to properly group router ports so as to maximally sleep router cards. Results indicate that the proposed card-based sleeping strategy can save up to 30% energy consumption.

AS3D.4 • 15:15
Optimal Design of Cost- and Energy-Efficient Scalable Passive Optical Backbone Networks, Farzad Abtahi[1], Cicek Cavdar[1], Jiajia Chen[1], Sahar Khanmohamadi[1,4], Lena Wosinska[1], Guillaume Mantelet[2], Émile Archambault[2], Christine Tremblay[2], Michel P. Bélanger[3]; *[1]Information and Communication Technology, The Royal Institute of Technology KTH, Sweden; [2]Department of Electrical Engineering, École de technologie supérieure (ÉTS), Canada; [3]Ciena Corp., Canada;[4]Ericsson AB, Sweden.* We propose an optimization model minimizing number of wavelengths in passive optical backbone networks and obtaining the same resource usage as in networks based on active switching while reducing both cost and power consumption.

15:30–16:00 Tea Break, *3rd Floor Hallway (Near Exhibition Area)*

NOTES

Hibiscus

AS3E.5 • 15:00
Photosensitizer Encapsulated Organically Modified Silica (ORMOSIL) Nanoparticles for Tumor Diagnosis and Photodynamic Therapy, Jun Qian[1], Sailing He[1]; [1]*Centre for Optical and Electromagnetic Research, Zhejiang Provincial Key Laboratory for Sensing Technologies, China.* Organically modified silica (ORMOSIL) nanoparticles show great potentials of multimodal bio-imaging and "theranostic". We introduce the synthesis/functionalization of photosensitizer encapsulated ORMOSIL nanoparticles, and report their applications in tumor diagnosis and photodynamic therapy.

AS3E.6 • 15:15
Mitochondria Targeting Single-Walled Carbon Nanotubes for Cancer Photothermal and Photoacoustic Therapy, Feifan Zhou, Da Xing; *MOE Key Laboratory of Laser Life Science & Institute of Laser Life Science, College of Biophotonics, South China Normal University, China.* In the current study, we explore novel phototherapy model for cancer with mitochondria-targeting single-walled carbon nanotubes (SWNTs), which could prove to be a promising selective local treatment modality, while minimizing adverse side effects.

Marigold

AS3F.5 • 15:15
Droop Improvement in Blue InGaN Light Emitting Diodes with AlGaN/InGaN Superlattice Barriers, Jinhui Tong[1], Shuti Li[1]; [1]*Institute of Opto-electronic Materials and Technology, South China Normal Univ., China.* We study the characters of blue InGaN light emitting diodes with AlGaN/InGaN superlattice barriers. The efficiency droop can be markly improved when the AlGaN/InGaN superlattice barriers are used.

Dahlia

AS3G.4 • 15:00
A phase stabilized quadruple OTDM multiplier for RZ/CS-RZ optical clock with an optical bandpass filter, Masato Otsuki[1], Renjo Takama[1], Hiroyuki Toda[1]; [1]*Doshisha Univ., Japan.* We demonstrate a phase stabilized quadruple OTDM multiplier for RZ/CS-RZ optical clock with an optical bandpass filter. 10 GHz optical clock was multiplied to 40 GHz with 17 dB undesired sideband suppression ratio.

Camellia

AS3H.6 • 15:00 Invited
On some slow light structures with metamaterials, Sailing He; *JORCEP--Sino-Swedish Joint Research Center of Photonics.* We will discuss some slow light structures with metamaterials.

15:30–16:00 Tea Break, *3rd Floor Hallway (Near Exhibition Area)*

NOTES

Orchid

16:00–18:00
AS4A • SC 4 - Data Centers and Optical Interconnects
Presider: George Rouskas; North Carolina State Univ., USA

AS4A.1 • 16:00 Invited
Intra- and Inter- Data Center Networking Architectures for Future Cloud Computing, Ben Yoo[1]; [1]*Univ. of California Davis, USA*. This paper covers (1) extremely high throughput and low-latency inter-data center networking with high-radix AWGR optical switches, and (2) elastic optical networking for interconnection of large data centers and telecommunication systems in the cloud.

AS4A.2 • 16:30 Invited
The Role of Optical Transport in "Software Defined Networking", Ting Wang[1]; [1]*NEC Laboratories America Inc, USA*. This presentation will discuss the role of optical transport in software defined networking.

Hydrangea

16:00–18:00
AS4B • SC 2 - Photonic Integrated Circuits
Presider: Guang-Hua Duan; Alcatel-Thales III-V Laboratory, France

AS4B.1 • 16:00 Tutorial
Modeling and design of high density photonic integrated circuits, Weiping Huang[1]; [1]*McMaster Univ., Canada.* In this tutorial, I will give a general overview of the recent development for modeling and simulation of photonic devices and ICs. I will address some of the technical issues related to modeling and simulation of photonic devices for real-world applications. In particular, I will present a hierarchical model developed for complex photonic ICs. Finally, other aspects of computer-aided design for photonic devices such as model parameter extraction and design optimization will be discussed.

Dr. Huang is internationally known for his contributions and expertise for photonic devices and integrated circuits. He has authored and co-authored over two hundred (200) journal papers and one hundred (100) conference papers and holds seven (7) US patents. He is a senior member of IEEE, a member of OSA and SPIE. Dr. Huang was elected to the MIT Electromagnetics Academy. He was elected as a Cheung Kong Scholars by Ministry of Education, People's Republic of China, and Li Ka Shing Foundation, Hong Kong in 2000.

Dr. Huang was the founding president of Shandong University Oversea Alumni Association and is the founding president of Jinan Oversea Chinese Scholars and Professional Association.

Chrysanthemum

16:00–18:00
AS4C • SC 2 - Transmission Impairments
Presider: Chongjin Xie; Alcatel-Lucent Bell Labs, USA

AS4C.1 • 16:00 Invited
Phase estimation in Digital Coherent Optical Communications, Changyuan Yu[1,2], Pooi-Yuen Kam[1], Shengjiao Cao[1]; [1]*ECE Department, National Univ. of Singapore, Singapore;* [2]*A*STAR Institute for Infocomm Research, Singapore.* We review our work of decision-aided phase estimation methods for both single carrier and OFDM coherent optical communication systems.

AS4C.2 • 16:30
Blind and Low Complexity CD Compensation and Estimation Method in DSP based Coherent Optical Systems, Emma Matarazzo[1], Raffaele Corsini[1], Andrea Peracchi[1], Tommaso Foggi[1], Gianluca Meloni[1], Luca Potì[1], Roberto Magri[2], Ernesto Ciaramella[1]; [1]*CNIT, Italy;* [2]*Ericsson Telecomunicazioni, Italy.* A chromatic dispersion compensation and estimation algorithm for coherent optical systems is proposed and experimentally validated. The method is based on a Frequency Domain Equalizer, a Time Domain Equalizer and an Optical Performance Monitoring block in loop configuration.

AS4C.3 • 16:45
An Investigation on Power Allocation between Subcarriers with Mixed Formats in Spectrum-flexible Optical Networks, Songwei Ma[1], Bingli Guo[1], Yunfeng Zhao[1], Xin Chen[1], Juhao Li[1], Zhangyuan Chen[1], Yongqi He[1]; [1]*Peking Univ., China.* We investigate launched power allocation of multi-rate transmission with mixed 16-QAM and QPSK OFDM signals, with fixed and flexible power allocation scheme discussed. Simulation results show that flexible allocation scheme achieves much better transmission performance.

Begonia

16:00–18:00
AS4D • SC 4 - Elastic Optical Networks II
Presider: Christine Tremblay; École de Technologie Supérieure, Canada

AS4D.1 • 16:00 Invited
Strategies for Improving the Throughput of Dynamic Service Provisioning in Elastic Optical Networks, Zuqing Zhu[1], Wei Lu[1], Liang Zhang[1]; [1]*Univ. of Sci. & Tech.of China, China.* In this talk, we discuss several novel dynamic routing, modulation and spectrum assignment algorithms for high throughput service provisioning in elastic optical networks. The simulation results indicate that the proposed algorithms achieve larger resource utilization.

AS4D.2 • 16:30
Traffic Grooming in Flexible Bandwidth Optical Networks, Yibo Jia[1], Jie Zhang[1], Yongli Zhao[1], Ting Zhou[1], Xiaosong Yu[1], Hui Yang[1], Wanyi Gu[1]; [1]*Beijing Univ of Posts & Telecom, China.* Three novel traffic grooming schemes are proposed in Flexible Bandwidth Optical Networks. Simulations show that considering both link and spectrum resource efficiency, Improved Shortest Path Scheme can achieve better performance compared with the others.

AS4D.3 • 16:45
Sub-band Virtual Concatenation Lightpath Blocking Performance Evaluation for CO-OFDM Optical Networks, Anliang Cai[1], Limei Peng[1], Gangxiang Shen[1]; [1]*School of Electronic and Information Engineering, Soochow Univ., China.* We apply Virtual Concatenation (VCAT) technique to the frequency domain by transmitting the sub-bands of a CO-OFDM optical channel via different routes. Simulation results show that the VCAT technique can significantly improve lightpath blocking performance.

Hibiscus

16:00–18:00
AS4E • SC 5 - Biophotonics
Presider: Yong Zhang; National Univ. of Singapore, Singapore

AS4E.1 • 16:00 Invited
Green, Compact Diode Laser-based Systems for Biophotonics Application, Peter E. Andersen[1], Ole Bjarlin Jensen[1], Andre Muller[1], Paul Michael Petersen[1]; [1]*Danmarks Tekniske Universitet, Denmark.* Compact, green diode-laser based systems are developed for biophotonics applications. Several Watts of optical output, diffraction-limited power are achieved via nonlinear frequency conversion and two different schemes are presented. Various applications within biophotonics are discussed.

AS4E.2 • 16:30
Highly-sensitive optical waveguide sensor based on SiON using two cascaded-microring resonators, Luping Zhu[1], Mingyu Li[1], Junjun Ye[1], Jian-Jun He[1]; [1]*State Key Laboratory of Modern Optical Instrumentation, Zhejiang Univ., China.* A waveguide sensor using two cascaded micro-ring resonators based on silicon oxynitride (SiON) waveguide was investigated. The refractive index change of 2.9×10-7 can be measured through intensity interrogation with a low-cost broadband light source.

AS4E.3 • 16:45
Silicon nanowire waveguide sensor based on two cascaded ring resonators, Xianxin Jiang[1]; [1]*Department of Optical Engineering, Zhejiang Univeristy, China.* We report the latest experimental results of cascaded double ring sensor. To improve the sensitivity, nanowire waveguide sensor operating in TM polarization is designed and fabricated with EBL system. The measured transmission spectrum shows good agreement with theoretical analysis.

Marigold

16:00-18:00
JS4F • SC6 - ICAM Joint Session on Plasmonics, LEDs, and Solar Cells
Presider: Xianyu Ao; South China Normal University, China

JS4F.1 • 16:00 Invited
Fluorescent SiC for White Light-emitting Diodes, Haiyan Ou[1], Y. Ou[1], S. Kamiyama[2], M. Kaiser[3], P. Wellmann[3], M. K. Linnarsson[4], V. Jokubavicius[5], R. Yakimova[5], M. Syvajarvi[5]; [1]*Dept. of Photonics Engineering, UESTC, Denmark;* [2]*Dept. of Materials Science and Engineering, Meijo Univ., Japan;* [3]*Materials of Electronics Energy Technology, Univ. of Erlagen-Nuremberg, Germany;* [4] *School of Information and Communication Technology, KTH Royal Inst. of Technology, Sweden;* [5]*Dept. of Physics, Chemistry and Biology, Linkoping Univ., Sweden.* The strong photoluminescence from f-SiC was achieved after the optimization of the B and N concentrations. Surface nanostructures were successfully applied to enhance the extraction.

JS4F.2 • 16:30
Na2SiO3-assistant Single Crystalline Silicon Etching for Solar Cell Application, Ke Pei[1], Weijin Peng[1], Jinwei Gao[1]; [1]*Institute for Advanced Materials (IAM), South China Academy of Advanced Optoelectronics, South China Normal Univ., China.* Compared with conventional method, the way to the lower reflective pyramidal textures with good uniformity and features is approached, minimizing the reflection loss and potentially benefit to the power conversion efficiencies of solar cell devices.

JS4F.3 • 16:45 Invited
Solar Energy Conversion into Electricity and Hot Water by Thermoelectric Effect, Zhifeng Ren[1]; [1]*Department of Physics, Boston College, USA.* In this talk, I will discuss our recent studies on a few materials systems such as half-Heuslers, lead selenide, skutterudites, silicon-germanium alloys, etc. that are interest for power conversion applications including solar and any other heat sources.

Dahlia

16:00–18:00
AS4G • SC 3 - Optical OFDM
Presider: Chao Lu; Hong Kong Polytechnic Univ., Hong Kong

AS4G.1 • 16:00 Invited
Real-Time Optical OFDM and Colorless OOFDMA PONs, Jianming TANG[1], R. P. Giddings[1], E. Hugues-Salas[1], Y. Hong[1]; [1]*Bangor Univ., UK.* Record-high 20Gb/s real-time optical OFDM IMDD transmissions over 25km SSMFs and 500m OM2 MMFs are experimentally demonstrated utilising 4GS/s DACs/ADCs. Extensive performance characteristics are reported of bidirectional OOFDMA-PONs with adaptive DBA and RSOA/REAM-based colourless ONUs.

AS4G.2 • 16:30 Tutorial
OFDM-based high spectral efficiency transmission, Xiang Liu[1], Sethumadhavan Chandrasekhar[1]; [1]*Alcatel-Lucent, USA.* We review recent advances in the generation, detection, and transmission of high spectral efficiency optical superchannels that utilize orthogonal-frequency-division-multiplexing for optical carrier modulation and/or carrier multiplexing. System implications brought by these superchannels are also discussed.

Xiang Liu is a Distinguished Member of Technical Staff at Bell Labs, Alcatel-Lucent. He received his Ph.D. degree in applied physics from Cornell University. His doctoral work contributed to the first observation of optical spatiotemporal solitons. Since joining Bell Labs in 2000, Xiang has been primarily working on high-speed optical communication

Camellia

16:00–18:00
AS4H • SC 2 - III-V Semiconductor lasers
Presider: Gong-Ru Lin; National Taiwan Univ., Taiwan

AS4H.1 • 16:00 Invited
Wavelength Switchable Semiconductor Lasers, Jian-Jun He[1]; [1]*Zhejiang Univ., China.* The principle, design and experimental results of wavelength switchable semiconductor lasers based on half-wave-coupled cavities are presented. With easy-to-fabricate simple structures, single-electrode controlled fast switching over a wide tuning range is demonstrated with high SMSR.

AS4H.2 • 16:30
Direct Modulation of Deep-Submicron Slotted Single Mode FP Laser, Danfeng Fan[1], Lei Wang[1], Tingting Yu[1], Li Zou[1], Jian-Jun He[1]; [1]*Department of Optical Engineering, Zhejiang Univ., China.* By utilizing chirp managed laser (CML) technology to improve the direct modulation performance of deep-submicron slotted single mode FP laser, a dispersion penalty of only 0.4 dB after 100 km SSMF is achieved. The back-to-back penalty is only 1.8 dB compared to a zero chirp LiNbO3 MZ transmitter.

AS4H.3 • 16:45
Q-modulated distributed feedback laser with 28GHz 3dB bandwidth, Li H. Zhu[1], Lei Wang[1], Jian-Jun He[1]; [1]*Department of Optical Engineering, Zhejiang Univ., China.* We report the first experimental result on Q-modulated distributed feedback laser. A 28GHz 3dB bandwidth is achieved with a 25μm rear reflector.

Orchid

AS4A.3 • 17:00
Formulation of MUX/DEMUX Functions for Multiple Input-Output Port Cyclic AWG, Kiyo Ishii[1,2], Hiroshi Hasegawa[2], Ken-ichi Sato[2]; *[1]Network Photonics Research Center, National Institute of Advanced Industrial Science and Technology, Japan; [2]Electrical Engineering and Computer Science, Nagoya Univ., Japan.* We develop a mathematical formulation of the wavelength routing function of a cyclic AWG that has multiple input and output ports. The target routing device offers colorless MUX/DEMUX function between wavelength and wavelength group layers.

AS4A.4 • 17:15
Enhanced Fat Tree- An Optical/Electrical Hybrid Interconnection for Data Center, Xiaoshan Yu[1], Huaxi Gu[1], Kun Wang[2], Gang Wu[1]; *[1]State Key Laboratory of Integrated Service Networks, Xidian Univ., China; [2]School of computer science, Xidian Univ., China.* An optical/electrical hybrid interconnection termed enhanced fat tree with an improved optical circuit switching strategy and multi-wavelength router is proposed. It solves the inefficient flow-based routing in fat tree and achieves considerable performance.

AS4A.5 • 17:30
Global Load Balancing Algorithm based on Cross Stratum Optimization in Dynamic Optical Networks, Yu Yang[1], Jie Zhang[1], Yongli Zhao[1], Hui Yang[1], Shouyu Wang[1], Wanyi Gu[1], Yi Lin[2], Yong Lee[2]; *[1]State Key Laboratory of Information Photonics and Optical Communications, Beijing Univ. of Posts and Telecomm, China; [2]Advanced Technology Division,Huawei Technologies, China.* We propose a novel global load balancing algorithm based on the Cross Stratum Optimization architecture to realize the joint optimization of application resource and network resource on Optical as a Service (OaaS) testbed.

Hydrangea

AS4B.2 • 17:00
Ultracompact Channel Drop Filters Based on Waveguide Cavities, Ping Yu[1], Ting Hu[1], Chen Qiu[1], Huiye Qiu[1], Ao Shen[1], Xiaoqing Jiang[1], Jiangyi Yang[1]; *[1]Department of Information Science and Electronics Engineering & Cyrus Tang Center for Sensor Materials and Applications, Zhejiang Univ., China.* We propose channel drop filters based on waveguide cavities. The proposed filters operate in Gires-Tournois-like resonator regime that includes a 100% reflecting rear mirror. Typical lengthes of the proposed filters are less than 15μm.

AS4B.3 • 17:15
Design and fabrication of low-refractive-index polymeric photonic crystal nanobeam structures, Ziming Meng[1,2], Yihua Hu[1], Zhiyuan Li[2]; *[1]School of Physics and Optoelectronic Engineering, Guangdong Univ. of Technology, China; [2]Laboratory of Optical Physics, Institute of Physics,Chinese Academy of Sciences, China.* The design of high-Q polymeric photonic crystal nanobeam microcavities is studied based on the three-dimensional finite-difference time-domain method.The fabrication of air-bridged nanobeam structures is presented using focused ion beam etching and wet chemical etching.

AS4B.4 • 17:30
Polymer Based Hybrid Integrated Coherent Receiver for Next Generation Optical Access Networks, Abongwa Theurer[1], Richard Seidel[1], Reinhold Ziegler[1], Crispin Zawadzki[2], Ziyang Zhang[2], Norbert Keil[2], Andreas Matiss[1], Andreas G. Steffan[1]; *[1]u2t Photonics AG, Germany; [2]Institute for Telecommunications, Heinrich Hertz Institute, Germany.* A hybrid integrated coherent dual polarization receiver based on polymer planar lightwave circuit is presented. The chip comprises polarization beam splitter, multimode interference couplers and photodiodes. Responsivity of 0.03A/W and bandwidth of 23GHz were achieved.

Chrysanthemum

AS4C.4 • 17:00 Invited
Nonlinearity equalization technology in digital coherent receiver, Tsuyoshi Yoshida[1]; *[1]Mitsubishi Electric Corporation, Japan.* Combining equalization technologies is key to mitigating the effects of a range of fiber nonlinearities. Digital back-propagation is effective in reducing the channel memory, and maximum-likelihood detection mitigates any residual inter-symbol interference.

AS4C.5 • 17:30
Stabilization of 40 Gbit/s Optical DQPSK Receiver, Takuya Chikamoto[1], Masaki Nishioka[1], Tatsuya Shimizu[1], Hiroyuki Toda[1], Koji Inafune[2], Masatoshi Kagawa[2], Hitoshi Murai[2]; *[1]Doshisha Univ., Japan; [2]Oki Electric Industry Co., Ltd., Japan.* We demonstrate a stabilization of 40 Gbit/s optical DQPSK receiver using a wavelength tunable CW laser. The BER of the received data was successfully stabilized.

Begonia

AS4D.4 • 17:00
Integrated-Layer Routing and Resources Assignment Optimization in Mixed-Line-Rate IP over OTN Networks, Shan Yin[1], Shanguo Huang[1], Xin Li[1], Jie Zhang[1], Min Zhang[1], Wanyi Gu[1]; *[1]State Key Laboratory of Information Photonics and Optical Communications, Beijing Univ. of Posts and Telecomm, China.* This paper proposes an ILP model for integrated layer routing and resources assignment in MLR IP over OTN networks. The model solution obtains 23% cost reduction compared with the separate layer one through simulation experiments.

AS4D.5 • 17:15
A Pattern-layered Routing and Spectrum Allocation in OFDM-based Flexible Optical Networks, Xin Chen[1], Bingli Guo[1], Songwei Ma[1], Yan Wang[1], Juhao Li[1], Zhangyuan Chen[1], Yongqi He[1]; *[1]Peking Univ., China.* We introduced a pattern-layered framework to investigate the routing and spectrum allocation in flexible optical network. A novel fragment-aware RSA algorithm is proposed and simulation results show that it outperforms previous studies.

AS4D.6 • 17:30
A Collision-aware Spectrum Allocation Scheme in Flexible Optical Networks, Yan Wang[1], Bingli Guo[1], Songwei Ma[1], Xin Chen[1], Juhao Li[1], Zhangyuan Chen[1], Yongqi He[1]; *[1]Peking Univ., China.* We propose a novel collision-aware spectrum allocation scheme to avoid backward collision of spectrum reservation in flexible optical networks. This scheme achieves lower total blocking probability through effectively reducing backward blocking probability.

Hibiscus

AS4E.4 • 17:00
Plasmonic Sensors Based on Rayleigh Anomaly, Yanxia Cui[1,2], Guohui Li[1,2], Kin Hung Fung[4], Yuying Hao[1,2], Sailing He[3], Nicholas X. Fang[4]; [1]*Colledge of Physics and Optoelectronics, Taiyuan Univ. of Technology, China;* [2]*Key Laboratory of Advanced Transducers and Intelligent Control System (Ministry of Education), Taiyuan Univ. of Technology, China;* [3]*Centre for Optical and Electromagnetic Research, State Key Laboratory of Modern Optical Instrumentation, JORCEP (KTH-ZJU Joint Center of Photonics), Zhejiang Univ., China;* [4]*Department of Mechanical, Massachusetts Institute of Technology, USA*. Plasmonic sensors composed of metallic periodic grooves can excite very sharp and narrow reflection dip owing to Rayleigh anomaly and its figure of merit can be as high as 1100 when the sensitivity is 550 nm per refractive-index unit.

AS4E.5 • 17:15
Microfluidic surface plasmon resonance sensor array based on prism phase modulator (PPM), Gaoao Ye[1], Jun Qian[1], Hao Cheng[1], Sailing He[1]; [1]*Centre for Optical and Electromagnetic Research, Zhejiang Univ., China.* We propose a novel prism phase modulator (PPM) in a phase-sensitive surface plasmon resonance (SPR) sensing system. Experiment results show the detection limit of our PPM based microfluidic SPR sensor array is 9.11×10-7 RIU.

AS4E.6 • 17:30
Super-resolution Imaging By Fluorescence Emission Difference (FED) Microscopy, Shuai Li[1], Cuifang Kuang[1], Xiang Hao[1], Zhaotai Gu[1], Xu Liu[1]; [1]*Zhejiang Univ., China.* We have proposed a novel microscopy method based on the intensity difference of two differently acquired images. A resolving ability of λ/4 which is beyond the diffraction limit has been demonstrated by the experimental results.

Marigold

JS4F.4 • 17:15 Invited
Design of Efficient OLEDs, K.M. Fung, S. Y. Ching and K.W. Cheah; *Institute for Advanced Materials and Department of Physics, Hong Kong Baptist University, Kowloon Tong, Hong Kong.* The performance OLED can be enhanced by judicious design using novel materials. The doping of Cs2CO3 in electron injection material is one of the commonly adopted methods. We investigated its chemical status when it is doped into electron transport materials. We also investigated doped metals as transparent electrode, characterizing their electrical and optical properties.

Dahlia

technologies including advanced modulation formats, coherent detection schemes, and fiber nonlinear impairment mitigation. Recently he was recognized as a core member of the "100Gb/s Coherent (Long Haul – High Capacity WDM Interface) Team" that was awarded the 2010 Bell Labs President's Award.

Dr. Liu has authored/coauthored more than 230 journal and conference papers, with over 1,600 citations and an H-index of over 23. He holds over 45 US patents. Dr. Liu is a Fellow of the OSA and an Associated Editor of Optics Express. He has served or is serving in the technical committees of various conferences such as OFC, ACP, FiO, and OSA and IEEE Summer Topical Meetings.

AS4G.3 • 17:30
A time-domain channel estimation algorithm for CO-OFDM, Xi Fang[1], Chuanchuan Yang[1], Fan Zhang[1]; [1]*Peking Univ., China.* We propose to use an efficient time-domain channel estimation algorithm for CO-OFDM system, which improves the accuracy of channel estimation by maximum-likelihood algorithm and promotes the system robustness against transmission impairments.

Camellia

AS4H.4 • 17:00
GaAs Based Gratingless Wavelength Tunable Semiconductor Laser, Wenxiong Wei[1], Lei Wang[1], Jian-Jun He[1]; [1]*State Key Laboratory of Modern Optical Instrumentation, Centre for Integrated Optoelectronics, Department of Optical Engineering Zhejiang Univ., China.* we report a wavelength switchable laser based on GaAs without grating and epitaxial regrowth. Single-electrode controlled wavelength switching over 30 channels,0.4nm channel spacing, is achieved, with a SMSR around 30dB and center wavelength 877nm.

AS4H.5 • 17:15
High Power 808 nm Bragg Reflection Waveguide Lasers with Ultralow Beam Divergence, Lijie Wang,[1,2] Cunzhu Tong,[1] Yugang Zeng,[1] Sicong Tian,[1] Enbo Xing,[1,2] Ye Yang,[1] Lijun Wang[1]; [1]*State Key laboratory of Luminescence and Application, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China;* [2]*Graduate School of the Chinese Academy of Sciences, China.* Bragg reflection waveguide diode lasers emitting at 808 nm have demonstrated narrow near-circular shaped spot emission. The low vertical beam divergence of 8.3° and power of 1.75 W were achieved.

AS4H.6 • 17:30
Experimental Demonstration of Subnano-Second Wavelength Switching in V-Coupled-Cavity Semiconductor Laser, Shanli Guo[1], Jianjun Meng[1], Lei Wang[1], Li Zou[1], Li H. Zhu[1], Jian-Jun He[1]; [1]*Department of Optical Engineering, Zhejiang Univ., China.* The tuning characteristics based on both free carrier dispersion and thermal effect induced by the tuning current of a V-coupled-cavity laser are investigated. Sub-naosecond and tens of microseconds wavelength switching time between two neighboring channels are measured, respectively.

Orchid

Hydrangea

AS4B.5 • 17:45
Polarization-Independent Variable Optical Attenuator Employing Dye-Doped (Polymer/Liquid-Crystal) Composite Film for 1.5-μm Optical Fiber Communication, Seiji Fukushima[1], Koki Yoshinaga[1], Tomohiro Hachino[1], Yasutaka Igarashi[1], Shinji Noguchi[2], Hiroki Higuchi[2], Hirotsugu Kikuchi[2]; *[1]Kagoshima Univ., Japan; [2]Kyushu Univ., Japan.* Polarization-independent optical attenuation at 1.5 μm was demonstrated by using a dichroic dye-doped (polymer/liquid-crystal) composite film. The maximum attenuation of 17.1 dB was obtained when an aperture structure was introduced to block scattered light.

Chrysanthemum

AS4C.6 • 17:45
Long Term Monitoring of Chromatic Dispersion Fluctuations in a Buried Fiber Cable in a Tropical Climate, Kok H. Fong[1]; *[1]Telekom Research & Development Sdn Bhd, Malaysia.* We investigate chromatic dispersion fluctuations of 120 km of deployed fibers by long term monitoring and theoretical analysis. We discussed the implications to the deployment of high speed transmission systems in tropical climates.

Begonia

NOTES

Hibiscus

AS4E.7 • 17:45

Gas Monitoring in Human Body Cavities Using Non-Intrusive Diode Laser Absorption Spectroscopy, Gabriel Somesfalean[1,5], Patrik Lundin[1,2], Emilie Krite Svanberg[3,4], Mahmood Soltanolkotabi[1], Lorenzo Cocola[1], Märta Lewander[6], Stefan Andersson-Engels[1,2], John Jahr[3], Vineta Fellman[7], Katarina Svanberg[8,9], Svanberg Sune[1,9]; *[1]Department of Physics, Lund Univ., Sweden; [2]Joint Research Center of Photonics between the Royal Institute of Technology, Zhejiang Univ. and Lund Univ., Zhejiang Univ., China; [3]Department of Anaestesiology and Intensive Care Medicine, Lund Univ., Sweden; [4]Department of Anaestesiology and Intensive Care Medicine, Lund Univ., Sweden; [5]Centre for Optical and Electromagnetic Research, Zhejiang Univ., China; [6]Gasporox AB, Sweden; [7]Department of Pediatrics, Lund Univ., Sweden;[8]Department of Oncology, Lund Univ., Sweden; [9]Centre for Optical and Electromagnetic Research, South China Normal Univ., China.* Diode laser absorption spectroscopy was utilized for non-intrusive assessment of gas content in human body cavities, including intestines and lungs of a new-born, the mastoid bone, and sinus cavities for monitoring sinusitis recovery in adults.

Marigold

Dahlia

AS4G.4 • 17:45

Multi-channel equalization of OFDM signal, Tao Zeng[1], Qi Yang[1], Xiao Xiao[1], Cai Li[1], Zhu Yang[1], Shaohua Yu[1]; *[1]Wuhan Research Inst of Post & Telecom, China.* We propose a new multi-channel equalization method to figure out the data symbol carried by different OFDM subcarrier, which breaks the limitation of ADC sampling rate and bandwidth.

Camellia

AS4H.7 • 17:45

Analysis of Metal confined AlGaInAs/InP Microdisk lasers Laterally Coupled to Two Waveguides, Ling-xiu Zou[1], Jian-Dong Lin[1], Xiao-Meng Lv[1], Heng LOng[1], Qi-Feng Yao[1], Yong-Zhen Huang[1], Yun Du[1]; *[1]Institute of Microelectronics of CAS, China.* AlGaInAs/InP microdisk lasers laterally coupled to two waveguides are fabricated and tested. An extinction ratio exceeding 20 dB is observed when external optical source is injected. The transmission spectra of the device are also analyzed.

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Key to Authors and Presiders

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