PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 9288

, "Front Matter: Volume 9288," Proc. SPIE 9288, Photonics North 2014, 928801 (25 September 2014); doi: 10.1117/12.2086140

SPIE.

Event: Photonics North 2014, 2014, Montréal, Canada

PROCEEDINGS OF SPIE

Photonics North 2014

Steve MacLean
David V. Plant
Editors

28–30 May 2014
Montréal, Canada

Organized by
Centre d'optique, photonique et laser, Université Laval (Canada)
CPIC—Canadian Photonics Industry Consortium (Canada)
INO—Institut National d'Optique (Canada)
Quebec Photonic Network (Canada)

Sponsored by
Sytacom (Canada)
Agilent Technologies (Canada)
CPIC—Canadian Photonics Industry Consortium (Canada)

Published by
SPIE

Volume 9288

Proceedings of SPIE 0277-786X, V. 9288

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Photonics North 2014, edited by Steve MacLean, David V. Plant, Proc. of SPIE Vol. 9288, 928801
© 2014 SPIE · CCC code: 0277-786X/14/\$18 · doi: 10.1117/12.2086140

Proc. of SPIE Vol. 9288 928801-1

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Photonics North 2014*, edited by Steve MacLean, David V. Plant, Proceedings of SPIE Vol. 9288 (SPIE, Bellingham, WA, 2014) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628413632

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2014, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/14/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID Number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID Number.

Contents

vii	<i>Authors</i>
ix	<i>Conference Committee</i>
xi	<i>Introduction</i>

HIGH POWER LASER TECHNOLOGY, ULTRAFAST OPTICS, AND APPLICATIONS

9288 02	A simple technique for accurate characterization of thermal lens in solid state lasers [9288-33]
---------	--

NONLINEAR OPTICS, NANOPHOTONICS, AND QUANTUM OPTICS

9288 03	The effect of laser energy on V₂O₅ thin film growth prepared by laser assisted molecular beam deposition [9288-8]
---------	--

OPTICAL COMMUNICATIONS

9288 05	An analytical XPM model for dispersion-managed fiber optic systems [9288-21]
9288 06	An efficient scheme of split-step Fourier method for fiber optic communication systems [9288-22]
9288 07	Flexible grid spacing using Nyquist-shaped channels for undersea transmission [9288-25]
9288 08	Performance evaluation of modulation format independent carrier phase estimation and decision directed carrier phase estimation for fiber non-linearity mitigation [9288-27]
9288 09	Investigation of a hybrid optical-electronic switch supporting different service classes [9288-38]
9288 0A	Impact of hot temperature on end-face geometry of LC/UPC connectors [9288-39]
9288 0B	Comparisons of LMS equalizers for PMD mitigation in polarization-multiplexed coherent fiber optic systems [9288-40]
9288 0C	Long haul and high speed network using dual polarization two-band OFDM CS-NRZ-(D)QPSK signal [9288-46]
9288 0D	Analysis of optical back propagation under non-ideal optical phase conjugation and amplifier noise [9288-53]

OPTOELECTRONICS AND INTEGRATED OPTICS

- 9288 OE **Analysis of the large and small signal direct current modulation response up to 60GHz of metal-clad nano-lasers** [9288-10]
- 9288 OF **Growth control of Ga(As)Sb quantum dots (QD) on GaAs with reflectance anisotropy spectroscopy (RAS)** [9288-12]
- 9288 OG **Challenge of inhomogeneous waveguides analysis** [9288-15]
- 9288 OH **Simulation of a metal nano-strip grating distributed Bragg reflector (DBR) Laser** [9288-49]

PHOTONIC COMMERCIALIZATION

- 9288 OI **Optical response of large-area aluminum-coated nano-bucket arrays on flexible PET substrates** [9288-1]
- 9288 OJ **Wide band fiber Bragg grating accelerometer for rotating AC machinery condition monitoring** [9288-17]

PHOTONIC MATERIALS

- 9288 OK **Band gap dependence upon thickness of chalcogenide Ge-As-S thin films** [9288-34]
- 9288 OL **Photoinduced GRIN lens formation in chalcogenide Ge-As-S thin films** [9288-36]
- 9288 OM **Chemical vapor deposition of anisotropic ultrathin gold films on optical fibers: real-time sensing by tilted fiber Bragg gratings and use of a dielectric pre-coating** [9288-37]
- 9288 ON **Study of photo isomerization and photoinduced anisotropy of a mesogenic azobenzene dye mixture in various solid and liquid matrices** [9288-45]
- 9288 OO **High performance platforms for integrated nonlinear optics** [9288-58]

PHOTONIC SENSORS AND BIOMEDICAL OPTICS

- 9288 OP **Ex-vivo multi-modal microscopy of healthy skin** [9288-2]
- 9288 OQ **Photoacoustic imaging of an inflammatory lesion model in the neonatal rat brain** [9288-3]
- 9288 OR **MRI-guided fiber-based fluorescence molecular tomography for preclinical atherosclerosis imaging** [9288-6]
- 9288 OS **An improved method of measuring heart rate using a webcam** [9288-7]
- 9288 OT **Femtosecond laser induced fiber Bragg gratings for harsh environment sensing applications** [9288-13]

- 9288 0U **Silicon photonics characterization platform for gyroscopic devices** [9288-28]
- 9288 0V **Design and finite element modeling of a novel optical microsystems-based tactile sensor for minimal invasive robotic surgery** [9288-29]
- 9288 0W **Strategies for leukemic biomarker detection using long-range surface plasmon-polaritons** [9288-43]
- 9288 0X **Near-infrared spectroscopy of image clarity perception in the human brain** [9288-44]
- 9288 0Y **Resonance structure of quantum-dot-coated microspheres for microfluidic sensing** [9288-47]
- 9288 0Z **Plasmonic properties of suspended nanodisc structures for enhancement of the electric field distributions** [9288-54]
- 9288 10 **Analysis of mode transitions in a long-period fiber grating with a nano-overlay of diamond-like carbon** [9288-55]

PHOTONIC THEORY, DESIGN, AND SIMULATIONS

- 9288 11 **Analysis of Yb³⁺/Er³⁺-codoped microring resonator cross-grid matrices** [9288-16]
- 9288 12 **Theoretical sensitivity analysis of quadruple Vernier racetrack resonators designed for fabrication on the silicon-on-insulator platform** [9288-18]
- 9288 13 **Roles of high order bending modes in optical wave coupling** [9288-23]
- 9288 14 **Spoof plasmons in real metals with an arbitrary shape of perforation** [9288-24]
- 9288 15 **A novel silicon nitride slot waveguide** [9288-32]
- 9288 16 **Investigation of mode partition noise in Fabry-Perot laser diode** [9288-48]
- 9288 17 **Advances in silicon photonics segmented electrode Mach-Zehnder modulators and peaking enhanced resonant devices** [9288-56]
- 9288 18 **Accelerated simulation of optical coherence tomography of objects with arbitrary spatial distributions** [9288-59]

PLASMONICS, HYBRID PLASMONICS, AND ARTIFICIAL MEDIA

- 9288 19 **Surface plasmon enhanced optoelectronics** [9288-57]
- 9288 1A **Effect of symmetry breaking and substrate on the optical properties of silver sphere-like nanoparticles in different surrounding media** [9288-62]

Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Abdel Samad, B., 03	Hohertz, Donna, 0I
Abumazwed, A., 0Z	Huang, Wei-Ping, 13, 16
Albert, Jacques, 0M	Jaeger, Nicolas A. F., 0U, 12
Almarghalani, Maan, 0U	Joreess, Howie, 0M
Alsawafra, Mohammed, 1A	Kavanagh, Karen L., 0I
Ashrit, P. V., 03	Kirk, A. G., 0Z
Barry, Seán T., 0M	Koba, M., 10
Bellec, Pierre, 0Q	Krupin, O., 0W
Berini, Pierre, 0W, 19	Kumar, Shiva, 05, 06, 0B
Berti, Romain, 0Q	Kung, Peter, 0J
Bock, Wojtek J., 10	Landrock, Clint, 0I
Boeck, Robert, 12	Lepers, Catherine, 0C
Brabant, D., 10	Lesage, Frédéric, 0P, 0Q, 0R
Cada, M., 0G, 14	Li, Baoqiang, 0R
Castonguay, Alexandre, 0P	Li, J., 07
Caverley, Michael, 0U	Li, Xun, 13, 16
Chaichok, Wasan, 0A	Liang, Haibo, 13, 15
Chen, Lawrence R., 0D	Liang, Xiaojun, 05, 06, 0B
Chrostowski, Lukas, 0U, 12	Lima, Ivan T., 18
Chuo, Yindar, 0I	Liu, Yi, 0S
Comanici, Maria I., 0J	Lodygensky, G. A., 0Q
Cretu, Edmond, 0U	Loeber, Thomas H., 0F
Deng, Lanxin, 0H, 15, 16	Londono, Irène, 0Q
Ding, H., 0T	Lourdiane, Mounia, 09, 0C
Ding, Qiudi, 0B	Lu, P., 0T
Djurovic, Sinisa, 0J	Lugo, J. E., 0X
Doti, Rafael, 0X	Major, A., 02
Eldio, M., 0G	Malektaji, Siavash, 18
Escobar I., Mauricio R., 18	Mandia, David J., 0M
Faubert, Jocelyn, 0X	Manjooran, S., 02
Fazel, Sina, 0C	Mehta, P., 07
Fouckhardt, Henning, 0F	Meldrum, A., 0Y
Gălătuș, Ramona, 11	Merget, F., 17
Galstian, T., 0K, 0L, 0N	Mihailov, S. J., 0T
Gaudette, J., 07	Minasyan, A., 0N
Ghanbari Mardasi, Amir, 0V	Mirzaeian, H., 02
Ghanbari, Mahmood, 0V	Morandotti, Roberto, 0O
Giorgi, Javier B., 0M	Moss, David J., 0O
González, Francisco Javier, 0P	Mu, Jianwei, 0H, 13, 15, 16
Gordon, Peter, 0M	Müller, J., 17
Gric, T., 0G, 14	Omrane, Badr, 0I
Grobic, D., 0T	Ouyang, Jianfei, 0S
Guevara, Edgar, 0P, 0Q	Pakala, Lalitha, 08
Guillén-Torres, Miguel Ángel, 0U	Palanjan, K., 0K, 0L
Guo, Qingyi, 0H, 15, 16	Pouliot, Philippe, 0R
Gutiérrez-Hernández, José Manuel, 0P	Rezagholipour Dizaji, Mohammad, 0D
Habak, C., 0X	Richter, Johannes, 0F

Romero-García, S., 17
 Salmani Tehrani, Mehdi, 0V
 Samoud, Wiem, 09
 Sarraf, Elie H., 0U
 Sattar, Z. A., 0E
 Scepanovic, S., 0J
 Schmauss, Bernhard, 08
 Shao, Jing, 06
 Sharif Azadeh, S., 17
 Shen, B., 17
 Sherif, Sherif S., 18
 Shore, K. Alan, 0E
 Smietana, Mateusz, 10
 Smith, Alexander C., 0J
 Strassner, Johannes H., 0F
 Thongdaeng, Rutsuda, 0A
 Tork, A., 0N
 Truong, Vo-Van, 1A
 Tshilo, Kavul, 0J
 Vallée, R., 0K, 0L
 Vallés, Juan A., 11
 Vilchis-Rodriguez, Damian S., 0J
 Wahbeh, Mamoun, 1A
 Walker, R. B., 0T
 Wang, C., 0W
 Wang, Guanhui, 0D
 Wangsan, Sathit, 0A
 Ward, Matthew J., 0M
 Ware, Cédric, 09
 Wartak, M. S., 14
 Witzens, J., 17
 Worasucheep, Duangrudee, 0A
 Xie, Ningshi, 0Q
 Yan, Yonggang, 0S
 Zhi, Y., 0Y
 Zhou, Wenjun, 0M

Conference Committee

Conference Chairs

Steve MacLean, INRS-EMT (Canada)
David V. Plant, McGill University and SYTACom (Canada)

Vice Chairman

George A. Lampropoulos, A.U.G. Signals (Canada)

Technical Program Chairs

Roberto Morandotti, INRS (Canada)
Stewart Aitchison, University of Toronto (Canada)

Session Chairs

- 1 Green Photonics, Energy, and Related Technologies
Winnie Ye, Carleton University (Canada)
- 2 High Power Laser Technology, Ultrafast Optics, and Applications
Donna Strickland, Waterloo University (Canada)
- 3 Nonlinear Optics, Nanophotonics, and Quantum Optics
Luca Razzari, INRS-EMT (Canada)
- 4 Optical Communications
Raman Kashyap, École Polytechnique de Montréal (Canada)
- 5 Optoelectronics and Integrated Optics
Amr Helmy, University of Toronto (Canada)
- 6 Photonic Commercialization
Peter Kung, QPS (Canada)
- 7 Photonics Materials
Peter Hermann, University of Toronto (Canada)
- 8 Photonic Sensors and Biomedical Optics
Al Meldrum, University of Alberta (Canada)

- 9 Photonics Theory, Design, and Simulation
 Pavel Cheben, National Research Council Canada (Canada)
- 10 Plasmonic, Hybrid Plasmonics, and Artificial Media
 Mo Mojahedi, University of Toronto (Canada)

Introduction

Photonics technologies have become pervasive and contribute to many different sectors including communications, sensing, displays, and lighting. It is in this context that Montreal welcomes the Canadian and International Photonics communities to its annual premier event: Photonics North 2014.

Researchers will share their latest results and innovations. The programming includes a collection of plenary, invited, and contributed talks as well as a commercial exhibit will allow several Canadian and foreign suppliers of photonic technology and instrumentation to showcase their products.

On behalf of the entire Program Committee, we welcome you to Photonics North.

David V. Plant

On behalf of the organizing committee for Photonics North 2014 I would like to welcome you to the "Palais des Congrès" in Montreal for the 17th annual Photonics North Conference. We have an exciting conference covering topics ranging from the fundamental interaction of photons with matter to practical sensors for a variety of useful applications.

Sessions this year include: Optical Communications; Optoelectronics and Integrated Optics; Photonics Materials; Nonlinear Optics, Nanophotonics and Quantum Optics; Photonic Sensors and Biomedical Optics; Photonic Commercialization; Photonic Theory, Design, and Simulation; Plasmonic, Hybrid Plasmonics, and Artificial Media; High Power Laser Technology, Ultrafast Optics, and Applications; and Green Photonics, Energy, and Related Technologies.

We are fortunate to have a large group of experts (including your colleagues and friends) coming together in a venue that is conducive to fostering new ideas and integrating innovative concepts across disciplines. The conference is committed to a high standard of excellence and we promise that you will agree that the bar has been raised again this year.

Enjoy Photonics North 2014!

Steve MacLean