

PROCEEDINGS OF SPIE

Optical Components and Materials XII

Shibin Jiang
Michel J. F. Digonnet
Editors

9–11 February 2015
San Francisco, California, United States

Sponsored and Published by
SPIE

Volume 9359

Proceedings of SPIE 0277-786X, V. 9359

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

Optical Components and Materials XII, edited by Shibin Jiang,
Michel J. F. Digonnet, Proc. of SPIE Vol. 9359, 935901 · © 2015
SPIE · CCC code: 0277-786X/15/\$18 · doi: 10.1117/12.2193227

Proc. of SPIE Vol. 9359 935901-1

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 *Optical Components and Materials XII*, edited by Shibin Jiang, Michel J. F. Digonnet, Proceedings of SPIE Vol. 9359 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628414493

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 © 2015, 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/15/\$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. Papers are published as they are submitted and meet publication criteria. A unique 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.

Contents

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

SESSION 1 OPTICAL NONLINEARITY BASED DEVICES

- 9359 02 **Two-dimensional semiconductors for ultrafast photonic applications (Invited Paper)**
[9359-1]
- 9359 03 **Widely tunable soliton self-frequency shift and dispersive wave generation in a highly nonlinear fiber** [9359-2]
- 9359 04 **Raman gain of SiC as a potential medium for Raman lasers** [9359-3]
- 9359 05 **Ultra-long fiber Raman lasers: design considerations** [9359-4]

SESSION 2 NANO MATERIALS AND DEVICES

- 9359 08 **Amorphous chalcogenide layers and nanocomposites for direct surface patterning**
[9359-7]
- 9359 0A **Optical properties of MgF₂ nano-composite films dispersed with noble metal nanoparticles synthesized by sol-gel method** [9359-9]

SESSION 3 OPTICAL FILTERS

- 9359 0D **Bending strength measurements at different materials used for IR-cut filters in mobile camera devices** [9359-12]
- 9359 0E **Acousto-optic tunable filter for imaging application with high performance in the IR region**
[9359-13]

SESSION 4 MICROSTRUCTURED AND NOVEL FIBERS

- 9359 0G **Linear and nonlinear optical properties of chalcogenide microstructured optical fibers (Invited Paper)** [9359-15]
- 9359 0H **Design and performance of multicore fiber optimized towards communications and sensing applications** [9359-16]
- 9359 0I **Opportunities for designing microstructured optical fibers for efficient femtosecond laser grating inscription** [9359-17]

9359 OJ **The role of highly non-linear index change mechanism during femtosecond grating writing in microstructured optical fibers [9359-18]**

SESSION 5 PLASMONIC DEVICES

9359 OL **Hybrid reflection type metasurface of nano-antennas designed for optical needle field generation [9359-20]**

9359 OP **Super-focusing using plasmonic lens based on super oscillation effect [9359-24]**

SESSION 6 FIBER BASED COMPONENTS

9359 OQ **Latest advances on fused fiber components for power scaling of fiber lasers (Invited Paper) [9359-25]**

9359 OS **High signal-to-noise ratio acoustic sensor using phase shifted gratings interrogated by the Pound-Drever-Hall technique [9359-27]**

9359 OT **Fiber Bragg grating based sensors in conventional double clad large mode area fibers [9359-28]**

SESSION 7 RARE-EARTH DOPED MATERIALS AND LASERS I

9359 OV **UV-visible luminescence properties of the broad-band Yb:CALGO laser crystal [9359-31]**

9359 OX **Down- and up-conversion emissions in Er-doped transparent fluorotellurite glass-ceramics (Invited Paper) [9359-33]**

SESSION 8 RARE-EARTH DOPED MATERIALS AND LASERS II

9359 10 **Rare-earth-ion-doped waveguide lasers on a silicon chip (Invited Paper) [9359-35]**

9359 12 **Comparison of photodarkening in 1030nm and 1070nm Yb-doped fibre lasers [9359-37]**

9359 13 **Upconversion against direct emission in Er³⁺-Tm³⁺-codoped tellurite-glass containing gold nanoparticles [9359-38]**

9359 14 **The REPUSIL process and the capability of fluorine doping for the adjustment of optical and thermochemical properties in silica materials [9359-39]**

SESSION 9 SUB-WAVELENGTH OPTICS

9359 15 **Polarization-independent light-dispersing device based on diffractive optics [9359-41]**

9359 16 **Optical performance of random anti-reflection structures on curved surfaces [9359-42]**

SESSION 10 DETECTOR, SWITCH AND MODULATOR

- 9359 1A **Through silicon via developments for silicon photomultiplier sensors** [9359-46]
- 9359 1B **Fully CMOS analog and digital SiPMs** [9359-47]
- 9359 1C **Ultra-low noise and exceptional uniformity of SensL C-series SiPM sensors** [9359-49]
- 9359 1D **Effect of multi-input injection locking on hysteresis width and switching time in SMFP-LDs for short pulse switch** [9359-50]
- 9359 1E **Monolithically integrated quantum dot optical gain modulator with semiconductor optical amplifier for 10-Gb/s photonic transmission** [9359-51]

POSTER SESSION

- 9359 1F **Development of a long-gauge vibration sensor** [9359-53]
- 9359 1I **Flattened supercontinuum generation in tellurite-phosphate and chalcogenide-tellurite hybrid microstructured optical fibers with tailored chromatic dispersion spectra** [9359-56]
- 9359 1J **Experimental research on the multi-order acousto-optic diffraction based on Raman-Nath diffraction** [9359-57]
- 9359 1K **Luminescence of (Mg,Zn)Al₂O₄:Tb mixed spinel thin films prepared by spin-coating** [9359-58]
- 9359 1L **Optical properties and size distribution of the nanocolloids made of rare-earth ion-doped NaYF₄** [9359-59]
- 9359 1N **Application of photo-doping phenomenon in amorphous chalcogenide GeS₂ film to optical device** [9359-61]
- 9359 1O **Optical and electronic properties of Si ion implantation of silver atoms** [9359-62]
- 9359 1P **Nonlinear electro-optic tuning of plasmonic nano-filter** [9359-63]
- 9359 1Q **Broad and ultra-flat optical parametric gain in tellurite hybrid microstructured optical fibers** [9359-64]
- 9359 1R **Requirements for gain/oscillation in Yb³⁺/Er³⁺-codoped microring resonators** [9359-65]
- 9359 1U **Optical properties of Pr³⁺-, Ce³⁺-, and Eu³⁺-doped ternary lead halides** [9359-68]
- 9359 1W **Nonlinear optical properties of single crystal cadmium magnesium telluride** [9359-70]
- 9359 1Y **Assessment of fiber optic sensors for aging monitoring of industrial liquid coolants** [9359-72]

- 9359 21 **Chalcogenide amorphous nanoparticles doped poly (methyl methacrylate) with high nonlinearity for optical waveguide** [9359-76]
- 9359 24 **Packaging of phosphor-converted white light-emitting diodes for solid state lighting** [9359-79]

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.

Adam, Jean-Luc, 0G
Aggarwal, I. D., 16
Akahane, Kouichi, 1E
Allen, Graham, 04
Amako, J., 15
Arai, Katsuya, 1N
Asano, Koji, 1I
Baghdasaryan, Tigran, 0I, 0J
Balda, R., 0X
Bartelt, H., 14
Bartschke, J., 0T
Beigang, R., 0T
Berghmans, Francis, 0I, 0J
Bergonzo, A., 0H
Bluiett, Althea, 1U
Bohdan, Roland, 08
Brilland, Laurent, 0G
Bronzi, Danilo, 1B
Brown, Ei E., 1U
Burunkova, Iulia, 08
Busse, L. E., 16
Caillaud, Celine, 0G
Chen, Ruitao, 1J
Cheng, Tonglei, 03, 1I, 1Q, 2I
Cheng, Wood-Hi, 24
Chernukha, Yevheniia, 1O
Chiasera, Alessandro, 12
Comanici, Maria I., 0S, 1F
Cooper, L. J., 0H
Csarnovics, Istvan, 08
Darwish, Abdalla M., 1L
Dawson, Jay W., 04
Dellith, J., 14
Deng, Dinghuan, 03, 1I, 1Q, 2I
Dietrich, Volker, 0D
Doualan, J. L., 0V
Duan, Zhongchao, 1I
Dubinskii, Mark, 04
El-Amraoui, M., 13
El Maklizi, Mahmoud, 0P
El Sachat, Alexandros, 1Y
Faustino, John, 0Q
Fernandez, J., 0X
Ferrari, Maurizio, 12
Frantz, J., 16
Fu, Kai-Jo, 24
Fujii, E., 15
G. Rivera, V. A., 13
Gälätuş, R., 1R
Gebavi, Hrvoje, 12
Geernaert, Thomas, 0I, 0J
Gillooly, A., 0H
Gonzalo, J., 0X
Grimm, St., 14
Gu, Huadong, 1J
Gu, Zetong, 1J
Guha, Shekhar, 1W
Hankey, J., 0H
Hartmann, Peter, 0D
Hendawy, Mostafa, 0P
Herbert, D., 1A, 1C
Hill, M., 0H
Hömmereich, Uwe, 1U
Ismail, Yehea, 1P
Jackson, C., 1A, 1C
Jaffres, A., 0V
Johnson, N. P., 0E
Joshi, R., 16
Kalide, A., 14
Kawanishi, Tetsuya, 1E
Kawashima, Hiroyasu, 1I
Kerz, Franca, 0D
Kokenyesi, Sandor, 08
Koltchanov, I., 05
Kotb, Rehab, 1P
Kroon, R. E., 1K
Kroushkov, D. I., 05
Kung, Peter, 0S, 1F
Langner, A., 14
Ledemi, Y., 13
Lee, Yu-Chun, 24
Leich, M., 14
Lewis, Ashley, 1L
Lewis, Danielle, 1L
L'huillier, J. A., 0T
Li, Qian, 1F
Liu, Lai, 2I
Loiseau, P., 0V
Lombardo, David, 1W
Major, K. J., 16
Marega, E., Jr., 13
Markos, Christos, 1Y
Maton, P., 0H
Matsumoto, Morio, 1I
McGarvey, B., 1A, 1C
Mechin, David, 0G, 12
Meristoudi, Anastasia, 1Y
Merkle, Larry D., 04

Messaddeq, Y., 13
 Miguel, A., 0X
 Molnar, Sandor, 08
 Moncorgé, R., 0V
 Morea, R., 0X
 Murakami, Yoshihisa, 1N
 Nagasaka, Kenshiro, 21
 Nakarmi, Bikash, 1D
 Nieborowsky, A., 0T
 Ohishi, Yasutake, 03, 1I, 1Q, 21
 O'Neill, K., 1A, 1C
 Pannell, C., 0E
 Papadopoulos, Aggelos, 1Y
 Patel, Darayas N., 1L
 Pollnau, Markus, 10
 Poutous, M. K., 16
 Read, T., 0H
 Renversez, Gilles, 0G
 Richter, A., 05
 Riziotis, Christos, 1Y
 Robin, Thierry, 12
 Samuel, Edmund, 1Q
 Sanghera, J. S., 16
 Sarkisov, Sergey, 1L
 Schötz, G., 14
 Schuster, K., 14
 Schwuchow, A., 14
 Shao, Zhongxing, 1J
 Sharma, S. K., 0V
 Shibuya, Takehisa, 0A, 1N
 Shintaku, Toshihiro, 1N
 Silva, O. B., 13
 Slagle, Jonathan E., 1W
 Soujima, Nobuaki, 0A
 Stashchuk, Vasyl S., 1O
 Suzuki, Takenobu, 03, 1I, 1Q, 21
 Swart, H. C., 1K
 Swillam, Mohamed A., 0P, 1P
 Tabaza, W. A. I., 1K
 Taccheo, Stefano, 12
 Taylor, C. D., 16
 Tezuka, Hiroshige, 1I
 Thienpont, Hugo, 0I, 0J
 Tisa, Simone, 1B
 Tong, Hoang Tuan, 03, 1I, 1Q
 Tosi, Alberto, 1B
 Trivedi, Sudhir B., 1U, 1W
 Troles, Johann, 0G
 Tsai, Chun-Chin, 24
 Umezawa, Toshimasa, 1E
 Unger, S., 14
 Valentine, Maucus, 1L
 Valentine, Rueben, 1L
 Valle, S., 0E
 Vallés, Juan A., 1R
 Velanas, Pantelis, 1Y
 Viana, B., 0V
 Villa, Federica, 1B
 Wakaki, Moriaki, 0A, 1N
 Wall, L., 1A, 1C
 Wang, B. S., 0Q
 Wang, Jun, 02
 Wang, Shiyi, 0L
 Ward, J., 0E
 Webb, A. S., 0H
 Weigand, B., 0T
 Wesley, Dennis, 1L
 Won, Y. H., 1D
 Wright, Donald M., III, 1L
 Xue, Xiaojie, 03, 1I, 1Q, 21
 Yamamoto, Naakatsu, 1E
 Yang, Jie, 1J
 Yue, Cheng-Feng, 24
 Zappa, Franco, 1B
 Zhan, Qiwen, 0L
 Zhang, Jun, 04
 Zhang, Lei, 21
 Zhang, Yiwei, 1F
 Zheng, Chenqi, 1J
 Zou, Yu, 1B

Conference Committee

Symposium Chairs

David L. Andrews, University of East Anglia (United Kingdom)
Alexei L. Glebov, OptiGrate Corporation (United States)

Symposium Co-chairs

Jean-Emmanuel Broquin, IMEP-LAHC (France)
Shibin Jiang, AdValue Photonics, Inc. (United States)

Program Track Chair

James G. Grote, Air Force Research Laboratory (United States)

Conference Chairs

Shibin Jiang, AdValue Photonics, Inc. (United States)
Michel J. F. Digonnet, Stanford University (United States)

Conference Program Committee

Jean-Luc Adam, Université de Rennes 1 (France)
Joel Bagwell, Edmund Optics Inc. (United States)
Rolindes Balda, Universidad del País Vasco (Spain)
Robert P. Dahlgren, NASA Ames Research Center (United States) and
Silicon Valley Photonics (United States)
Leonid B. Glebov, CREOL, The College of Optics and Photonics,
University of Central Florida (United States)
Seppo K. Honkanen, University of Eastern Finland (Finland)
Jacques Lucas, Université de Rennes 1 (France)
Yasutake Ohishi, Toyota Technological Institute (Japan)
Aydogan Ozcan, University of California, Los Angeles (United States)
Giancarlo C. Righini, Museo Storico della Fisica e Centro Studi e
Ricerche Enrico Fermi (Italy)
Setsumisa Tanabe, Kyoto University (Japan)
John M. Zavada, National Science Foundation (United States)

Session Chairs

- 1 Optical Nonlinearity Based Devices
Jacques Lucas, Université de Rennes 1 (France)

- 2 Nano Materials and Devices
Michel J. F. Digonnet, Stanford University (United States)
- 3 Optical Filters
Giancarlo C. Righini, Museo Storico della Fisica e Centro Studi e Ricerche Enrico Fermi (Italy)
- 4 Microstructured and Novel Fibers
Rolindes Balda, Universidad del País Vasco (Spain)
- 5 Plasmonic Devices
Seppo K. Honkanen, University of Eastern Finland (Finland)
- 6 Fiber Based Components
Leonid B. Glebov, CREOL, The College of Optics and Photonics, University of Central Florida (United States)
- 7 Rare-Earth Doped Materials and Lasers I
Angel Flores, Air Force Research Laboratory (United States)
- 8 Rare-Earth Doped Materials and Lasers II
Stefano Taccheo, Swansea University (United Kingdom)
- 9 Sub-Wavelength Optics
Jun Wang, Shanghai Institute of Optics and Fine Mechanics (China)
- 10 Detector, Switch and Modulator
Joel Bagwell, Edmund Optics Inc. (United States)