

PROCEEDINGS OF SPIE

Nanoengineering: Fabrication, Properties, Optics, and Devices XI

Eva M. Campo
Elizabeth A. Dobisz
Louay A. Eldada
Editors

19–20 August 2014
San Diego, California, United States

Sponsored and Published by
SPIE

Volume 9170

Proceedings of SPIE 0277-786X, V. 9170

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

Nanoengineering: Fabrication, Properties, Optics, and Devices XI, edited by
Eva M. Campo, Elizabeth A. Dobisz, Louay A. Eldada, Proc. of SPIE Vol. 9170,
917001 · © 2014 SPIE · CCC code: 0277-786X/14/\$18 · doi: 10.1117/12.2081262

Proc. of SPIE Vol. 9170 917001-1

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 *Nanoengineering: Fabrication, Properties, Optics, and Devices XI*, edited by Eva M. Campo, Elizabeth A. Dobisz, Louay A. Eldada, Proceedings of SPIE Vol. 9170 (SPIE, Bellingham, WA, 2014) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628411973

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

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

SESSION 1 NANOPHOTONICS FOR ENERGY

9170 02	High-sensitivity silicon nanowire phototransistors (Invited Paper) [9170-1]
9170 03	Thermo-active polymer nanocomposites: a spectroscopic study [9170-2]
9170 06	Heterojunction of nano-poly (O-toluidine) on silicon nanowires is investigated as a candidate heterojunction diode [9170-5]
9170 08	Characteristic temperature analysis for PbSe/PbSrSe multiple quantum well structure [9170-7]

SESSION 2 NANOMECHANICAL NANOFLUIDIC DEVICES

9170 09	Mechanical behavior of microelectromechanical microshutters [9170-8]
9170 0B	Photothermal nanopositioners based on graphene nanocomposites [9170-10]
9170 0C	Progress towards a MEMS tunable infrared filter using porous silicon [9170-11]

SESSION 3 NANOSTRUCTURE PROPERTIES AND DEVICES

9170 0E	Tracking of the organic species during the synthesis of cobalt-based nanoparticles in non-aqueous solution (Invited Paper) [9170-13]
9170 0F	Optical characterization of CMOS compatible micro optics fabricated by mask-based and mask-less hybrid lithography [9170-14]
9170 0H	Polymer-carbon nanotube composites: electrospinning, alignment and interactions (Invited Paper) [9170-16]

SESSION 4 SUBWAVELENGTH STRUCTURES

9170 0L	Effects of different wetting layers on the growth of smooth ultra-thin silver thin films [9170-20]
9170 0M	Simulation of a film of random particulate medium containing aggregates of metal nanospheres [9170-22]

SESSION 5 NANOPHOTONIC DEVICES

9170 00 **High finesse silicon ring resonators for monolithic mode-locked lasers** [9170-24]

SESSION 6 NANOFABRICATION OF OPTICAL ELEMENTS

9170 0V **Nano fabrication of compound bifocal zone plate for x-ray optics** [9170-32]

9170 0X **Omnidirectional wavelength selective emitters/absorbers based on dielectric-filled anti-reflection coated two-dimensional metallic photonic crystals** [9170-34]

SESSION 7 INNOVATIVE PATTERNING

9170 0Z **Laser- assisted biosynthesis for noble nanoparticles production** [9170-36]

9170 10 **Nanoimprint fabrication of wiregrids micro-polarizers in near infrared spectra using SU-8 as an intermediate film** [9170-37]

SESSION 8 NANOPARTICLE PROPERTIES

9170 13 **Polarized light emission by deposition of aligned semiconductor nanorods** [9170-41]

9170 14 **Design of single-polarization single-mode photonic nanowire** [9170-42]

9170 15 **Generation of Cd_{1-x}Zn_xS nanoparticles by laser ablation in liquids** [9170-43]

9170 16 **Deep UV microsphere nanolithography to achieve sub-100 nm feature size** [9170-44]

POSTER SESSION

9170 18 **Fabrication of high aspect ratio silicon gratings by interference lithography and potassium hydroxide anisotropic etch technique** [9170-47]

9170 1C **Surface potential and field effect in structures with Ge-nanoclusters grown on Si(100) surface** [9170-51]

9170 1D **Comparison of triangular and squared ITO nano-grating of GaN LEDs** [9170-52]

9170 1F **Lightfast optical current in dielectric by plasmonically induced local field** [9170-54]

9170 1I **Formation of sub-wavelength pitch regular structures employing a motorized multiple exposure Lloyd's mirror holographic lithography setup** [9170-57]

9170 1J **Processing and characterization of monodisperse phosphine-free CdSe colloidal quantum dots** [9170-58]

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.

Akhlaghi-Bouzan, M., 0O
Alamgir, Faisal M., 0H
Aristov, V. V., 0V
Asgari, Sirous, 1J
Aubert, Tangi, 13
Bailli, A., 14
Banerjee, Saswatee, 0M
Behill, Ashli, 1D
Ben Salem, A., 14
Bi, Lali, 18
Bonakdar, Alireza, 16
Brown, Robert L., 16
Burns, Devin E., 09
Campo, Eva M., 03, 0H
Čelanović, Ivan, 0X
Cherif, R., 14
Chou, Jeffrey B., 0X
Dan, Yaping, 02
Davenport, Tatiana K. C., 1D
Delfyett, P. J., 0O
Edwards, Vernessa, 0Z
El-Zohary, Salah E., 06
Fischer, Daniel A., 03, 0H
Gomes, Raquel, 13
Haraguchi, M., 06
Hayenga, W. E., 0O
Hens, Zeger, 13
Hong, Yilin, 18
Hyrka, Yu. V., 1C
Ishikawa, T., 0V
Isoyan, A. A., 0V
Jafarli, R., 15
Jafarov, M. A., 15
Jang, Sung Jun, 16
Jaye, Chernob, 03, 0H
Jiang, Xiaolong, 18
Jin, Xiaomin, 1D
Joannopoulos, John D., 0X
Johnson, Lee, 0F
Jones, Justin S., 09
Jurkevičiūtė, Aušrine, 1I
Khajavikhan, M., 0O
Khodr, M., 08
Kim, Sang-Gook, 0X
Kim, Seungchul, 1F
Kondratenko, S. V., 1C
Kozak, Dmitry A., 0C
Koziej, D., 0E
Kukhtareva, Tatiana, 0Z
Kukhtareva, Nickolai, 0Z
Kumar, A., 14
Kuyumchyan, A. V., 0V
Kuyumchyan, N. A., 0V
Kwon, Ojoon, 1F
Larios, Eduardo, 03, 0H
Lee, Tae-Woo, 1F
Li, Mary J., 09
Loomis, James, 0B
Maghsoudi, Hadi, 1J
Mahboub, Melika, 1J
Milster, Tom, 0F
Mkrtchyan, V. P., 0V
Mohammadimasoudi, Mohammad, 13
Mohseni, Hooman, 16
Moses, Sherita, 0Z
Nasirov, E. F., 15
Neyts, Kristiaan, 13
Ni, Chuan, 0L
Niederberger, M., 0E
Okamoto, T., 06
Omastová, Mária, 03
Panchapakesan, Balaji, 0B
Penninck, Lieven, 13
Pruessner, Marcel, 0C
Qiu, Keqiang, 18
Rabinovich, William, 0C
Rezaei, Mohsen, 16
Rinnerbauer, Veronika, 0X
Saini, T. S., 14
Sarangan, Andrew M., 0L, 10
Shah, Piyush, 0L
Shen, Yichen, 0X
Shenashen, M. A., 06
Shulakov, E. V., 0V
Šimatonis, Linas, 1I
Sinha, R. K., 14
Soljačić, Marin, 0X
Staniuk, M., 0E
Stievater, Todd, 0C
Strubbe, Filip, 13
Summitt, Chris, 0F
Suvorov, A. Y., 0V
Takashima, Yuzuru, 0F
Tamulevičius, Sigitas, 1I
Tamulevičius, Tomas, 1I
Tan, Siew Li, 02
Tsuji, Akinori, 06
Virganavičius, Dainius, 1I

Wang, Junxin, 10
Wang, Qingbo, 18
Wang, Sunclin, 0F
Winter, A. Douglas, 03, 0H
Wu, Lixiang, 18
Yeng, Yi Xiang, 0X
Zaverton, Melissa, 0F
Zghal, M., 14
Zhao, Xingyan, 02
Zheng, Yanchang, 18

Conference Committee

Symposium Chairs

Satoshi Kawata, Osaka University (Japan)
Manijeh Razeghi, Northwestern University (United States)

Symposium Co-chairs

David L. Andrews, University of East Anglia Norwich (United Kingdom)
James G. Grote, Air Force Research Laboratory (United States)

Conference Chairs

Eva M. Campo, Bangor University (United Kingdom)
Elizabeth A. Dobisz, HGST (United States)
Louay A. Eldada, Quanergy, Inc. (United States)

Conference Program Committee

André-Jean Attias, Université Pierre et Marie Curie (France)
Irene Fernandez-Cuesta, Lawrence Berkeley National Laboratory
(United States)
Sarah Haigh, The University of Manchester (United Kingdom)
Sondra Hellstrom, California Institute of Technology (United States)
Ghassan E. Jabbour, Arizona State University (United States)
Robert Magnusson, The University of Texas at Arlington (United States)
Balaji U. Panchapakesan, University of Louisville (United States)
Won Park, University of Colorado at Boulder (United States)
Dorota A. Pawlak, Institute of Electronic Materials Technology
(Poland)
Jun Tanida, Osaka University (Japan)
Richard Tiberio, Stanford University (United States)
Chee Wei Wong, Columbia University (United States)

Session Chairs

- 1 Nanophotonics for Energy
Louay A. Eldada, Quanergy Systems, Inc. (United States)
- 2 Nanomechanical Nanofluidic Devices
Eva M. Campo, Bangor University (United Kingdom)
- 3 Nanostructure Properties and Devices
Louay A. Eldada, Quanergy Systems, Inc. (United States)

- 4 Subwavelength Structures
Elizabeth A. Dobisz, HGST (United States)
- 5 Nanophotonic Devices
Elizabeth A. Dobisz, HGST (United States)
- 6 Nanofabrication of Optical Elements
Louay A. Eldada, Quanergy Systems, Inc. (United States)
- 7 Innovative Patterning
Won Park, University of Colorado at Boulder (United States)
- 8 Nanoparticle Properties
Eva M. Campo, Bangor University (United Kingdom)