PROCEEDINGS OF SPIE

Quantum Dots and Nanostructures: Growth, Characterization, and Modeling XIV

Diana L. Huffaker Holger Eisele Editors

30–31 January 2017 San Francisco, California, United States

Sponsored and Published by SPIE

Volume 10114

Proceedings of SPIE 0277-786X, V. 10114

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

Quantum Dots and Nanostructures: Growth, Characterization, and Modeling XIV, edited by Diana L. Huffaker, Holger Eisele, Proc. of SPIE Vol. 10114, 1011401 © 2017 SPIE · CCC code: 0277-786X/17/\$18 · doi: 10.1117/12.2276128

Proc. of SPIE Vol. 10114 1011401-1

The papers 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. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers 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 these proceedings:

Author(s), "Title of Paper," in Quantum Dots and Nanostructures: Growth, Characterization, and Modeling XIV, edited by Diana L. Huffaker, Holger Eisele, Proceedings of SPIE Vol. 10114 (SPIE, Bellingham, WA, 2017) Seven-digit Article CID Number.

ISSN: 0277-786X ISSN: 1996-756X (electronic) ISBN: 9781510606692 ISBN: 9781510606708 (electronic)

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 © 2017, 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/17/\$18.00.

Printed in the United States of America.

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



Paper Numbering: Proceedings of SPIE follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of 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 and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The five 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.

Contents

- v Authors
- vii Conference Committee

NANOWIRE DEVICES II

- 10114 06 Lasing in a single nanowire with quantum dots (Invited Paper) [10114-4]
- 10114 09 Optical spectroscopy of p-GaAs nanopillars on Si for monolithic integrated light sources [10114-7]

QUANTUM DOT CHARACTERIZATION

10114 OB Shape and confinement control in mid and far infrared nanocrystals [10114-8]

NANOWIRE CHARACTERISTICS

10114 OK Influence of droplet size on the growth of high-quality self-catalyzed GaAsP nanowires [10114-18]

QUANTUM DOT DEVICES AND MATERIALS

10114 OP Highly ordered Ga(As)Sb quantum dots grown on pre-structured GaAs [10114-23]

PLASMONIC AND COLLOIDAL NANOSTRUCTURES

- 10114 0Q Low-temperature photoluminescence studies in epitaxially-grown GaAsN/InAs/GaAsN quantum-dot-in-well structures emitting at 1.31 μm [10114-24]
- 10114 OR Time-resolved photoluminescence study of magnetic CdSe/CdMnS/CdS core/multi-shell nanoplatelets [10114-25]
- 10114 0S Local characterization of light trapping effects of metallic and dielectric nanoparticles in ultra-thin Cu(In,Ga)Se₂ solar cells via scanning near-field optical microscopy [10114-26]
- 10114 0T Investigating the influence of ligands on the surface-state emission of colloidal CdSe quantum dots [10114-27]

POSTER SESSION 10114 OU Study of the nonlinear optical properties of CdS quantum dots in phosphate glass [10114-9] 10114 OV Fabrication of diffraction gratings with electrically variable pitch and their effect on surface plasmon resonance [10114-28] 10114 OY Light-emitting and photovoltaic devices based on quantum well-dots hybrid nanostructures [10114-31] 10114 OZ Delay characteristics comparison of coherently coupled high-Q multi-cavity array and single embedded quantum dot cavity systems [10114-32] 10114 10 Impact of varying barrier thickness on the optical characteristics of multilayer InAs/GaAs QDIPs [10114-33] 1011412 A low temperature investigation of the optical properties of coupled InAs quantum dots with GaAsN/GaAs spacers [10114-35] 10114 16 Biosensing characteristics of InAs nanowire transistors grown by MOCVD [10114-41] 10114 18 Analytical study of optical activity of chiral-shape nanocrystals [10114-43] 10114 19 Selective-area growth of InAs nanowire arrays on $Si_3N_4/Si(111)$ by molecular beam epitaxy [10114-45]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five 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.

Aagesen, Martin, OK Andrade, A. A., OU Arakawa, Yasuhiko, 06 Baimuratov, Anvar S., 18 Balgarkashi, Akshay, 0Q, 12 Baranov, Alexander V., 18 Bhatnagar, Anuj, OQ, 12 Biswas, Mahitosh, 0Q, 12 Cartwriaht, Alexander N., OR Chakrabarti, Subhananda, OQ, 10, 12 Choi, Young Wan, 16 Cruguel, Herve, OB D. Morales, J. S., 09 Dantas, N. O., OU Das, Debabrata, 0Q, 12 De Souza, J. M., OU Delikanli, Savas, OR Demir, Hilmi Volkan, OR Dufour, Marion, OB Fedorov, Anatoly V., 18 Foukhardt, Henning, OP Fumagalli, Paul, OS Gandan, S., 09 Herrera-Fierro, P., 19 Huffaker, Diana L., 09 Huo, Suguo, OK Hwang, Jeongwoo, 16 Ithurria, Sandrine, OB Izquierdo, Eva, OB Jethi, Lakshay, OT Jurczak, Pamela, OK Kalyuzhnyy, Nikolay A., OY Kambhampati, Patanjali, OT Karperien, Lucas, OV Ki, Hyun Chul, 16 Kim, Dongyoung, OK Kim, Doo Gun, 16 Kim, Seon Hoon, 16 Kim, Tae Un, 16 Kocaman, Serdar, OZ Krause, Michael M., OT Laegel, Bert, OP Lhuillier, Emmanuel, OB Liu, Huiyun, OK Livache, Clément, OB Loeber, Thomas Henning, OP Mack, Timothy G., 0T Makkar, Roshan L., 0Q, 12 Martinez, Bertille, OB

Maximov, Mikhail V., OY Messias, D. N., OU Mintairov, Sergey A., 0Y Murphy, Joseph R., OR Nadtochiy, Alexey M., 0Y Norden, Tenzin, OR Ochalski, Tomasz J., 09 Pal, Dinesh, 10 Panda, Debiprasad, 10 Payusov, Alexey S., OY Petrou, Athos, OR Pilla, V., OU Prineas, J. P., 19 Rawool, Harshal, 10 Ray, V., 19 Ren, D., 09 Rouvimov, Sergei, OY Royer, Sebastien, OB Rukhlenko, Ivan D., 18 Sabat, Ribal Georges, OV Sanchez, Ana M., OK Savelyev, Artem V., OY Schmid, Martina, OS Scrace, Thomas A., OR Shernyakov, Yuri M., OY Shin, Jae Cheol, 16 Shinde, Nilesh, 0Q, 12 Silva, A. C. A., OU Singh, Sandeep, 0Q, 12 Sink, J. R., 19 Song, Min, OS Strassner, Johannes, OP Sun, Yue, OK Tatebayashi, Jun, 06 Tepliakov, Nikita V., 18 Thomay, Tim, OR Toor, F., 19 Turhan Sayan, Gönül, OZ Wolff, Sandra, OP Wu, Jiang, OK Xu, Xian Zhen, OB Xu, Xiulai, OK Yin, Guanchao, OS Zhang, K., 19 Zhang, Peiyao, OR Zhang, Tianmu, OR Zhang, Yunyan, OK Zhukov, Alexey E., 0Y

Conference Committee

Symposium Chairs

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

Symposium Co-chairs

 Connie J. Chang-Hasnain, University of California, Berkeley (United States)
 Graham T. Reed, Optoelectronics Research Centre, University of Southampton (United Kingdom)

Program Track Chair

Ali Adibi, Georgia Institute of Technology (United States)

Conference Chairs

Diana L. Huffaker, University of California, Los Angeles (United States) **Holger Eisele**, Technische Universität Berlin (Germany)

Conference Program Committee

Baolai L. Liang, University of California, Los Angeles (United States)
Huiyun Liu, University College London (United Kingdom)
Zetian Mi, McGill University (Canada)
Jeffrey C. Owrutsky, U.S. Naval Research Laboratory (United States)
Qi Hua Xiong, Nanyang Technological University (Singapore)

Session Chairs

- Nanowire Devices I
 Diana L. Huffaker, University of California, Los Angeles (United States)
- 2 Nanowire Devices II Håkan Pettersson, Halmstad Universitet (Sweden)
- 3 Quantum Dot Characterization Andrea Lenz, Technische Universität Berlin (Germany)

- 4 Nanowire Materials **Philipp Ebert**, Forschungszentrum Jülich GmbH (Germany)
- 5 Nanowire Characteristics **Zetian Mi**, University of Michigan (United States)
- 6 Quantum Dot Devices and Materials Holger Eisele, Technische Universität Berlin (Germany)
- Plasmonic and Colloidal Nanostructures
 Subhananda Chakrabarti, Indian Institute of Technology Bombay (India)