PROCEEDINGS OF SPIE

Low-Dimensional Materials and Devices 2019

Nobuhiko P. Kobayashi A. Alec Talin Albert V. Davydov Editors

11–13 August 2019 San Diego, California, United States

Sponsored and Published by SPIE

Volume 11085

Proceedings of SPIE 0277-786X, V. 11085

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

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 SPIEDigital Library.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 Low-Dimensional Materials and Devices 2019, edited by Nobuhiko P. Kobayashi, A. Alec Talin, Albert V. Davydov, Proceedings of SPIE Vol. 11085 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510628632

ISBN: 9781510628649 (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 © 2019, 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 \$21.00 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/19/\$21.00.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

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 first 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 vii	Authors Conference Committee
	OD STRUCTURES AND CLUSTERS I
11085 07	Engineering site-controlled quantum dots for optical quantum information processing (Invited Paper) [11085-6]
	OD STRUCTURES AND CLUSTERS II
11085 OF	Red emission carbon dots for microLED application [11085-14]
11085 OH	Preparation of highly stability $Zn_xCd_{1-x}S$ white light quantum dots by silica coating [11085-16]
	LOW-D DEVICES
11085 OL	Opportunities for transition metal oxide devices in solid state random number generators (Invited Paper) [11085-20]
	2D AND LAYERED STRUCTURES I
11085 0Q	Effect of annealing on electrochemical stability of chemically preintercalated bilayered vanadium oxide cathodes in batteries [11085-25]
	2D AND LAYERED STRUCTURES II
11085 OR	Two-dimensional hybrid organic-inorganic semiconductors deposited by resonant infrared, matrix-assisted pulsed laser evaporation (Invited Paper) [11085-26]
11085 OT	Near-infrared photonic phase-change properties of transition metal ditellurides (Invited Paper) [11085-28]
11085 OU	The effect of growth temperature and metal-to-chalcogen on the growth of WSe ₂ by molecular beam epitaxy (Invited Paper) [11085-29]

2D AND LAYERED STRUCTURES III

	2D AND LATERED STRUCTURES III
11085 OW	Electric field induced variations of excited state lifetimes and photoluminescence spectra in 2D heterostructures [11085-31]
11085 OY	Revealing of intrinsic intralayer phonon coupling by polarization-resolved analysis in monolayer MoS $_2$ [11085-33]
	POSTER SESSION
11085 12	Microstructural characterization and phase transitions in polycrystalline and nanocrystalline doped zirconia for incorporation in medical prosthesis [11085-36]
11085 13	Study of magnetic properties of a nano-graphene monolayer within Ising ferromagnetic model with mixed spins [11085-37]
11085 15	Polarization-dependent optical absorption in phosphorene flakes [11085-39]
11085 16	Improved carrier confinement and strain profile in heterogeneously coupled SK-SML quantum dot heterostructure [11085-40]
11085 17	Investigation of various capping layer configuration on heterogeneously coupled SML on SK quantum dots heterostructure [11085-41]
11085 18	The effects of V-III ratio on structural and optical properties of self-assembled InAs quantum dots [11085-42]
11085 19	The effect of growth rate variation on structural and optical properties of self assembled InAs quantum dots [11085-43]
11085 1A	A detailed investigation on the impact of variation in monolayer coverage on optical properties of InAs/GaAs multilayer quantum dot heterostructure [11085-44]
11085 1D	Effect of substrate temperature variation on the structural and optical properties of self assembled InAs quantum dots [11085-47]
11085 1F	Realizing Li-ion full cell using LiFePO $_4$ cathode and Mn $_3$ O $_4$ -mesoporous carbon composite anode for energy storage applications [11085-49]
11085 1J	HCDI performance of Na-2x3 and Na-2x4 nanowires for water desalination [11085-53]
11085 1K	Influence of quaternary (In _{0.21} Al _{0.21} Ga _{0.58} As) capping on the performance of InAs quantum dot infrared photodetector [11085-54]
11085 1N	Optical and structural investigation of ex-situ passivated strain coupled InAs surface quantum dots [11085-57]
11085 10	The enhancement in luminescence property of chemically passivated near surface quantum well and quantum dots [11085-58]

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.

A., Abhilash, 1F Aanand, Abhijeet, 18, 19, 1D Agarwal, Anubhav, 18, 19 Andris, Ryan, OQ, 1J Angelsky, O. V., 13 Avelino, Wellington, 0L Balachandran, Prasanna V., OU Bogdanowicz, R., 15 Bruma, Alina, 12 Chakrabarti, Subhananda, 16, 17, 18, 19, 1A, 1D, 1K, 1N, 1O Cheng, Li-Jing, 0F Chung, Shu-Ru, OH Clites, Mallory, 0Q Constantin, Costel, 0U Craus, Mihai-Liviu, 12 Dahale, Rishabh A., 18, 19 Das, Debabrata, 17, 18, 19, 1A, 1D, 1K, 1N, 1O Davydov, Albert, 0T Dongre, Suryansh, 18, 19, 1A, 1D Doroshkevych, Oleksandr S., 12 Engel, Michael, 0W Fonseca, Leonardo, OL Gazi, Sanowar Alam, 18, 19, 1A, 1D Gocalinska, A., 07 Huang, Teng-De, 0Y Huang, Yun-Xuan, 0H Ivashko, V. V., 13 Jakóbczyk, P., 15 Jaramillo, R., OT Jayalekshmi, S., 1F Juska, G., 07 K. M., Anilkumar, 1F Konstantinova, Tatiana E., 12 Krylyuk, Sergiy, OT Kumar, Ravinder, 1K Lan, Yann-Wen, 0Y Li, Yifei, 0T Litwin, Peter M., 0U Liu, Ye, OF Lu, Ting-Hua, 0Y M., Manoj, 1F Maksimyak, P. P., 13 Mantri, Manas Ranjan, 1N, 1O Marques, Bernardo L., OL McDonnell, Stephen, 0U Medeiros-Ribeiro, Gilberto, OL

Mondal, Shubham, 18, 19, 1N, 1O

Moroni, S. T., 07

Nilsson, Victoria, 0U Novy, Frantisek, 12 Ohlberg, Douglas A. A., 0L Panda, Debiprasad, 17, 18, 19, 1A, 1D, 1K, 1N, 10 Pansare, Amol V., 1N, 1O Patel, Aditya, 1A Paul, Sritoma, 18, 19, 1N, 1O Pelucchi, E., 07 Pomerantseva, Ekaterina, OQ, 1J Ramavath, Rajkumar, 16, 17 Ranjbar, I., 07 Raut, Pravin, 16, 17 Ridley, Phillip, 0Q, 1J Saha, Jhuma, 16, 17, 1K Sales, Maria Gabriela, 0U Savin, Adriana, 12 Simbulan, Kristan Bryan, OY Sinah, Akshay, OT Steiner, Mathias, 0W Stiff-Roberts, Adrienne D., OR Tanyi, Ekembu K, OF Tongbram, Binita, 1K Turchenko, Vitalii, 12 Varo, S., 07 Wang, Yi-Chieh, 0F Wieloszyńska, A., 15 Wright, Niara E., 0R Wu, Bo, OF

Conference Committee

Symposium Chairs

Halina Rubinsztein-Dunlop, The University of Queensland (Australia)Mark L. Brongersma, Geballe Laboratory for Advanced Materials (GLAM) (United States), Stanford University (United States)

Symposium Co-chairs

Reuven Gordon, University of Victoria (Canada) **Natalia M. Litchinitser**, Duke University (United States)

Conference Chairs

Nobuhiko P. Kobayashi, University of California, Santa Cruz (United States)

A. Alec Talin, Sandia National Laboratories (United States)Albert V. Davydov, National Institute of Standards and Technology (United States)

Conference Co-chair

M. Saif Islam, University of California, Davis (United States)

Conference Program Committee

Deji Akinwande, The University of Texas at Austin (United States)Koray Aydin, Northwestern University (United States)Can Bayram, University of Illinois at Urbana-Champaign (United States)

Kristine A. Bertness, National Institute of Standards and Technology (United States)

Necmi Biyikli, University of Connecticut (United States)
Hilal Cansizoglu, University of California, Davis (United States)
Ertugrul Cubukcu, University of California, San Diego (United States)
Shadi A. Dayeh, Los Alamos National Laboratory (United States)
Jung Han, Yale University (United States)
Chennupati Jagadish, The Australian National University (Australia)
Alexey Koposov, Institute for Energy Technology (Norway)
Duygu Kuzum, University of California, San Diego (United States)
Marina S. Leite, University of Maryland, College Park (United States)
Francois Leonard, Sandia National Laboratories (United States)

Samuel S. Mao, Lawrence Berkeley National Laboratory (United States)

Samuel T. Picraux, Los Alamos National Laboratory (United States)

Paola Prete, Istituto per la Microelettronica e Microsistemi (Italy)

Zhifeng Ren, Boston College (United States)

Atsuhito Sawabe, Aoyama Gakuin University (Japan)

Loucas Tsakalakos, GE Global Research (United States)

Emanuel Tutuc, The University of Texas at Austin (United States)

Lionel Vayssieres, Xi'an Jiaotong University (China)

George T. Wang, Sandia National Laboratories (United States)

Sanshui Xiao, Danmarks Tekniske Universitet (Denmark)

Session Chairs

1 1D Structures

Nobuhiko P. Kobayashi, University of California, Santa Cruz (United States)

2 0D Structures and Clusters I

Rachel S. Goldman, University of Michigan (United States)

3 ALD and PVD

Albert V. Davydov, National Institute of Standards and Technology (United States)

4 OD Structures and Clusters II

Alina Bruma, University of Maryland, College Park (United States)

5 Low-D Devices

Rafael Jaramillo, Massachusetts Institute of Technology (United States)

6 2D and Layered Structures

Babak Nikoobakht, National Institute of Science and Technology (United States)

7 2D and Layered Structures ||

Sonia Conesa-Boj, Technische Universiteit Delft (Netherlands)

8 2D and Layered Structures III

George T. Wang, Sandia National Laboratories (United States)