

# PROCEEDINGS OF SPIE

## Nanotechnology VII

**Ion M. Tiginianu**  
*Editor*

**4–6 May 2015**  
**Barcelona, Spain**

*Sponsored and Published by*  
SPIE

**Volume 9519**

Proceedings of SPIE 0277-786X, V. 9519

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

Nanotechnology VII, edited by Ion M. Tiginianu, Proc. of SPIE Vol. 9519, 951901  
© 2015 SPIE · CCC code: 0277-786X/15/\$18 · doi: 10.1117/12.2203113

Proc. of SPIE Vol. 9519 951901-1

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 *Nanotechnology VII*, edited by Ion M. Tiginyanu, Proceedings of SPIE Vol. 9519 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628416428

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](http://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.



[SPIEDigitalLibrary.org](http://SPIEDigitalLibrary.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. the six-digit CID number.

# Contents

- v Authors
- vii Conference Committee
- ix Measuring life: sensors and analytics for precision medicine (Plenary Paper) [9518-502]

---

## NANOPHOTONICS AND PLASMONICS

- 9519 03 ALD-tuned titanium dioxide nanophotonics [9519-2]
- 9519 04 Fabrication of photonic crystal circuits based on GaN ultrathin membranes by maskless lithography [9519-3]

---

## QUANTUM DOTS, NANOCRYSTALS AND NANOWIRES

- 9519 06 Defect luminescence in oxide nanocrystals grown by laser assisted techniques [9519-6]

---

## APPLICATIONS IN NANO-BIOMEDICINE

- 9519 0G Optical detection of two-color-fluorophore barcode for nanopore DNA sensing [9519-16]
- 9519 0H Complexation of porphyrins with nanoparticles of zeolite [9519-39]
- 9519 0I Oxide-bioceramic coatings obtained on titanium items by the induction heat treatment and modified with hydroxyapatite nanoparticles [9519-18]

---

## MICROFABRICATION

- 9519 0K Metal silicide/Si thin-film Schottky-diode bolometers [9519-20]
- 9519 0M A 2D nanoparticle sorter: towards an on-chip quantification and full characterization of nanoparticles [9519-22]
- 9519 0N C-IOP/NiO/Ni<sub>3</sub>S<sub>6</sub> composite with the inverse opal lattice as an electrode for supercapacitors [9519-23]

---

## POSTER SESSION

- 9519 0T Novel nanoplasmonic biosensor integrated in a microfluidic channel [9519-17]

- 9519 0W **Generation-recombination processes in InGaAs/GaAs heterostructures with one-dimensional nanostructures** [9519-36]
- 9519 0X **Reduced QCSE in InGaN-based LEDs by patterned sapphire substrates with enlarging the diameter of hexagonal hole** [9519-37]
- 9519 0Z **Spectral and dielectric properties of nematic liquid crystal doped semiconductor quantum dots CdSe/ZnS** [9519-40]
- 9519 10 **Mathematical modeling of sustainability of porous Al<sub>2</sub>O<sub>3</sub> growth during two-stage anodization process** [9519-41]
- 9519 11 **An analytical model of multi-particle electric double-layer interaction between identical spherical colloid nanoparticles** [9519-42]
- 9519 15 **Atomic layer deposition of Al<sub>2</sub>O<sub>3</sub> on NF<sub>3</sub>-pre-treated graphene** [9519-46]
- 9519 17 **Production of porous oxide coatings with ultrafine crystalline structure on medical implants fabricated from alloy 12Cr18Ni9Ti** [9519-48]
- 9519 18 **Electrodynamic properties of the nanocarbon/polymer composites with aligned by magnetic field secondary non-conductive component** [9519-49]
- 9519 19 **Light absorption of cylindrical quantum dot with Morse potential in the presence of parallel electrical and magnetic fields** [9519-50]

# 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.

- |                                  |                            |
|----------------------------------|----------------------------|
| Albert, Matthias, 15             | Lupina, Grzegorz, 15       |
| Alfimov, Anton V., 10, 11        | Masalov, Vladimir M., 0N   |
| Aryslanova, Elizaveta M., 10, 11 | Matzui, Ludmila, 18        |
| Atkin, Vsevolod S., 0I           | Melnichenko, Mykola, 18    |
| Bartha, Johann W., 15            | Monteiro, T., 06           |
| Ben Sedrine, N., 06              | Neves, A. J., 06           |
| Bera, Arijit, 03                 | Nico, C., 06               |
| Braniste, Tudor, 04              | Oddoy, Tim, 15             |
| Chapnin, Valery V., 0K           | Oliynyk, Victor, 18        |
| Chen, Po-Hsun, 0X                | Petrova, Natalia V., 0I    |
| Chen, Yen-Pu, 0X                 | Poshivalova, Elena Yu., 17 |
| Chivilikhin, Sergey A., 10, 11   | Rodionov, Igor V., 0I, 17  |
| Chizh, Kirill V., 0K             | Rodrigues, J., 06          |
| Colpo, Pascal, 0M                | Rossi, François, 0M        |
| Costa, F. M., 06                 | Roussey, Matthieu, 03      |
| Darakchieva, Vanya, 15           | Salamo, Gregory, 0W        |
| Desmet, Cloé, 0M                 | Santos, N. F., 06          |
| Emelchenko, Gennadi A., 0N       | Sargsyan, Hakob H., 0H     |
| Fernandes, A. J. S., 06          | Schmidt, T., 0G            |
| Fomin, Aleksandr A., 0I, 17      | Sepulveda, B., 0T          |
| Fomina, Marina A., 0I, 17        | Sergentu, Vladimir, 04     |
| Furrow, Colin, 0W                | Shcherbinin, D. P., 0Z     |
| Ghazaryan, Robert K., 0H         | Shevranian, Marina A., 0H  |
| Gutowski, Jürgen, 04             | Skaptsov, Aleksandr A., 0I |
| Gyulkhandanyan, Anna G., 0H      | Soares, M. R. N., 06       |
| Gyulkhandanyan, Grigor V., 0H    | Solis-Tinoco, V., 0T       |
| Harrer, Stefan, ix               | Su, Vincent, 0X            |
| Hayrapetyan, D. B., 19           | Sukhinina, Nadezhda S., 0N |
| Häyrinen, Markus, 03             | Sychugov, I., 0G           |
| Holz, T., 06                     | Tevosyan, H. Kh., 19       |
| Honkanen, Seppo, 03              | Tiginyanu, Ion M., 04      |
| Junige, Marcel, 15               | Ursaki, Veaceslav, 04      |
| Kalinushkin, Victor P., 0K       | Valsesia, Andrea, 0M       |
| Kazaryan, E. M., 19              | Volciuc, Olesea, 04        |
| Kitzmann, Julia, 15              | Vovchenko, Ludmila, 18     |
| Kondratenko, Serhiy, 0W          | Ware, Morgan, 0W           |
| Konshina, E. A., 0Z              | Wenger, Christian, 15      |
| Koshuro, Vladimir A, 0I          | Yakimova, Rositsa, 15      |
| Kotanjyan, T. V., 19             | Yakovenko, Olena, 18       |
| Kovalova, Marianna, 0W           | Yakovlev, Artem, 0W        |
| Kuan, Chieh-Hsiung, 0X           | You, Yao-Hong, 0X          |
| Kuittinen, Markku, 03            | Yuryev, Vladimir A., 0K    |
| Kunets, Vasyl, 0W                | Zakharevich, Andrey M., 17 |
| Kurachkina, M. A., 0Z            | Zakoyan, Anna A., 0H       |
| Launetz, Vilen, 18               | Zhang, M., 0G              |
| Lechuga, L. M., 0T               | Zhokhov, Andrey A., 0N     |
| Lee, Ming-Lun, 0X                | Zverkova, Irina I., 0N     |
| Lin, Ray-Ming, 0X                |                            |
| Linnros, J., 0G                  |                            |



# Conference Committee

## Symposium Chair

**Ulrich Schmid**, Technische Universität Wien (Austria)

## Symposium Co-chairs

**Thomas Becker**, EADS Deutschland GmbH (Germany) and nta Isny

(Germany)

**Jacopo Iannacci**, Fondazione Bruno Kessler (Italy)

## Symposium Local Co-chair

**Carles Cané**, Centre Nacional de Microelectrónica (Spain)

## Conference Chair

**Ion M. Tiginianu**, Academy of Sciences of Moldova (Moldova)

## Conference Co-chairs

**Rainer Adelung**, Christian-Albrechts-Universität zu Kiel (Germany)

**Hidenori Mimura**, Shizuoka University (Japan)

## Conference Programme Committee

**Adrian Bachtold**, ICFO - Institut de Ciències Fotòniques (Spain)

**Necmi Biyikli**, Bilkent University (Turkey)

**Nicolas Grandjean**, École Polytechnique Fédérale de Lausanne  
(Switzerland)

**Jürgen Gutowski**, Universität Bremen (Germany)

**Roger A. Lewis**, University of Wollongong (Australia)

**Jan Linnros**, Royal Institute of Technology (Sweden)

**Teresa Monteiro**, Universidade de Aveiro (Portugal)

**Hadis Morkoç**, Virginia Commonwealth University (United States)

**Thierry Pauperté**, École Nationale Supérieure de Chimie de Paris  
(France)

**Ionel V. Vlad**, The Romanian Academy (Romania)

**Vladimir A. Yuryev**, A. M. Prokhorov General Physics Institute  
(Russian Federation)

**Anatoly V. Zayats**, King's College London (United Kingdom)

Session Chairs

Monday Plenary Session

**Ulrich Schmid**, Technische Universität Wien (Austria)

- 1 Nanophotonics and Plasmonics  
**Ion M. Tiginianu**, Academy of Sciences of Moldova (Moldova)
- 2 Quantum Dots, Nanocrystals and Nanowires  
**Yogendra K. Mishra**, Christian-Albrechts-Universität zu Kiel (Germany)
- 3 Aerographite, Graphene, Carbon Nanotubes  
**Hidenori Mimura**, University of Shizuoka (Japan)

Tuesday Plenary Session

**Sander van den Driesche**, Universität Bremen (Germany)

**Ion M. Tiginianu**, Academy of Sciences of Moldova (Moldova)

- 4 Applications in Nano-Biomedicine  
**Andrei Sarua**, University of Bristol (United Kingdom)
- 5 Microfabrication  
**Necmi Biyikli**, Bilkent University (Turkey)

Wednesday Plenary Session

**José Luis Sánchez-Rojas**, Universidad de Castilla-La Mancha (Spain)

**Jacopo Iannacci**, Fondazione Bruno Kessler (Italy)

- 6 Synthesis, Surface Modification, Nano-Devices and Reliability  
**Teresa Monteiro**, Universidade de Aveiro (Portugal)