

PROGRESS IN BIOMEDICAL OPTICS AND IMAGING
Vol. 9, No. 24

Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications V

Alexander N. Cartwright
Dan V. Nicolau
Editors

21–23 January 2008
San Jose, California, USA

Sponsored and Published by
SPIE

Volume 6865

Proceedings of SPIE, 1605-7422, v. 6865

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

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 *Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications V*, edited by Alexander N. Cartwright, Dan V. Nicolau, Proceedings of SPIE Vol. 6865 (SPIE, Bellingham, WA, 2008) Article CID Number.

ISSN 1605-7422
ISBN 9780819470409

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445
SPE.org

Copyright © 2008, 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 1605-7422/08/\$18.00.

Printed in the United States of America.

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



SPEIDigitalLibrary.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 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 Conference Committee

SESSION 1 MICRO- AND NANOSENSORS I

- 6865 04 **Direct-write patterning of nanostructured sensory waveguides for integrated optical bioimaging applications (Invited Paper)** [6865-03]
M. Hajj-Hassan, T. Gonzalez, H. Djeghelian, E. Ghafar-Zadeh, McGill Univ. (Canada); D. Therriault, Ecole Polytechnique de Montréal (Canada); V. Chodavarapu, M. Andrews, McGill Univ. (Canada)
- 6865 05 **Biomolecular motors challenge imaging and enable sensing (Keynote Paper)** [6865-04]
H. Hess, T. Fischer, A. Agarwal, P. Katira, I. Finger, E. Mobley, R. Tucker, Univ. of Florida (USA); J. Kerssemakers, S. Diez, Max Planck Institute for Molecular Cell Biology and Genetics (Germany)
- 6865 06 **Statistical analysis of the motility of nano-objects propelled by molecular motors** [6865-05]
R. C. Conceição, The Univ. of Liverpool (United Kingdom) and Univ. Nova de Lisboa (Portugal); D. Bakewell, D. Nicolau, The Univ. of Liverpool (United Kingdom)

SESSION 2 MICRO- AND NANOSENSORS II

- 6865 08 **Differential near-field scanning optical microscopy based on sensor arrays (Invited Paper)** [6865-07]
A. Ozcan, Univ. of California, Los Angeles (USA); E. Cubukcu, F. Capasso, Harvard Univ. (USA); A. Bilenca, B. E. Bouma, G. J. Tearney, Wellman Ctr. for Photomedicine, Harvard Medical School (USA)
- 6865 0B **Molecular interferometric imaging study of molecular interactions** [6865-10]
M. Zhao, X. Wang, D. Nolte, Purdue Univ. (USA)
- 6865 0D **Fabrication of silicon dioxide nano array for bio-mimicking of molecular interactions** [6865-12]
H.-H. Lu, C.-W. Lin, National Taiwan Univ. (Taiwan); T.-C. Hsiao, National Chiao Tung Univ. (Taiwan); C.-K. Lee, S.-M. Hsu, National Taiwan Univ. (Taiwan)
- 6865 0E **A novel method of using hollow-core photonic crystal fiber as a Raman biosensor** [6865-13]
M. Naji, A. Khetani, Univ. of Ottawa (Canada); N. Lagali, R. Munger, Ottawa Health Research Institute and The Ottawa Hospital (Canada); H. Anis, Univ. of Ottawa (Canada)

SESSION 3 NANOPARTICLE-BASED IMAGING

- 6865 0H **Magnetic luminescent nanoparticles as internal calibration for an immunoassay for ricin** [6865-22]
D. Dosev, M. Nichkova, Z.-Y. Ma, S. J. Gee, B. D. Hammock, I. M. Kennedy, Univ. of California, Davis (USA)

- 6865 0I **Organic molecular sensing by single metal porphyrin nanoparticles** [6865-23]
T. Uwada, Hamano Life Science Research Foundation (Japan); Y. Hosokawa, Hamano Life Science Research Foundation (Japan), Osaka Univ. (Japan), and CREST, Japan Science and Technology Agency (Japan); N. Takizawa, Hamano Life Science Research Foundation (Japan); K. Okano, Hamano Life Science Research Foundation (Japan) and Osaka Univ. (Japan); H. Masuhara, Hamano Life Science Research Foundation (Japan), Osaka Univ. (Japan), and CREST, Japan Science and Technology Agency (Japan)
- 6865 0K **Gold nanoshells for OCT imaging contrast: From model to in-vivo study** [6865-25]
E. V. Zagaynova, Nizhny Novgorod State Medical Academy (Russia); M. V. Shirmanova, Nizhny Novgorod State Medical Academy (Russia) and N.I. Lobachevsky State Univ. of Nizhny Novgorod (Russia); A. G. Orlova, Nizhny Novgorod State Medical Academy (Russia) and Institute of Applied Physics (Russia); I. V. Balalaeva, Institute of Applied Physics (Russia) and N.I. Lobachevsky State Univ. of Nizhny Novgorod (Russia); M. Yu. Kirillin, Univ. of Oulu (Finland) and M.V. Lomonosov Moscow State Univ. (Russia); V. A. Kamensky, Institute of Applied Physics (Russia); M. L. Bugrova, M. A. Sirotnina, Nizhny Novgorod State Medical Academy (Russia)
- 6865 0L **Cell-population tracking using quantum dots in flow cytometry** [6865-26]
H. D. Summers, R. J. Errington, P. J. Smith, S. Chappell, Cardiff Univ. (United Kingdom); P. Rees, M. R. Brown, Swansea Univ. (United Kingdom); J. F. Leary, Purdue Univ. (USA)
- 6865 0N **Gold nanoshell mediated hyperthermia enhances the efficacy of radiation therapy** [6865-28]
P. Diagaradjane, A. Shetty, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); J. Wang, Nanospectra Biosciences, Inc. (USA); A. Elliot, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); J. Schwartz, Nanospectra Biosciences, Inc. (USA); S. Shentu, C. Park, A. Deorukhkar, J. Stafford, S. Cho, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA); J. Tunnell, The Univ. of Texas at Austin (USA); J. Hazle, S. Krishnan, The Univ. of Texas M.D. Anderson Cancer Ctr. (USA)
- 6865 0O **Modeling laser thermal therapy output for nanoshell heating using a natural coordinate system** [6865-29]
A. M. Elliott, J. D. Hazle, C. Li, R. J. Stafford, The Univ. of Texas, M.D. Anderson Cancer Ctr. (USA)

POSTER SESSION

- 6865 0P **Quantitative detection of antibiotic resistance genes using magnetic/luminescent core-shell nanoparticles** [6865-18]
A. Son, K. R. Hristova, D. Dosev, I. M. Kennedy, Univ. of California, Davis (USA)
- 6865 0Q **Gold nanoshell thermal confinement of conformal laser thermal therapy in liver metastasis** [6865-19]
A. M. Elliott, The Univ. of Texas, M.D. Anderson Cancer Ctr. (USA); J. Wang, Nanospectra Biosciences, Inc. (USA) and The Univ. of Texas, M.D. Anderson Cancer Ctr. (USA); A. M. Shetty, The Univ. of Texas, M.D. Anderson Cancer Ctr. (USA); J. Schwartz, Nanospectra Biosciences, Inc. (USA); J. D. Hazle, R. J. Stafford, The Univ. of Texas, M.D. Anderson Cancer Ctr. (USA)

Conference Committee

Symposium Chairs

James Fujimoto, Massachusetts Institute of Technology (USA)
R. Rox Anderson, Wellman Center for Photomedicine, Massachusetts General Hospital (USA) and Harvard School of Medicine (USA)

Program Track Chairs

Paras N. Prasad, University at Buffalo (USA)
Dan V. Nicolau, The University of Liverpool (United Kingdom)

Conference Chairs

Alexander N. Cartwright, University at Buffalo (USA)
Dan V. Nicolau, The University of Liverpool (United Kingdom)

Program Committee

Igal Brener, Sandia National Laboratories (USA)
Philippe M. Fauchet, University of Rochester (USA)
Paul L. Gourley, Sandia National Laboratories (USA)
Piotr Grodzinski, Los Alamos National Laboratory (USA)
Brian McGraith, Dublin City University (Ireland)
Igor L. Medintz, Naval Research Laboratory (USA)
Ammasi Periasamy, University of Virginia (USA)
Paras N. Prasad, University at Buffalo (USA)
Weihong Tan, University of Florida (USA)

Session Chairs

- 1 Micro- and Nanosensors I
Dan V. Nicolau, The University of Liverpool (United Kingdom)
- 2 Micro- and Nanosensors II
Vamsy P. Chodavarapu, McGill University (Canada)
- 3 Nanoparticle-Based Imaging
Alexander N. Cartwright, University at Buffalo (USA)

Poster Session

Dan V. Nicolau, The University of Liverpool (United Kingdom)

