PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 8570

, "Front Matter: Volume 8570," Proc. SPIE 8570, Frontiers in Biological
Detection: From Nanosensors to Systems V, 85700S (15 March 2013); doi:
10.1117/12.2022678

SPIE.

Event: SPIE BiOS, 2013, San Francisco, California, United States

PROGRESS IN BIOMEDICAL OPTICS AND IMAGING

Vol. 14 No. 6

Frontiers in Biological Detection: From Nanosensors to Systems V

Benjamin L. Miller
Philippe M. Fauchet
Editors

2–3 February 2013
San Francisco, California, United States

Sponsored and Published by
SPIE

Volume 8570

Proceedings of SPIE, 1605-7422, V.8570

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

Frontiers in Biological Detection: From Nanosensors to Systems V, edited by
Benjamin L. Miller, Philippe M. Fauchet, Proc. of SPIE Vol. 8570, 85700S
© 2013 SPIE · CCC code: 1605-7422/13/\$18 · doi: 10.1117/12.2022678

Proc. of SPIE Vol. 8570 85700S-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 *Frontiers in Biological Detection: From Nanosensors to Systems V*, edited by Benjamin L. Miller, Philippe M. Fauchet, Proceedings of SPIE Vol. 8570 (SPIE, Bellingham, WA, 2013) Article CID Number.

ISSN: 1605-7422

ISBN: 9780819493392

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 © 2013, 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 1605-7422/13/\$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

vii Conference Committee

SESSION 1 WAVEGUIDES AND RING RESONATORS

- 8570 01 **A computational approach to optimize microring resonators for biosensing applications** [8570-1]
J. C. Wirth, Birck Nanotechnology Ctr., Purdue Univ. (United States); B. R. Wenner, M. S. Allen, J. W. Allen, Air Force Research Lab. (United States); M. Qi, Birck Nanotechnology Ctr., Purdue Univ. (United States)
- 8570 02 **Cascaded microring resonators for biomedical applications: improved sensitivity at large tuning range** [8570-2]
V. Zamora, P. Lützow, D. Pergande, H. Heidrich, Fraunhofer Heinrich-Hertz-Institut (Germany)
- 8570 04 **Real-time detection of small and large molecules using a porous silicon grating-coupled Bloch surface wave label-free biosensor** [8570-5]
G. A. Rodriguez, J. D. Ryckman, Y. Jiao, Vanderbilt Univ. (United States); R. L. Fuller, Vanderbilt Univ. (United States) and Villanova Univ. (United States); S. M. Weiss, Vanderbilt Univ. (United States)

SESSION 2 PHOTONIC CRYSTALS

- 8570 05 **Silicon photonic crystal microarrays for high throughput label-free detection of lung cancer cell line lysates with sensitivity and specificity (Invited Paper)** [8570-6]
S. Chakravarty, Omega Optics, Inc. (United States); W.-C. Lai, Y. Zou, The Univ. of Texas at Austin (United States); R. M. Gemmill, Medical Univ. of South Carolina (United States); R. T. Chen, Omega Optics, Inc. (United States) and The Univ. of Texas at Austin (United States)
- 8570 06 **Evanescent field trapping of bacterial spores using photonic crystal cavities** [8570-7]
T. van Leest, J. Caro, Technische Univ. Delft (Netherlands)
- 8570 07 **Two dimensional photonic crystal biosensors as a platform for label-free sensing of biomolecules** [8570-8]
R. Sriram, J. E. Baker, Univ. of Rochester (United States); P. M. Fauchet, Vanderbilt Univ. (United States); B. L. Miller, Univ. of Rochester (United States)
- 8570 08 **High yield silicon photonic crystal microcavity biosensors with 100fM detection limit** [8570-9]
Y. Zou, The Univ. of Texas at Austin (United States); S. Chakravarty, Omega Optics, Inc. (United States); W.-C. Lai, C.-C. Hsieh, R. T. Chen, The Univ. of Texas at Austin (United States)

SESSION 3 FLUIDICS AND SYSTEMS

- 8570 09 **Microscale tools for measuring spatiotemporal chemical gradients in biological systems (Invited Paper)** [8570-10]
J. B. Wydallis, C. S. Henry, D. S. Dandy, S. Tobet, Colorado State Univ., Fort Collins (United States)
- 8570 0A **Detection, isolation, and capture of circulating breast cancer cells with photoacoustic flow cytometry** [8570-11]
K. Bhattacharyya, M. Njoroge, B. S. Goldschmidt, B. Gaffigan, K. Rood, J. A. Viator, Christopher S. Bond Life Sciences Ctr., Univ. of Missouri-Columbia (United States)
- 8570 0C **Biophotonics: a European perspective** [8570-13]
T. Robin, J. Cochard, TEMATYS (France); F. Breussin, Yole Développement (France)

SESSION 4 FIBERS AND PLASMONICS

- 8570 0D **Taking single virus detection and sizing to the limit with molecular sensitivity: the birth of nanoplasmonic-microcavity hybrid sensors (Invited Paper)** [8570-14]
S. Arnold, Polytechnic Institute of New York Univ. (United States)
- 8570 0E **Sub-wavelength fluorescent polymer coatings to convert standard glass capillaries into robust microfluidic refractometric sensors** [8570-15]
K. J. Rowland, A. François, P. Hoffmann, T. M. Monro, The Univ. of Adelaide (Australia)
- 8570 0F **A fiber tip label free biological sensing platform for in vivo applications** [8570-16]
A. François, K. J. Rowland, T. M. Monro, The Univ. of Adelaide (Australia)
- 8570 0G **Tapered optical fibers for aqueous and gaseous phase biosensing applications** [8570-17]
B. J. King, I. Idehenre, P. E. Powers, A. M. Sarangan, J. W. Haus, K. M. Hansen, Univ. of Dayton (United States)

SESSION 5 NANOPORES AND PLASMONICS

- 8570 0H **Controlled release of theophylline from poly(vinyl alcohol) hydrogels/porous silicon nanostructured systems** [8570-18]
N. Cervantes-Rincón, F. J. Medellín-Rodríguez, Univ. Autónoma de San Luis Potosí (Mexico); V. A. Escobar-Barrios, Instituto Potosino de Investigación Científica y Tecnológica (Mexico); G. Palestino, Univ. Autónoma de San Luis Potosí (Mexico)
- 8570 0J **Quantum bio-nanosensors based on quantum dot-metallic nanoparticle systems** [8570-20]
S. M. Sadeghi, The Univ. of Alabama in Huntsville (United States)
- 8570 0K **Properties of resonant modal-plasmonic multiparametric biosensors (Invited Paper)** [8570-21]
R. Magnusson, J. Yoon, The Univ. of Texas at Arlington (United States); D. Wawro, Resonant Sensors Inc. (United States)

SESSION 6 IMAGING, ABSORBANCE, AND FLUORESCENCE

- 8570 OM **Rapid detection of malignant bio-species using digital holographic pattern recognition and nano-photonics** [8570-23]
S. S. Sarkisov, SSS Optical Technologies, LLC (United States); T. Kukhtareva, N. V. Kukhtarev, M. J. Curley, V. Edwards, M. Creer, Alabama A&M Univ. (United States)
- 8570 ON **Towards an easy-to-use tuberculosis diagnosis through exhaled breath analysis: a liquid fluorimeter with an excitation at 265 nm** [8570-24]
J. Hue, M. Dupoy, S. Vignoud, J. L. Ricaud, CEA-LETI MINATEC (France); T. Tran-Thi, S. Karpe, DSM, CEA, SPAM, CNRS (France); A. Novelli-Rousseau, F. Mallard, Biomerieux (France)
- 8570 OO **Optical characterization of micro-porous ceramics using tunable diode laser** [8570-25]
L. Mei, G. Somesfalean, Lund Univ. (Sweden) and Zhejiang Univ. (China) and Joint Research Ctr. of Photonics (China); S. Svanberg, Lund Univ. (Sweden) and Joint Research Ctr. of Photonics (China) and South China Normal Univ. (China)

POSTER SESSION

- 8570 OQ **Combined sensing platform for advanced diagnostics in exhaled mouse breath** [8570-27]
P. R. Fortes, Univ. Estadual de Campinas (Brazil) and Univ. Ulm (Germany); A. Wilk, F. Seichter, Univ. Ulm (Germany); M. Cajlakovic, S. Koestler, V. Ribitsch, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria); U. Wachter, J. Vogt, P. Radermacher, Univ. Ulm (Germany); C. Carter, Lawrence Livermore National Lab. (United States); I. M. Raimundo Jr., Univ. Estadual de Campinas (Brazil); B. Mizaikoff, Univ. Ulm (Germany)
- 8570 OR **Charge injection through nanocomposite electrode in microfluidic channel for electrical lysis of biological cells** [8570-28]
M. Mishra, A. Krishna, A. Chandra, B. M. Shenoy, G. M. Hegde, D. Roy Mahapatra, Indian Institute of Science (India)

Author Index

Conference Committee

Symposium Chairs

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

Program Track Chair

Brian Jet-Fei Wong, Beckman Laser Institute and Medical Clinic (United States)

Conference Chairs

Benjamin L. Miller, University of Rochester Medical Center (United States)
Philippe M. Fauchet, Vanderbilt University (United States)

Conference Program Committee

Holger Becker, microfluidic ChipShop GmbH (Germany)
Xudong Fan, University of Michigan (United States)
Jiri Homola, Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic)
Laura Maria Lechuga, Centre d'Investigacions en Nanociència i Nanotecnologia (Spain)
Frances S. Ligler, U.S. Naval Research Laboratory (United States)
Elric W. Saaski, Research International, Inc. (United States)
Michael J. Sailor, University of California, San Diego (United States)
Oliver G. Schmidt, Leibniz-Institut für Festkörper- und Werkstoffforschung Dresden (Germany)
Christopher C. Striemer, Adarza Biosystems Inc. (United States)
Sharon M. Weiss, Vanderbilt University (United States)

Session Chairs

- 1 Waveguides and Ring Resonators
Benjamin L. Miller, University of Rochester Medical Center (United States)
- 2 Photonic Crystals
Philippe M. Fauchet, Vanderbilt University (United States)
- 3 Fluidics and Systems
Benjamin L. Miller, University of Rochester Medical Center (United States)

- 4 Fibers and Plasmonics
 Philippe M. Fauchet, Vanderbilt University (United States)
- 5 Nanopores and Plasmonics
 Benjamin L. Miller, University of Rochester Medical Center (United States)
- 6 Imaging, Absorbance, and Fluorescence
 Philippe M. Fauchet, Vanderbilt University (United States)