# Frontiers in Biological Detection: From Nanosensors to Systems VII

Benjamin L. Miller Philippe M. Fauchet Brian T. Cunningham Editors

7 February 2015 San Francisco, California, United States

Sponsored and Published by SPIE

Volume 9310

Proceedings of SPIE, 1605-7422, V. 9310

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

Frontiers in Biological Detection: From Nanosensors to Systems VII, edited by Benjamin L. Miller, Philippe M. Fauchet, Brian T. Cunningham, Proc. of SPIE Vol. 9310, 931001 · © 2015 SPIE CCC code: 1605-7422/15/\$18 · doi: 10.1117/12.2183941

Proc. of SPIE Vol. 9310 931001-1

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 VII, edited by Benjamin L. Miller, Philippe M. Fauchet, Brian T. Cunningham, Proceedings of SPIE Vol. 9310 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 1605-7422 ISBN: 9781628414004

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. 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 1605-7422/15/\$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, 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.

## Contents

- v Authors
- vii Conference Committee

#### SESSION 1 PHOTONIC CRYSTALS, WAVEGUIDES, AND INTERFEROMETRY I

9310 03	Optical waveguide biosensor based on cascaded Mach-Zehnder interferometer and ring resonator with Vernier effect [9310-4]
9310 04	An optical biosensor for detection of pathogen biomarkers from Shiga toxin-producing <i>Escherichia coli</i> in ground beef samples [9310-5]
SESSION 2	PHOTONIC CRYSTALS, WAVEGUIDES, AND INTERFEROMETRY II
9310 06	Examining small molecule: HIV RNA interactions using arrayed imaging reflectometry [9310-7]
9310 07	A novel antibody immobilization strategy for optical biosensors [9310-8]
SESSION 3	RAMAN, PLASMONICS, AND FLUORESCENCE
9310 0A	Plasmonic nanoparticle interaction with cell membrane for diagnostic applications [9310-10]
9310 OB	Smartphone fluorescence spectroscopy [9310-13]
SESSION 4	OTHER ADVANCED TECHNIQUES
9310 OD	Laser cross-linking protein captures for living cells on a biochip [9310-2]

9310 OF Quantifying DNA and proteins using laser-induced thermophoresis [9310-15]

### 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.

Adams, Peter, 04 Arikady, Akshata, 0A Baldeck, Patrice L., 0D Banisadr, Afsheen, 04 Carter, Jared A., 07 Chaimavo, Wanaruk, 06 Chen, Hai-Wen, 0D Chen, Yih-Fan, OF Cunningham, Brian T., OB Das, Sumana, OA Graves, Steven, 04 Harika Villa, Krishna, 0A He, Jian-Jun, 03 Hegde, Gopalkrishna M., 0A Jiang, Xianxin, 03 Konnur, Manish C., 0A Lamoureux, Loreen, 04 Li, Mingyu, 03 Lifson, Mark A., 07 Lin, Che-Kuan, 0D Lin, Chih-Lang, 0D Lin, Chuen-Fu, 0D Miller, Benjamin L., 06, 07 Montano, Gabriel, 04 Moxley, Rodney, 04 Mukundan, Harshini, 04 Pan, Ming-Jeng, 0D Roy Mahapatra, D., 0A Song, Jinyan, 03 Stromberg, Zachary, 04 Tan, Yafang, OB Tang, Longhua, 03 Vasireddi, Ramakrishna, OA Wang, Chih-Hsuan, OF Yu, Hojoeng, OB Yu, Li-Hsien, OF

## **Conference Committee**

Symposium Chairs

James G. 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)
Brian T. Cunningham, University of Illinois at Urbana-Champaign (United States)

Conference Program Committee

 Xudong Fan, University of Michigan (United States)
 Laura Maria Lechuga, Catalan Institute of Nanoscience and Nanotechnology (Spain)
 Frances S. Ligler, U.S. Naval Research Laboratory (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)