

PROCEEDINGS OF SPIE

Smart Biomedical and Physiological Sensor Technology XII

**Brian M. Cullum
Eric S. McLamore**
Editors

**23–24 April 2015
Baltimore, Maryland, United States**

Sponsored and Published by
SPIE

Volume 9487

Proceedings of SPIE 0277-786X, V. 9487

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

Smart Biomedical and Physiological Sensor Technology XII, edited by Brian M. Cullum,
Eric S. McLamore, Proc. of SPIE Vol. 9487, 948701 · © 2015 SPIE
CCC code: 0277-786X/15/\$18 · doi: 10.1117/12.2199457

Proc. of SPIE Vol. 9487 948701-1

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 *Smart Biomedical and Physiological Sensor Technology XII*, edited by Brian M. Cullum, Eric S. McLamore, Proceedings of SPIE Vol. 9487 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628416039

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 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.



SPIDigitalLibrary.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.

Contents

v	Authors
vii	Conference Committee

SESSION 1	ADVANCES IN MICROFLUIDIC ANALYSES
9487 04	Sensor enhanced microfluidic devices for cell based assays and organs on chip [9487-3]
9487 06	Ultrafast real-time PCR with integrated melting curve analysis and duplex capacities using a low-cost polymer lab-on-a-chip system [9487-5]
SESSION 2	ELECTROCHEMICAL/ELECTRO-LUMINESCENT SENSING
9487 08	Rapid detection of listeria spp. using an internalin A aptasensor based on carbon-metal nanohybrid structures [9487-7]
SESSION 3	REGULATION AND MONITORING
9487 0E	Dynamic analysis and performance evaluation of the BIAcore surface plasmon resonance biosensor [9487-11]
9487 0H	Remote characterization of biological specimens using all-optical frequency-domain photoacoustic microscopy [9487-14]
9487 0I	3D noninvasive, high-resolution imaging using a photoacoustic tomography (PAT) system and rapid wavelength-cycling lasers (Best Paper Award) [9487-15]
SESSION 4	RECENT DEVELOPMENTS IN BIOLOGICAL SERS SENSING
9487 0K	Flexible SERS-based substrates: challenges and opportunities toward an Army relevant universal sensing platform (Best Paper Award) [9487-16]
9487 0L	Surface-enhanced Raman scattering from living cells: from differentiating healthy and cancerous cell to cytotoxicity assessment (Invited Paper) [9487-17]
9487 0N	Functionalized paper SERS (P-SERS) substrates for selective targeting of analytes in complex samples [9487-19]
9487 0O	Large area super-resolution chemical imaging via rapid dithering of a nanoprobe (Best Paper Award) [9487-20]

SESSION 5 SMART MATERIALS FOR BIOLOGICAL AND BIOMEDICAL SENSING	
9487 OP	Characterization of the role of oxide spacers in multilayer-enhanced SERS probes [9487-22]
9487 OS	Enhancing enzymatic efficiency by attachment to semiconductor nanoparticles for biosensor applications (Invited Paper) [9487-25]
SESSION 6 PATIENT BASED MONITORING	
9487 OU	Automated calculation of bifurcation carotid angle for analyzing the risk of carotis plaques by using carotid CT angiographic images [9487-27]
9487 OV	Electroencephalograph (EEG) study of brain bistable illusion [9487-28]
9487 OW	Sensor probes and phantoms for advanced transcranial magnetic stimulation system developments [9487-29]
9487 OX	A very low-cost 3D scanning system for whole-body imaging [9487-30]
9487 OZ	Mathematical modeling of Chikungunya fever control [9487-32]
INTERACTIVE POSTER SESSION	
9487 10	Speckle-correlation imaging through highly scattering turbid media with LED illumination [9487-33]
9487 11	Imaging through turbid media via sparse representation: imaging quality comparison of three projection matrices [9487-34]
9487 13	Leptospirosis risk around a potential source of infection [9487-36]

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.

Ancona, Mario G., 0S	Schneider, Tristan, 06
Becker, Holger, 04	Schulz, Ingo, 04
Bi, Xiangli, 11	Schunck, Tobias, 06
Breger, Joyce C., 0S	Schwalb, N., 08
Chan, Gary, 0I	Shao, Xiaopeng, 10, 11
Choa, Fow-Sen, 0V, 0W	Simon, Laurent, 0E
Çulha, Mustafa, 0L	Singamaneni, Srikanth, 0K
Cullum, Brian M., 0O, 0P	Stewart, Michael H., 0S
Dai, Weijia, 10, 11	Straub, Jeremy, 0X
Demir, N., 0U	Strobach, Xenia, 06
Demir, S., 0U	Strobbia, Pietro, 0P
Deschamps, Jeffrey R., 0S	Susumu, Kimihiro, 0S
Du, Xiaoming, 0W	Trivedi, Sudhir, 0W
Elyorgun, Deniz, 06	Ungerböck, Birgit, 04
Farrell, Mikella E., 0K	Vanegas, D. C., 08
Gärtner, Claudia, 04	Walper, Scott A., 0S
Gatscha, Theresia, 06	Wang, Lin, 10
Gomes, C., 08	Winkler, Christian, 06
Gougousi, Theodosia, 0P	Wu, Chunbai, 0I
Gransee, Rainer, 06	Wu, Tengfei, 10, 11
Gross, Daniel, 0I	Yu, Wei W., 0N
Heller, Donald F., 0I	
Henegar, Alex, 0P	
Hills, K. D., 08	
Hincapié-Palacio, Doracelly, 0Z, 13	
Hong, Elliot, 0V, 0W	
Hoppmann, Eric P., 0N	
Höth, Julian, 06	
Jahn, Tobias, 04	
Kerlin, Scott, 0X	
Klosner, Marc, 0I	
Kuku, Gamze, 0L	
Languirand, Eric R., 0O	
Li, Huijuan, 10, 11	
Loaiza-Echeverry, Erica, 13	
Mayr, Torsten, 04	
McLamore, E. S., 08	
Medintz, Igor L., 0S	
Meng, Qinglei, 0V, 0W	
Mert, Sevda, 0L	
Mosig, Alexander, 04	
Ochoa Acosta, Jesús, 13	
Oh, Eunkeu, 0S	
Ospina Giraldo, Juan, 0E, 0Z, 13	
Patel, Prashil, 0W	
Pellegrino, Paul M., 0K	
Rong, Yue, 08	
Sampathkumar, Ashwin, 0H, 0I	
Sançam, Melike, 0L	

Conference Committee

Symposium Chair

Wolfgang Schade, Clausthal University of Technology (Germany)
and Fraunhofer Heinrich-Hertz Institute (Germany)

Symposium Co-chair

Ming C. Wu, University of California, Berkeley (United States)

Conference Chairs

Brian M. Cullum, University of Maryland, Baltimore County
(United States)

Eric S. McLamore, University of Florida (United States)

Conference Program Committee

Troy A. Alexander, U.S. Army Research Laboratory (United States)

Christopher Anton, Episensors, Inc. (United States)

Karl S. Booksh, University of Delaware (United States)

Jonathan C. Claussen, U.S. Naval Research Laboratory
(United States)

Mikella E. Farrell, U.S. Army Research Laboratory (United States)

Amethyst S. Finch, U.S. Army Research Laboratory (United States)

Claudia Gärtner, microfluidic ChipShop GmbH (Germany)

Christopher D. Geddes, University of Maryland, Baltimore
(United States)

Ilko K. Ilev, U.S. Food and Drug Administration (United States)

Douglas Kiehl, Eli Lilly and Co. (United States)

T. Joshua Pfefer, U.S. Food and Drug Administration (United States)

Noriko Satake, UC Davis Medical Center (United States)

Shiv K. Sharma, University of Hawai'i (United States)

Mohan Singh, VBS Purvanchal University (India)

Narsingh B. Singh, University of Maryland, Baltimore County
(United States)

Ryan J. White, University of Maryland, Baltimore County
(United States)

Session Chairs

- 1 Advances in Microfluidic Analyses

Douglas Kiehl, Eli Lilly and Co. (United States)

Claudia Gärtner, microfluidic ChipShop GmbH (Germany)

- 2 Electrochemical/Electro-Luminescent Sensing
Claudia Gärtner, microfluidic ChipShop GmbH (Germany)
Ryan J. White, University of Maryland, Baltimore County (United States)
- 3 Regulation and Monitoring
Douglas Kiehl, Eli Lilly and Co. (United States)
T. Joshua Pfefer, U.S. Food and Drug Administration (United States)
- 4 Recent Developments in Biological SERS Sensing
Mikella E. Farrell, U.S. Army Research Laboratory (United States)
Ilko K. Ilev, U.S. Food and Drug Administration (United States)
- 5 Smart Materials for Biological and Biomedical Sensing
Jonathan C. Claussen, U.S. Naval Research Laboratory (United States)
Narsingh B. Singh, University of Maryland, Baltimore County
(United States)
- 6 Patient Based Monitoring
Douglas Kiehl, Eli Lilly and Co. (United States)