PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 10072

, "Front Matter: Volume 10072," Proc. SPIE 10072, Optical Diagnostics and Sensing XVII: Toward Point-of-Care Diagnostics, 1007201 (24 April 2017); doi: 10.1117/12.2276431

SPIE.

Event: SPIE BiOS, 2017, San Francisco, California, United States

PROGRESS IN BIOMEDICAL OPTICS AND IMAGING

Vol. 18 No. 36

Optical Diagnostics and Sensing XVII: Toward Point-of-Care Diagnostics

Gerard L. Coté

Editor

30–31 January 2017

San Francisco, California, United States

Sponsored by
SPIE

Co-sponsored by
Cobolt (Sweden)

Published by
SPIE

Volume 10072

Proceedings of SPIE, 1605-7422, V. 10072

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

Optical Diagnostics and Sensing XVII: Toward Point-of-Care Diagnostics, edited by Gerard L. Coté, Proc. of SPIE Vol. 10072, 1007201 · © 2017 SPIE · CCC code: 1605-7422/17/\$18 · doi: 10.1117/12.2276431

Proc. of SPIE Vol. 10072 1007201-1

The papers 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. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers 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 these proceedings:

Author(s), "Title of Paper," in *Optical Diagnostics and Sensing XVII: Toward Point-of-Care Diagnostics*, edited by Gerard L. Coté, Proceedings of SPIE Vol. 10072 (SPIE, Bellingham, WA, 2017)
Seven-digit Article CID Number.

ISSN: 1605-7422

ISSN: 2410-9045 (electronic)

ISBN: 9781510605855

ISBN: 9781510605862 (electronic)

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 © 2017, 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 1605-7422/17/\$18.00.

Printed in the United States of America.

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

**SPIE. DIGITAL
LIBRARY**

SPIEDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of 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 and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five 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.

Contents

vii	<i>Authors</i>
ix	<i>Conference Committee</i>

SESSION 1	OPTICAL BIOSENSING USING SURFACE ENHANCED RAMAN SPECTROSCOPY
10072 02	Portable SERS sensor for malachite green and other small dye molecules [10072-1]
10072 03	Optimization of Surface Enhanced Raman Scattering (SERS) assay for the transition from benchtop to handheld Raman systems (Hubner Best Student Paper Award) [10072-2]
10072 06	Nanoimprint lithography-based plasmonic crystal-surface enhanced Raman scattering substrate for point of care testing application [10072-5]
SESSION 2	OPTICAL DETECTION OF BACTERIAL PRESENCE
10072 09	Mid-IR spectroscopic instrumentation for point-of-care diagnosis using a hollow silica waveguide gas cell [10072-8]
10072 0A	Detection of lipopolysaccharides in serum using a waveguide-based optical biosensor [10072-9]
SESSION 3	OPTICAL POINT OF CARE SENSING: AT THE BEDSIDE
10072 0D	Reliable glucose monitoring by ex-vivo blood microdialysis and infrared spectrometry for patients in critical care [10072-12]
10072 0E	Monitoring of interstitial buffer systems using micro-dialysis and infrared spectrometry [10072-13]
SESSION 4	OPTICAL POINT OF CARE TECHNOLOGIES FOR SENSING: IN THE FIELD
10072 0I	Development of an imaging method for quantifying a large digital PCR droplet [10072-17]
10072 0K	Hybrid integration of VCSELs onto a silicon photonic platform for biosensing application [10072-19]
SESSION 5	FLUORESCENT ASSAYS FOR OPTICAL SENSING AND IMAGING
10072 0M	340nm UV LED excitation in time-resolved fluorescence system for europium-based immunoassays detection [10072-21]

10072 ON **Fluorescence analysis of ubiquinone and its application in quality control of medical supplies** [10072-22]

SESSION 6 IMAGING PHOTOPLETHYSMOGRAPHY

10072 OP **Using consumer-grade devices for multi-imager non-contact imaging photoplethysmography** [10072-24]

10072 OQ **Assessing photoplethysmographic imaging performance beyond facial perfusion analysis** [10072-25]

10072 OR **A multispectral testbed for cardiovascular sensing using imaging photoplethysmography** [10072-26]

10072 OS **Measurements of pulse rate using long-range imaging photoplethysmography and sunlight illumination outdoors** [10072-27]

SESSION 7 SPECTROSCOPY EXPERIMENTAL AND MODELING TOWARD PERFUSION AND OXYGENATION MONITORING

10072 OT **Optical monitoring of spinal cord hemodynamics: a feasibility study** [10072-28]

10072 OU **In vivo preclinical verification of a multimodal diffuse reflectance and correlation spectroscopy system for sensing tissue perfusion** [10072-29]

10072 OW **Monte Carlo modeling of spatially complex tissue for the optimization of optical pulse oximeters** [10072-31]

10072 OX **Simulation of diffuse reflectance for characterisation of particle suspensions** [10072-32]

SESSION 8 LABEL FREE OPTICAL SENSING AND DIAGNOSIS

10072 OY **Sensor system for non-invasive optical carboxy-and methemoglobin determination** [10072-33]

10072 OZ **Analyte detection in complex samples using a biomimetic, non-spectroscopic sensing method** [10072-34]

10072 10 **Multispectral and colour analysis for ubiquinone solutions and biological samples** [10072-35]

10072 11 **Measuring tryptophan concentrations of aqueous solutions for cancer research using terahertz time-domain spectroscopy with metal parallel-plate waveguides (Hubner Best Student Paper Award)** [10072-36]

- 10072 12 **Rapid, sensitive and reproducible method for point-of-collection screening of liquid milk for adulterants using a portable Raman spectrometer with novel optimized sample well** [10072-37]
- 10072 13 **Design of smartphone-based spectrometer to assess fresh meat color** [10072-38]

POSTER SESSION

- 10072 15 **An improved optical scheme for self-mixing low-coherence flowmeters** [10072-40]
- 10072 17 **Design verification of a compact system for detecting tissue perfusion using bimodal diffuse optical technologies** [10072-42]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five 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.

Aggarwal, Ishwar D., 0Z	Huang, Jen-Yu, 0I
Amelard, Robert, 0Q	Hughson, Richard L., 0Q
Anderson, Aaron S., 0A	Ihrig, Dieter, 0D, 0E
Bae, Euiwon, 13	Jung, Youngkee, 13
Beigang, René, 11	Karim, Zachary, 0A
Black, Paul, 09	Kempaiah, Prakasha, 0A
Blackford, Ethan B., 0P, 0R, 0S	Khodaei, Yashar, 11
Brock, Beate, 0Y	Kim, Hyun-Wook, 13
Budde, Janpeter, 0D	Kim, Yuan H. Brad, 13
Butcher, Ryan, 0W	Kolodziejcki, Noah J., 0U, 17
Cardile, Paolo, 0K	Kraith, Jens, 0Y
Carroll, Lee, 0K	Kwon, Brian K., 0T
Cattini, Stefano, 15	Lee, Jun Su, 0K
Chen, Yi-Chieh, 0X	Lee, Seung Yup, 0U, 17
Chertov, Aleksandr N., 0N, 10	Lee, Shu-Sheng, 0I
Choudhury, Mahua, 03	Leonhardt, Steffen, 0D
Christian, James F., 0U, 17	Li, Jingting, 02
Chung, Yooree G., 0U, 17	Livingstone, Beth, 09
Clausi, David A., 0Q	Locke, Andrea, 03
Cocchieri, L., 0E	Lu, Huihui, 0K
Coté, Gerard L., 03, 0W	Lue, Leo, 0X
Cripton, Peter A., 0T	Macnab, Andrew, 0T
Daly, Aidan, 0K	Major, Kevin J., 0Z
Delbeck, Sven, 0D	Manouchehri, Neda, 0T
Di Cecilia, Luca, 15	Marks, Haley, 03
Dighe, Priya, 0A	McAdams, Daniel R., 0U, 17
Doggett, Norman, 0A	McGoverin, Cushla M., 12
Elm, J., 0E	McMahon, Benjamin, 0A
Endo, Tatsuhiro, 06	Mukundan, Harshini, 0A
Estep, Justin R., 0P, 0R, 0S	Mycek, Mary-Ann, 0U, 17
Ewald, Hartmut, 0Y	Nieuwoudt, Michel K., 12
Ewing, Kenneth J., 0Z	Noormohamed, Aneesa, 0A
Farkas, Dana, 0U	O'Brien, Peter, 0K
Feinberg, Stephen E., 0U, 17	Ong'echa, John M., 0A
Fernandez, Daniel E., 0U, 17	Opitz, Christiane, 11
Fodgaard, Henrik, 0M	O'Reilly, Jameson, 0U
Fowler, Dawn P., 09	Pakela, Julia M., 0U, 17
Francis, Daniel, 09	Patel, Mitesh K., 09
Gewiss, Helge, 0Y	Pedersen, Christian, 0M
Giertzuch, Peter-Lasse, 11	Perkins, Douglas J., 0A
Gorbunova, Elena V., 0N, 10	Poutous, Menelaos K., 0Z
Greaves, Danielle K., 0Q	Qiu, Suyan, 02
Hedrick, Taylor L., 0U, 17	Robinson, Mitchell, 0W
Heise, H. Michael, 0D, 0E	Rodenko, Olga, 0M
Helton, Michael C., 0U, 17	Rovati, Luigi, 15
Hens, Korbinian, 11	Sanghera, Jasbinder S., 0Z
Hodgkinson, Jane, 09	Schechinger, Monika, 03
Holroyd, Steve E., 12	Schubert, Maik-Hendrik, 11
Hsu, Yu-Hsiang, 0I	Shadgan, Babak, 0T

Shih, Wei-Chuan, 02
Shortt, Katelyn, 0T
Simpson, M. Cather, 12
Sizer, Jeremy, 09
So, Kitty, 0T
Sprenger, Thorsten, 11
Stapels, Christopher J., 0U, 17
Stoliarskaia, Daria, 0X
Streijger, Femke, 0T
Stromberg, Loreen R., 0A
Tatam, Ralph P., 09
Thomson, Kelly, 0X
Tidemand-Lichtenberg, Peter, 0M
Tiernan-Vandermotten, Sarra, 0X
Timm, Ulrich, 0Y
Timofeeva, Elvira O., 0N, 10
Vahlsing, Thorsten, 0D, 0E
Vishwanath, Karthik, 0U, 17
Walton, Christopher, 09
Ward, Brent B., 0U
Williams, David E., 12
Wong, Alexander, 0Q
Yamada, Kenji, 06
Zanfardino, Sara, 17
Zhao, Fusheng, 02
Zhao, Yan, 0K

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 Chairs

Ammasi Periasamy, University of Virginia (United States)

Daniel L. Farkas, University of Southern California (United States) and
SMI (United States)

Conference Chair

Gerard L. Coté, Texas A&M University (United States)

Conference Program Committee

Zane A. Arp, GlaxoSmithKline (United States)

Brent D. Cameron, The University of Toledo (United States)

Werner Gellermann, The University of Utah (United States)

H. Michael Heise, South-Westphalia University of Applied Sciences
(Germany)

Jürgen M. Lademann, Charité Universitätsmedizin Berlin (Germany)

Kristen C. Maitland, Texas A&M University (United States)

Michael J. McShane, Texas A&M University (United States)

Kenith E. Meissner, Swansea University (United Kingdom)

Timothy J. Muldoon, University of Arkansas (United States)

Aydogan Ozcan, University of California, Los Angeles (United States)

Babak Shadgan, The University of British Columbia (Canada)

Kexin Xu, Tianjin University (China)

Shaoqun Zeng, Britton Chance Center for Biomedical Photonics
(China)

Session Chairs

- 1 Optical Biosensing Using Surface Enhanced Raman Spectroscopy
Gerard L. Coté, Texas A&M University (United States)

- 2 Optical Detection of Bacterial Presence
 H. Michael Heise, South-Westphalia University of Applied Sciences
 (Germany)
- 3 Optical Point of Care Sensing: At The Bedside
 Zane A. Arp, GlaxoSmithKline (United States)
- 4 Optical Point of Care Technologies For Sensing: In The Field
 Gerard L. Côté, Texas A&M University (United States)
- 5 Fluorescent Assays for Optical Sensing and Imaging
 Timothy J. Muldoon, University of Arkansas (United States)
- 6 Imaging Photoplethysmography
 D. Patrick O'Neal, Louisiana Tech University (United States)
- 7 Spectroscopy Experimental and Modeling Toward Perfusion and
 Oxygenation Monitoring
 Babak Shadgan, The University of British Columbia (Canada)
- 8 Label Free Optical Sensing and Diagnosis
 Brent D. Cameron, The University of Toledo (United States)