PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 9328

, "Front Matter: Volume 9328," Proc. SPIE 9328, Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XIII, 932801 (21 April 2015); doi: 10.1117/12.2191765

Event: SPIE BiOS, 2015, San Francisco, California, United States

Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XIII

Daniel L. Farkas

Dan V. Nicolau

Robert C. Leif

Editors

9–11 February 2015

San Francisco, California, United States

Sponsored and Published by
SPIE

Volume 9328

Proceedings of SPIE, 1605-7422, V. 9328

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

Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XIII, edited by Daniel L. Farkas,
Dan V. Nicolau, Robert C. Leif, Proc. of SPIE Vol. 9328, 932801 · © 2015 SPIE
CCC code: 1605-7422/15/\$18 · doi: 10.1117/12.2191765

Proc. of SPIE Vol. 9328 932801-1

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 *Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XIII*, edited by Daniel L. Farkas, Dan V. Nicolau, Robert C. Leif, Proceedings of SPIE Vol. 9328 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 1605-7422

ISBN: 9781628414189

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.

SPIEDigitalLibrary.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

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

FUNCTIONAL IMAGING

9328 04	Determination of sub-diffraction-limited organelles and biomolecules using microsphere lenses in combination with fluorescence microscopy [9328-3]
9328 05	Intraoperative model based identification of tissue properties based on multimodal and multiscale measurements [9328-4]
9328 06	Multi-parametric imaging of tumor spheroids with ultra-bright and tunable nanoparticle O₂ probes [9328-5]
9328 07	Optical studies of oxidative stress in pulmonary artery endothelial cells [9328-6]
9328 08	Cholesterol efflux monitoring in macrophage form cells by using fluorescence lifetime imaging [9328-7]
9328 09	A multi-wavelength (u.v. to visible) laser system for early detection of oral cancer [9328-8]
9328 0A	Quantifying the optical properties of turbid media using polarization sensitive hyperspectral imaging (SkinSpect): two-layer optical phantom studies [9328-71]
9328 0B	Qualitative and quantitative comparison of colonic microendoscopy image features to histopathology [9328-10]
9328 0C	Light shift from ultraviolet to near infrared light: Cerenkov luminescence with gold nanocluster-near infrared (AuNc-NIR) conjugates [9328-11]

OPTICAL MANIPULATION

9328 0D	Software aided automatic cell optoporation system [9328-12]
9328 0F	Multimodal optical phenotyping of cancer cells [9328-14]

MICROARRAYS

9328 0H	Protein patterning: a comparison of direct spotting versus microcontact printing [9328-16]
---------	---

SPECTRAL AND MULTIPARAMETER IMAGING I

- 9328 OJ **Estimating skin blood saturation by selecting a subset of hyperspectral imaging data** [9328-18]
- 9328 OK **A preliminary study on a dual-modality OPT / micro-CT system** [9328-19]
- 9328 OL **Hyperspectral imaging to monitor simultaneously multiple protein subtypes and live track their spatial dynamics: a new platform to screen drugs for CNS diseases** [9328-20]

SPECTRAL AND MULTIPARAMETER IMAGING II

- 9328 OO **Characterization of connective tissue progenitors through phase contrast and multicolor fluorescence time-lapse microscopy** [9328-23]
- 9328 OR **Molecular constituents of colorectal cancer metastatic to the liver by imaging infrared spectroscopy** [9328-26]
- 9328 OS ***In vivo* bioluminescence tomography based on multi-view projection and 3D surface reconstruction** [9328-27]
- 9328 OT **Raman spectroscopy of non-penetrating peripheral nerve damage in swine: a tool for spectral pathology of nerves** [9328-28]
- 9328 OW **High-SNR static Fourier-transform imaging spectrometer based on differential structure** [9328-31]

BIOMEDICAL IMAGING USING A DMD OR OTHER MEMS ARRAY: JOINT SESSION WITH CONFERENCES 9328 AND 9376

- 9328 OZ **Parallel acquisition of Raman spectra from a 2D multifocal array using a modulated multifocal detection scheme** [9328-33]

CYTOMICS AND HISTOMICS I

- 9328 10 **Advanced flow cytometric analysis of nanoparticle targeting to rare leukemic stem cells in peripheral human blood in a defined model system (Invited Paper)** [9328-34]
- 9328 11 **Combined LIBS-Raman for remote detection and characterization of biological samples** [9328-35]
- 9328 14 **Quantification of cell surface receptor expression in live tissue culture media using a dual-tracer stain and rinse approach** [9328-39]
- 9328 15 **Non-linear optical measurements using a scanned Bessel beam (Invited Paper)** [9328-40]
- 9328 16 **Progress on an implementation of MIFlowCyt in XML** [9328-41]

- 9328 17 **Measuring oxygen tension modulation, induced by a new pre-radiotherapy therapeutic, in a mammary window chamber mouse model** [9328-42]
- 9328 18 **Label-free cardiac contractility monitoring for drug screening applications based on compact high-speed lens-free imaging** [9328-43]

INSTRUMENTATION

- 9328 19 **Optical cell cleaning with NIR femtosecond laser pulses** [9328-44]
- 9328 1A **Dynamics of cell and tissue growth acquired by means of 25 mm² to 10 cm² lens-free imaging** [9328-45]
- 9328 1B **Label-free analysis of single and multiple cells with a 2D light scattering static cytometer** [9328-46]
- 9328 1C **Microscope-on-chip: combining lens-free microscopy with integrated photonics** [9328-47]

REGENERATIVE MEDICINE

- 9328 1D **System for tracking transplanted limbal epithelial stem cells in the treatment of corneal stem cell deficiency** [9328-48]
- 9328 1E **Human oral mucosal epithelial cell sheets imaging with high-resolution phase-diversity homodyne OCT** [9328-49]

CYTOMICS AND HISTOMICS II

- 9328 1F **Using neural networks for high-speed blood cell classification in a holographic-microscopy flow-cytometry system** [9328-50]
- 9328 1I **Fast and robust identification of single bacteria in environmental matrices by Raman spectroscopy** [9328-53]
- 9328 1K **Frequency-domain fluorescence lifetime imaging system (pco.flim) based on a in-pixel dual tap control CMOS image sensor** [9328-70]

POSTER SESSION

- 9328 1L **Ex-vivo holographic microscopy and spectroscopic analysis of head and neck cancer** [9328-55]
- 9328 1M **Investigating the correlation between white matter and microvasculature changes in aging using large scale optical coherence tomography and confocal fluorescence imaging combined with tissue sectioning** [9328-56]
- 9328 1N **Plastic fiber optics for micro-imaging of fluorescence signals in living cells** [9328-58]

- 9328 1P **Complex dielectric properties of anhydrous polycrystalline glucose in the terahertz region** [9328-60]
- 9328 1Q **Determination of biological activity from fluorescence-lifetime measurements in *Saccharomyces cerevisiae*** [9328-61]
- 9328 1T **Tomographic reconstruction of melanin structures of optical coherence tomography via the finite-difference time-domain simulation** [9328-64]
- 9328 1U **Monitor RNA synthesis in live cell nuclei by using two-photon excited fluorescence lifetime imaging microscopy** [9328-66]
- 9328 1V **Microscopic imaging of resin-bonded dentin using Cryo-FIB/TEM system** [9328-69]

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.

Allen, Heather C., 0R	Farkas, Daniel L., 0A
Allier, C., 1A	Forsberg, Jonathan A., 0T
Anderson, Aaron S., 11	Franke, Robert, 1K
Auwerx, Johan, 04	Ghanian, Zahra, 07
Auyeung, Kelsey, 1L	Gijs, Martin A. M., 04
Auyeung, Kris, 1L	Gmitro, Arthur F., 17
Avti, Pramod K., 1M	Hartmann, P., 1Q
Awasthi, Samir, 15	Hitchcock, Charles L., 0R
Bakhsh, Turki A., 1V	Hoffman, Luis, 1C
Baritoux, Jean-Charles, 1I	Hoffmann, S., 05
Baselt, T., 1Q	Holler, Stephen, 1L
Batista, Ana, 0D, 19	Holst, Gerhard A., 1K
Bélanger, Samuel, 1M	Hu, Yifang, 0S
Bienstman, P., 1F	Huang, Shi-Hao, 1T
Blais-Ouellette, S., 0L	Hui, Hui, 0K
Boadi, J., 1D	Hwang, Won Sang, 08
Bordy, T., 1A	Isbach, Michael, 0F
Borisov, Sergey M., 06	Jansen, Roelof, 1C
Bourdat, Anne-Gaelle, 1I	Janssens, Stefan, 18
Braeken, Dries, 18	Jenkins, James, 06
Breunig, Hans Georg, 0D, 19	Jia, Qiong Z., 1P
Brucker, S., 05	Jin, Peng, 0W
Budde, Björn, 0F	Kalra, S., 09
Butke, Ryan, 0R	Kastl, Lena, 0F
Castonguay, Alexandre, 1M	Kemper, Björn, 0F
Chan, James W., 0Z, 15	Kim, Dug Young, 08
Chave, Robert, 0A	Kim, Min-Gon, 0C
Chen, Zhaomin, 0R	Kim, Soo Hyeok, 08
Chung, Euiheon, 0C	Koida, Kowa, 1N
Cilwa, Katherine E., 0T	Kondouri, Ganesh, 07
Claes, Tom, 1C	Kong, Beihua, 1B
Clancy, Kathryn F. A., 0H	Kong, Lingbo, 0Z
Claus, D., 05	König, Karsten, 0D, 19
Clegg, Samuel M., 11	Kwee, Edward, 0O
Coe, James V., 0R	Labrecque, S., 0L
Collier, Bradley B., 15	Lagae, Liesbet, 18, 1C, 1F
Cooper, Christy L., 10	Lai, Keith, 0B
Coutard, J.-G., 1A	Lambrechts, Andy, 18, 1C
Crane, Nicole J., 0T	Larsson, Marcus, 0J
De Koninck, P., 0L	Laryea, Jonathan A., 0B
Deng, Kexin, 0S	Laurent, Patricia, 1I
Dinten, Jean-Marc, 1A, 1I	Leary, James F., 10
Dmitriev, Ruslan I., 06	Lee, Sang Hak, 08
Dong, Di, 0K	Leif, Robert C, 16
Durkin, Anthony J., 0A	Leif, Stephanie H., 16
Eis, Annie, 07	Lempe, B., 1Q
Elster, Eric A., 0T	Leng, Chengcai, 0S
Espagnon, Isabelle, 1I	Lesage, Frédéric, 1M
Ewertöf, Maria, 0J	Leszczyński, M., 09

Li, Jia Y., 1P
 Li, Ran, 0R
 Lieu, Deborah K., 15
 Lin, Danying, 1U
 Lin, Jie, 0W
 Liu, Shanshan, 1B
 Liu, W., 1P
 MacKinnon, Nicholas, 0A
 Macluskey, M., 09
 MacNeil, S., 1D
 Mangiarini, F., 0L
 Marcet, S., 0L
 Martin, Edward W., Jr., 0R
 Matcher, S. J., 1D
 McInroy, Rhonda E., 11
 Menneteau, M., 1A
 Meredith, W., 09
 Miles, Brett, 1L
 Miller, Barrie, 0R
 Mimmagh, G., 09
 Mimmagh, W., 09
 Mischinger, J., 05
 Mizell, Jason S., 0B
 Mlikota, M., 05
 Moeini, Mohammad, 1M
 Momey, F., 1A
 Moseley, H., 09
 Mossey, P., 09
 Moullan, Norman, 04
 Mukund, Vignesh, 1C
 Mukundan, Harshini, 11
 Muldoon, Timothy J., 0B
 Mulroe, Brigid, 1L
 Mun, Hyoyoung, 0C
 Muschler, George, 0O
 Najda, S. P., 09
 Natsume, Mitsuo, 1N
 Navarro, F., 1A
 Nicolau, Dan V., 0H
 Nystrom, Steven V., 0R
 Oh, Gyungseok, 0C
 Osawa, Kentaro, 1E
 Osten, W., 05
 Papkovsky, Dmitri B., 06
 Park, Byoung Hee, 08
 Paspaley-Grbavac, Milan, 1L
 Pauwelyn, Thomas, 18
 Peng, Xiao, 1U
 Perlin, P., 09
 Pouliot, Philippe, 1M
 Povoski, Stephen P., 0R
 Powell, Kimerly, 0O
 Powless, Amy J., 0B
 Prieto, Sandra P., 0B
 Qi, Jing, 1U
 Qiao, Xu, 1B
 Qu, Junle, 1U
 Ranji, Mahsa, 07
 Reumers, Veerle, 18
 Rommel, Christina, 0F
 Rottenberg, Xavier, 1C
 Rudek, F., 1Q
 Ryu, Youngjae, 0C
 Saager, Rolf, 0A
 Sakurai, Takashi, 1N
 Salerud, E. Göran, 0J
 Sangwal, V., 1D
 Schafer, Rachel, 17
 Schäffer, T. E., 05
 Schemmann, M., 09
 Schierbaum, N., 05
 Schmauder, S., 05
 Schneider, B., 1F
 Schnekenburger, Jürgen, 0F
 Schultz, Emmanuelle, 1I
 Schumacher, P. M., 05
 Schwentner, C., 05
 Senda, Naoko, 1E
 Sepehr, Reyhaneh, 07
 Shi, Liangliang, 0K
 Simon, Anne-Catherine, 1I
 Singh, Aparna, 14
 Sinha, Lagnojita, 14
 Slaughter, Tiffani, 0T
 Slight, T., 09
 Sobrero, Maximiliano, 1L
 Song, Jeonghwan, 1C
 Song, Kun, 1B
 Song, Young Sik, 08
 Stahl, Richard, 18, 1C, 1F
 Stenzl, A., 05
 Strömberg, Tomas, 0J
 Su, Xuantao, 1B
 Sun, P., 1P
 Sylvestre, J.-P., 0L
 Tabatabaei, Maryam S., 1M
 Tarin, C., 05
 Taudt, C., 1Q
 Teutsch, T., 05
 Theaker, E., 09
 Tian, Jie, 0K, 0S
 Tichauer, Kenneth M., 14
 Tseng, Snow H., 1T
 Uchugonova, Aisada, 0D, 19
 Valentine, R., 09
 Vanmeerbeeck, Geert, 18, 1C, 1F
 Vasefi, Fartash, 0A
 Vercruysse, Dries, 1C
 Verhaegen, M., 0L
 Wang, Jun, 0K
 Wang, Kun, 0S
 Wang, Shiang-Jiu, 1T
 Wang, Yan, 1U
 Weber, U., 05
 Wilke, M., 05
 Wittmüß, P., 05
 Woods, J. A., 09
 Wurtz, Robert, 1L
 Xiang, Jialing, 14
 Xie, Linyan, 1B

Xu, Xiaochun, 14
Yan, Wei, 1U
Yang, Cynthia, 14
Yang, Hui, 04
Yang, Xin, 0K
Yang, Yan, 1B
Yang, Yujie, 0K
Yoo, Su Woong, 0C
Zhang, Shuang, 0S
Zhang, Yu, 0W
Zhu, Shuaishuai, 0W
Zou, Y., 1P

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 Chairs

Daniel L. Farkas, University of Southern California (United States) and SMI (United States)
Dan V. Nicolau, McGill University (Canada)
Robert C. Leif, Newport Instruments (United States)

Conference Co-Chairs

James F. Leary, Purdue University (United States)
Attila Tarnok, Universität Leipzig (Germany)
Rebecca R. Richards-Kortum, Rice University (United States)

Conference Program Committee

Vadim Backman, Northwestern University (United States)
Christopher H. Contag, Stanford University School of Medicine (United States)
Paul M. W. French, Imperial College London (United Kingdom)
Yuval Garini, Bar-Ilan University (Israel)
DaeGab Gweon, KAIST (Korea, Republic of)
Charles P. Lin, Wellman Center for Photomedicine (United States)
Sacha Loiseau, Mauna Kea Technologies (France)
Ramesh Raghavachari, U.S. Food and Drug Administration (United States)
Sebastian Wachsmann-Hogiu, University of California, Davis (United States)
Warren S. Warren, Duke University (United States)

Session Chairs

- 1 Functional Imaging
Dan V. Nicolau, McGill University (Canada)
- 2 Optical Manipulation
Dan V. Nicolau, McGill University (Canada)
- 3 Microarrays
Dan V. Nicolau, McGill University (Canada)
- 4 Spectral and Multiparameter Imaging I
Daniel L. Farkas, University of Southern California (United States) and
SMI (United States)
- 5 Spectral and Multiparameter Imaging II
Daniel L. Farkas, University of Southern California (United States) and
SMI (United States)
- 6 Biomedical Imaging using a DMD or Other MEMS Array: Joint Session
with Conferences 9328 and 9376
Michael R. Douglass, Texas Instruments Inc. (United States)
Robert C. Leif, Newport Instruments (United States)
- 7 Biomedical Imaging with Advanced Microscopy using a DMD or
other MEMS Array: Joint Session with Conferences 9328 and 9376
Michael R. Douglass, Texas Instruments Inc. (United States)
Robert C. Leif, Newport Instruments (United States)
- 8 Cytomics and Histomics I
Robert C. Leif, Newport Instruments (United States)
- 9 Instrumentation
Robert C. Leif, Newport Instruments (United States)
- 10 Regenerative Medicine
Attila Tarnok, Universität Leipzig (Germany)
- 11 Cytomics and Histomics II
Robert C. Leif, Newport Instruments (United States)