PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 11060

, "Front Matter: Volume 11060," Proc. SPIE 11060, Optical Methods for Inspection, Characterization, and Imaging of Biomaterials IV, 1106001 (22 August 2019); doi: 10.1117/12.2540351

SPIE.

Event: SPIE Optical Metrology, 2019, Munich, Germany

PROCEEDINGS OF SPIE

Optical Methods for Inspection, Characterization, and Imaging of Biomaterials IV

**Pietro Ferraro
Simonetta Grilli
Monika Ritsch-Marte
Christoph K. Hitzengerger**
Editors

**24–26 June 2019
Munich, Germany**

Cooperating Organisations
European Optical Society
German Scientific Laser Society (Wissenschaftliche Gesellschaft
Lasertechnik e.V.)

Published by
SPIE

Volume 11060

Proceedings of SPIE 0277-786X, V. 11060

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

Optical Methods for Inspection, Characterization, and Imaging of Biomaterials IV, edited by Pietro Ferraro,
Simonetta Grilli, Monika Ritsch-Marte, Christoph K. Hitzengerger, Proc. of SPIE Vol. 11060, 1106001
© 2019 SPIE · CCC code: 0277-786X/19/\$21 · doi: 10.1117/12.2540351

Proc. of SPIE Vol. 11060 1106001-1

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 Methods for Inspection, Characterization, and Imaging of Biomaterials IV*, edited by Pietro Ferraro, Simonetta Grilli, Monika Ritsch-Marte, Christoph K. Hitzemberger, Proceedings of SPIE Vol. 11060 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510627994
ISBN: 9781510628007 (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 © 2019, 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 \$21.00 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/19/\$21.00.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

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

**SPIE. DIGITAL
LIBRARY**

SPIDigitalLibrary.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 *Authors*
ix *Conference Committee*

ADVANCED DIAGNOSTICS BY SPECKLE TECHNIQUES

- 11060 07 **Detection of self-propelling bacteria by speckle correlation assessment and applications to food industry** [11060-6]
- 11060 08 **In-plane deformation gradient measurement using common-path spatial phase shift shearography** [11060-7]
- 11060 09 **A pyroelectric-based system for sensing low abundant lactose molecules** [11060-8]

DIGITAL HOLOGRAPHY

- 11060 0B **A review on optical methods to assess dental behavior under stress (Invited Paper)** [11060-10]
- 11060 0C **Morphology and spatial refractive index distribution of the retina accessed by hyperspectral quantitative phase microscopy** [11060-11]
- 11060 0D **Matched filter applied to discriminate particles with different sizes in biological flows** [11060-12]
- 11060 0E **Imaging the competition between growth and production of self-assembled lipid droplets at the single-cell level (Invited Paper)** [11060-39]

LEARNING APPROACHES IN MICROSCOPY I

- 11060 0H **Identification and classification of biological micro-organisms by holographic learning** [11060-16]

UNDERSTANDING BIOMECHANICS BY OPTICAL METHODS I

- 11060 0K **The evolution of the mechanical properties of orthodontic arches by stimulated infrared thermography** [11060-19]
- 11060 0L **Design of an optofluidic device for the measurement of the elastic modulus of deformable particles** [11060-20]

UNDERSTANDING BIOMECHANICS BY OPTICAL METHODS II

- 11060 00 **Analysis of retinal and choroidal images measured by laser Doppler holography (Invited Paper)** [11060-23]

PHASE CONTRAST AND 3D IMAGING

- 11060 0S **Automatic calibration of the spatial position and orientation for the tomographic digital holographic microscopy** [11060-27]

ADVANCED BIOSENSORS

- 11060 0X **Advanced label-free cellular identification in flow by collaborative coherent imaging techniques** [11060-32]
- 11060 0Y **Nano-biosensors based on dynamic light scattering** [11060-33]
- 11060 0Z **Wound healing assay of two competing cell types with dry mass measurement** [11060-55]

THERMAL IMAGING FOR MEDICINE AND BIOTECHNOLOGY

- 11060 11 **Sources of uncertainty in the evaluation of thermal images in medicine** [11060-36]

HOLOGRAPHY TECHNOLOGY: JOINT SESSION BETWEEN 11059 AND 11060

- 11060 13 **Automated cell identification with compact field portable 3D optical imaging (Keynote Paper)** [11060-38]
- 11060 14 **Holographic imaging of erythrocytes in acoustofluidic platforms** [11060-43]

PHASE CONTRAST TOMOGRAPHY: NEW TRENDS

- 11060 16 **Fast label-free optical diffraction tomography compatible with conventional wide-field microscopes (Invited Paper)** [11060-41]
- 11060 17 **Holographic processing pipeline for tomographic flow cytometry** [11060-42]
- 11060 18 **Block-matching-based filtration in holographic tomography reconstruction** [11060-44]

POSTER SESSION

- 11060 19 **The effect of particle aspect ratio on spatially and angularly resolved vis-NIR spectroscopy of suspensions [11060-45]**
- 11060 1A **3D manipulation of micro-objects based on optical tweezers using acousto-optic deflector and variofocal system [11060-46]**
- 11060 1C **Optical design of infrared endoscope systems for laparoscopic surgery [11060-48]**
- 11060 1D **Terminal container automated guided vehicle based on Lidar navigation [11060-49]**
- 11060 1E **Characterization of microplastics by holographic features for automatic detection in heterogeneous samples [11060-50]**
- 11060 1F **In vivo skin surface study by scattered ellipsometry method [11060-51]**
- 11060 1G **A method for reconstruction of terahertz dielectric response of thin liquid samples [11060-52]**
- 11060 1H **Intensity favored switching of nonlinear optical absorption mechanism in silver nanoparticles under nanosecond pulsed laser excitation [11060-53]**
- 11060 1I **Local orthostatic maneuver in the optical diagnosis of peripheral blood oxygenation [11060-54]**

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.

Alanazi, H., 0E	Guo, Rongxin, 0B
Alenichev, Mikhail K., 0Y	Harakeh, S., 0K
Alieva, Tatiana, 16	Hassani, Khosrow, 08
Ammer, Kurt, 11	He, Jiajian, 1D
Anand, Arun, 13	Heiduschka, Peter, 0C
Andreeva, Irina P., 0Y	Hooshmand-Ziafi, Helia, 08
Arroyo de Grandes, Maria Pilar, 0D	Hu, Yu-Chun, 0S
Atlan, M., 0O	Javidi, Bahram, 13
Bakholdin, Alexey, 1C	K., Chandrasekharan, 1H
Bao, Jun, 1D	Kaniyarakkal N. V., Sharafudeen, 1H
Barroso, Álvaro, 0C	Kemper, Björn, 0C
Batshev, Vladislav I., 1A	Ketelhut, Steffi, 0C
Benmarouane, A., 0K	Komandin, G. A., 1G
Bianco, Vittorio, 07, 0H, 1E	Korotaev, Valery V., 1F
Bobbe, Alexandra, 1C	Kozlov, Alexey B., 1A
Bodnar, J.-L., 0K	Krasin, Georgy K., 1A
Bulykina, Anastasiia B., 1F	Kujawińska, Malgorzata, 18
Cabassi, G., 09	Kurlov, V. N., 1G
Cacace, Teresa, 14	Levin, Alexander D., 0Y
Canul, A. J., 0E	Li, Junchang, 0B
Carcagni, Pierluigi, 0H, 1E	Li, Yankai, 0L
Causa, Filippo, 0X	Lin, Li-Chien, 0S
Chahine, N., 0K	Liu, Qingyu, 1D
Chen, Yi-chieh, 19	Lobera Salazar, Julia, 0D
Cheng, Chau-Jern, 0S	Lu, Lei, 1D
Chernomyrdin, N. V., 1G	Lue, Leo, 19
Cliff, J. B., 0E	Machikhin, Alexander S., 1A
Cohen Maslaton, Shir, 0Z	Maffettone, Pier Luca, 0L, 14
Dannhauser, David, 0X	Mandracchia, B., 07
Dashtdar, Masoomah, 08	Maremonti, Maria Isabella, 0X
de Corato, Marco, 14	Markman, Adam, 13
Deng, Yefeng, 1D	Memmolo, Pasquale, 0H, 0X, 14, 17, 1E
Distante, Cosimo, 0H, 1E	Merola, Francesco, 0H, 17, 1E
Dohnalkova, A. C., 0E	Miccio, L., 17
Dolganova, I. N., 1G	Millet, P., 0K
Drozhennikova, Ekaterina B., 0Y	Montrésor, Silvio, 0B
Durand, Jean-Cédric, 0B	Moon, Inkyu, 13
E., Shiju, 1H	Mouhoubi, K., 0K
Ekimenkova, Alisa, 1C	Mugnano, M., 09, 17
Fages, Michel, 0B	Muñoz Martinez, J. F., 09
Ferraro, Pietro, 07, 09, 0H, 0X, 14, 17, 1E	Musina, G. R., 1G
Fink, M., 0O	N. K., Siji Narendran, 1H
Garcia Goncalves, Luiz Marcos, 0H	Nazzaro, F., 07
Gavdush, A. A., 1G	Nettels-Hackert, Gerburg, 0C
Gennari, O., 09	Netti, Paolo Antonio, 0X
Gómez Climente, Marina, 0D	Nikifin, Maxim P., 0Y
Goncalves da Silva, Andouglas Junior, 0H	Nosov, Pavel A., 1A
Grigorenko, Vitaly G., 0Y	Nowocien, Sylwester, 11
Grilli, S., 07, 09	Nunes, Janine K., 0L

O'Connor, Timothy, 13
 Oleandro, E., 09
 Orlando, P., 09
 Palero Díaz, Virginia, 0D
 Paques, M., 0O
 Paturzo, Melania, 0H, 14, 1E
 Pelizzola,, V, 09
 Picart, Pascal, 0B
 Pichugina, Yulia V., 1A
 Puyo, L., 0O
 Rega, R., 07, 09
 Ringaci, Alina S., 0Y
 Rodrigo, José A., 16
 Rossi, Domenico, 0X
 Ryzhova, Victoria A., 1F
 S., Vijayakumar, 1H
 Sahel, J.-A., 0O
 Schnekenburger, Jürgen, 0C
 Shaked, Natan T., 0Z
 Silverman, A. M., 0E
 Slangen, Pierre, 0B
 Solleman, O. Yusuf, 0B
 Soto, Juan M., 16
 Stephanopoulos, G., 0E
 Stępień, Piotr, 18
 Stoliarskaia, Daria, 19
 Stone, Howard A., 0L
 Sun, Hongwei, 1D
 Thomson, Kelly, 19
 Toumi, Y., 0K
 Tuchin, V. V., 1G
 Uliřko, V. E., 1G
 Vasdekis, A. E., 0E
 Villone, Massimiliano M., 0L, 14
 Voznesenskaya, Anna, 1C
 Xia, Haiting, 0B
 Zaytsev, K. I., 1G

Conference Committee

Symposium Chairs

Marc P. Georges, Université de Liège (Belgium)

Jörg Seewig, Technische Universität Kaiserslautern (Germany)

Honorary Chair

Wolfgang Osten, Universität Stuttgart (Germany)

Conference Chairs

Pietro Ferraro, Institute of Applied Sciences and Intelligent Systems
(ISASI-CNR) (Italy)

Simone Grillo, Institute of Applied Sciences and Intelligent Systems
(ISASI-CNR) (Italy)

Monika Ritsch-Marte, Medizinische Universität Innsbruck (Austria)

Christoph K. Hitzinger, Medizinische Universität Wien (Austria)

Conference Programme Committee

Luigi Ambrosio, CNR (Italy)

Giuseppe Chirico, Università degli Studi di Milano-Bicocca (Italy)

Jonathan M. Cooper, University of Glasgow (United Kingdom)

Diego di Bernardo, Telethon Institute of Genetics and Medicine (Italy)

Alberto Diaspro, Istituto Italiano di Tecnologia (Italy)

Frank Dubois, Université Libre de Bruxelles (Belgium)

Wolfgang A. Ertmer, Leibniz Universität Hannover (Germany)

Roger Groves, Technische Universiteit Delft (Netherlands)

Jochen R. Guck, Technische Universität Dresden (Germany)

Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Pasquale Memmolo, Istituto di Scienze Applicate e Sistemi Intelligenti
(ISASI-CNR) (Italy)

Fernando Mendoza Santoyo, Centro de Investigaciones en Óptica,
A.C. (Mexico)

Lisa Miccio, Institute of Applied Sciences and Intelligent Systems
(ISASI-CNR) (Italy)

Serge Monneret, Institut Fresnel (France)

Paolo A. Netti, Università degli Studi di Napoli Federico II (Italy)

Fiorenzo Gabriele Omenetto, Tufts University (United States)

Pablo D. Ruiz, Loughborough University (United Kingdom)

David D. Sampson, The University of Western Australia (Australia)

Natan Tzvi Shaked, Tel Aviv University (Israel)

Claudia Tortiglione, Institute of Applied Sciences and Intelligent
Systems (ISASI-CNR) (Italy)

Ruikang K. Wang, University of Washington (United States)

Zeev Zalevsky, Bar-Ilan University (Israel)

Session Chairs

- 1 Advanced Microscopy Modalities
Lisa Miccio, Istituto di Scienze Applicate e Sistemi Intelligenti "Eduardo Caianiello" (Italy)
- 2 Advanced Diagnostics by Speckle Techniques
Vittorio Bianco, Institute of Applied Sciences and Intelligent Systems (ISASI-CNR) (Italy)
- 3 Digital Holography
Pierre P. Marquet, Centre de Recherche de l'Université Laval Robert-Giffard (Canada)
- 4 Learning Approaches in Microscopy I
Jürgen W. Czarske, Technische Universität Dresden (Germany)
- 5 Understanding Biomechanics by Optical Methods I
Kirill V. Larin, University of Houston (United States)
- 6 Understanding Biomechanics by Optical Methods II
Christoph K. Hitzenberger, Medizinische Universität Wien (Austria)
- 7 Phase Contrast and 3D Imaging
Demetri Psaltis, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
- 8 Learning Approaches in Microscopy II
Pietro Ferraro, Istituto di Scienze Applicate e Sistemi Intelligenti "Eduardo Caianiello" (Italy)
- 9 Advanced Biosensors
Monika Ritsch-Marte, Pacific Northwest National Laboratory (United States)
- 10 Thermal Imaging for Medicine and Biotechnology
Giuseppe Chirico, Università degli Studi di Milano-Bicocca (Italy)
- Holography Technology: Joint Session
 Pietro Ferraro, Istituto di Scienze Applicate e Sistemi Intelligenti "Eduardo Caianiello" (Italy)
 Pierre R. Slangen, Mines Alès (France)
- 11 Phase Contrast Tomography: New Trends
Monika Ritsch-Marte, Medizinische Universität Innsbruck (Austria)