

PROCEEDINGS OF SPIE

Biomedical Spectroscopy, Microscopy, and Imaging II

Jürgen Popp
Csilla Gergely
Editors

3–7 April 2022
Strasbourg, France

9–20 May 2022
ONLINE

Sponsored by
SPIE

Cosponsored by
City of Strasbourg (France)
IdEx University of Strasbourg (France)
CNRS (France)
iCube (France)
Université de Strasbourg (France)

Cooperating Organisations
Photonics 21 (Germany)
EOS—European Optical Society (Germany)
Photonics Public Private Partnership (Belgium)
Photonics France (France)

Published by
SPIE

Volume 12144

Proceedings of SPIE 0277-786X, V. 12144

Biomedical Spectroscopy, Microscopy, and Imaging II, edited by Jürgen Popp,
Csilla Gergely, Proc. of SPIE Vol. 12144, 1214401 · © 2022 SPIE
0277-786X · doi: 10.1117/12.2643400

Proc. of SPIE Vol. 12144 1214401-1

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 SPIDigitalLibrary.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 *Biomedical Spectroscopy, Microscopy, and Imaging II*, edited by Jürgen Popp, Csilla Gergely, Proc. of SPIE 12144, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510651647

ISBN: 9781510651654 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2022 Society of Photo-Optical Instrumentation Engineers (SPIE).

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 fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center 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.

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: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE 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 *Conference Committee*

NEUROPHOTONICS II

- 12144 02 **Fiber-based optrodes: dual optical and electrical probe for optogenetics** [12144-9]
- 12144 03 **3D micropatterned multiphoton stimulation via deep learning-based computer-generated holography with temporal focusing confinement** [12144-10]

RAMAN SPECTROSCOPY AND IMAGING I

- 12144 04 **Soft tissue tumor size prediction using precise fiber-optic Raman probes: in silico investigations** [12144-13]
- 12144 05 **Electronic Raman scattering calibration for quantitative surface-enhanced Raman spectroscopy and improved biostatistical analysis** [12144-64]

RAMAN SPECTROSCOPY AND IMAGING II

- 12144 06 **Label-free classification of T-cell differentiation via deep learning of hyperspectral stimulated Raman scattering microscopy images** [12144-19]

ADVANCED MICROSCOPY AND IMAGING I

- 12144 07 **Ultrafast light field tomography** [12144-24]
- 12144 08 **Multimodal handheld endomicroscopic system designed for in vivo laser ablation and nonlinear imaging with a large field of view** [12144-25]
- 12144 09 **Dynamics of colliding homogenous and heterogenous plasmas produced by nanosecond-laser ablation** [12144-34]

ADVANCED MICROSCOPY AND IMAGING II

- 12144 0A **The study of cell death mechanisms via simultaneous Raman and transport of intensity phase-imaging techniques (Invited Paper)** [12144-27]

12144 0B **Evaluation of microbial colony growth parameters by laser speckle imaging** [12144-30]

ADVANCED MICROSCOPY AND IMAGING III

12144 0C **An instrumental and computational pipeline for visualizing free viral particles (Invited Paper)**
[12144-35]

12144 0D **A miniaturized chip for 3D optical imaging of tissue regeneration in vivo** [12144-36]

12144 0E **Development of images multispectral processing for the skin cancer early diagnostics**
[12144-33]

MULTIPHOTON MICROSCOPY I

12144 0F **To improve in-vivo bio images of fast temporal focusing multiphoton microscopy by multi-stage U-Net image restoration** [12144-37]

OPTICAL COHERENCE TOMOGRAPHY

12144 0G **A longitudinal study of cervical tissue composition changes during normal pregnancy in mice using spectroscopic photoacoustic (Invited Paper)** [12144-40]

12144 0H **Optical coherence tomography guided Brillouin microscopy to study early embryonic development** [12144-44]

12144 0I **Machine learning classifiers for noninvasive glucose detection using a single wavelength mid-infrared photoacoustic spectroscopy** [12144-45]

MULTIPHOTON MICROSCOPY II

12144 0J **Analysis of collagen types I and II at bone fracture healing tissue using polarization SHG**
[12144-48]

12144 0K **Focal field engineered infrared-sensitive third-order sum frequency generation microscopy**
[12144-51]

POSTER SESSION

12144 0L **Macular edema degeneration classification on OCT and fundus images with portable platform based on artificial intelligence methods** [12144-52]

- 12144 0M **Analysis of Raman spectra using the multivariate curve resolution-alternating least squares (MCR-ALS) algorithm** [12144-55]
- 12144 0N **Optical modeling of compact Raman biomedical probe for endoscopic applications** [12144-57]
- 12144 0O **The assessment of reflectance ratios for determination of water content in leaves using shorter end of near-infrared spectroscopy** [12144-60]
- 12144 0P **Automatic cell identification and analysis on in vivo reflectance confocal microscopy images of the human epidermis** [12144-61]

Conference Committee

Symposium Chairs

Francis Berghmans, Vrije Universiteit Brussel (Belgium)
Thierry Georges, Oxxius SA (France)
Paul C. Montgomery, Université de Strasbourg (France)

Programme Track Chair

Jürgen Popp, Friedrich-Schiller-Universität (Germany)

Conference Chairs

Jürgen Popp, Friedrich-Schiller-Universität (Germany)
Csilla Gergely, Laboratoire Charles Coulomb (France)

Conference Programme Committee

Peter E. Andersen, Danmarks Tekniske Universitet (Denmark)
James M. Brewer, University of Glasgow (United Kingdom)
Arthur E. T. Chiou, National Yang-Ming University (Taiwan)
Jürgen W. Czarske, Technische Universität Dresden (Germany)
Johannes F. de Boer, Vrije Universiteit Amsterdam (Netherlands)
Kishan Dholakia, University of St. Andrews (United Kingdom)
Dror Fixler, Bar-Ilan University (Israel)
Sylvain Gioux, Université de Strasbourg (France)
Kirill V. Larin, University of Houston (United States)
Qingming Luo, Hainan University (China)
Thomas G. Mayerhöfer, Leibniz-Institut für Photonische Technologien e.V. (Germany)
Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany)
David D. Sampson, The University of Western Australia (Australia)
Ernst H. K. Stelzer, Johann Wolfgang Goethe-Universität Frankfurt am Main (Germany)
Hugo Thienpont, Vrije Universiteit Brussel (Belgium)
Siva Umamathy, Indian Institute of Science (India)
I. Alex Vitkin, Ontario Cancer Institute (Canada)
Gert von Bally, Center for Biomedical Optics and Photonics (Germany)
Brian C. Wilson, Princess Margaret Hospital (Canada)

