

PROCEEDINGS OF SPIE

Translational Biophotonics: Diagnostics and Therapeutics III

Zhiwei Huang
Lothar D. Lilge
Editors

25–29 June 2023
Munich, Germany

Sponsored by
SPIE

Co-sponsored by
Optica (United States)

Published by
SPIE

Volume 12627

Proceedings of SPIE 0277-786X, V. 12627

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

Translational Biophotonics: Diagnostics and Therapeutics III, edited by
Zhiwei Huang, Lothar D. Lilge, Proc. of SPIE Vol. 12627, 1262701
© 2023 SPIE · 0277-786X · doi: 10.1117/12.3007297

Proc. of SPIE Vol. 12627 1262701-1

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 *Translational Biophotonics: Diagnostics and Therapeutics III*, edited by Zhiwei Huang, Lothar D. Lilge, Proc. of SPIE 12627, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510664630
ISBN: 9781510664647 (electronic)

Published by

SPIE

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

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2023 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

ix *Conference Committee*

IN VIVO DIAGNOSTICS

- 12627 04 **In vivo Raman spectroscopic study of suspected melanoma skin lesions and healthy skin** [12627-1]
- 12627 07 **Multi-wavelength optoelectronic sensing system for real time and any time physiological monitoring and assessment** [12627-4]
- 12627 08 **In-vitro screening of immune response with FTIR spectroscopy in a miRNA murine knock out model** [12627-6]
- 12627 09 **Detection and identification by vibrational spectroscopy of myocardial biochemical alterations in heart failure with preserved ejection fraction** [12627-115]
- 12627 0A **Data fusion strategies for multi-modal classification of auto-immune dysregulation with vibrational spectroscopy** [12627-71]

RAMAN-BASED DIAGNOSTICS

- 12627 0B **Biophotonics diagnostics of oral cancer using Raman spectroscopy** [12627-8]
- 12627 0C **Fluorescence and Raman imaging of amyloid plaques reveals carotenoid accumulations** [12627-9]
- 12627 0D **Serum Raman spectroscopy in experimental carcinogenesis: explorations on role of tumour load** [12627-10]

BIOPHOTONICS IN FOOD SCIENCE

- 12627 0I **Fluorescence based detection of gaseous food spoilage indicators** [12627-14]

INFECTIOUS DISEASE

- 12627 0J **Suppression of airborne viral epidemic spread by UVC light barriers** [12627-15]
- 12627 0L **The effect of surface modifications for the aim of decreasing bacterial adhesion on titanium implants** [12627-17]

SMART SENSOR AND AI

- 12627 OP **New models of innovation through collaboration: the translation journey of novel concepts in corneal refractive surgery** [12627-114]

PHOTODYNAMIC THERAPY I

- 12627 OS **Anticancer effects of photodynamic therapy against colorectal multicellular tumour spheroids** [12627-27]
- 12627 OU **The phototoxic effect of zinc phthalocyanine on melanoma cells grown as a monolayer and three-dimensional multicellular spheroids** [12627-29]
- 12627 OV **Cell death mechanisms induced by green synthesized silver nanoparticles in combination with pheophorbide a-mediated photodynamic therapy against resistant MCF-7 cells overexpressed with P-glycoprotein** [12627-30]

BRAIN AND PHOTONICS I

- 12627 OW **Microscope integrated real time high density 4D MHz-OCT in neurosurgery: a depth and tissue resolving visual contrast channel and the challenge of fused presentation** [12627-31]

BRAIN AND PHOTONICS II

- 12627 OZ **Clinical evaluation of thulium laser/ultrasonic aspirator combination instrument during neurosurgical tumour resection** [12627-34]
- 12627 11 **Wavelet analysis of laser speckle contrast reveals new feature space for transcranial assessment of cerebral blood flow** [12627-36]
- 12627 12 **Spatially resolved plasmonic sensing at the tip of a multimode fiber** [12627-57]

PHOTODYNAMIC THERAPY II

- 12627 14 **Blue LED light affects mitochondria and modulates reactive oxygen species: preliminary in vitro results** [12627-37]
- 12627 16 **Analyses of protoporphyrin IX fluorescence photoswitching for prolonging the photodynamic diagnosis time of deeply located tumours** [12627-39]
- 12627 17 **Detection of laser-induced singlet oxygen: current approaches and challenges** [12627-40]

- 12627 18 **Comparative characterization of SiCl₂Pc and its cyclodextrin complexes as photosensitizers in photodynamic therapy** [12627-41]

BRAIN AND PHOTONICS III

- 12627 1B **Optical assessment of the response in cerebral metabolism to mean arterial pressure during the transition onto cardiopulmonary bypass** [12627-45]
- 12627 1D **Separable spectral unmixing based on the learning of periodic absorbance changes: application to functional brain mapping using RGB imaging** [12627-44]

BIOPHOTONICS IN BREAST CANCER DETECTION

- 12627 1H **A classifier for dynamic thermal imaging** [12627-50]

OPHTHALMOLOGY AND PHOTONICS

- 12627 1J **Histologic findings following retinal pigment epithelium removal using 8 microsecond laser pulses** [12627-52]
- 12627 1K **Color vision sensitivity screening before and one week after cataract removal surgery** [12627-53]
- 12627 1L **Comparison of acoustic transients with fringe washouts in OCT M-scans after RPE microsecond laser irradiation** [12627-54]

OPTICAL COHERENCE AND OTHER TECHNIQUES

- 12627 1M **Advances of LC-OCT technology for diagnostic support in dermatology** [12627-55]
- 12627 1N **Towards a novel bi-functional bioresorbable micro-structured optical fiber for theranostic applications** [12627-56]
- 12627 1P **Comparison between optical coherence tomography and phase shifting profilometry for surface estimation** [12627-59]
- 12627 1Q **Ex-vivo OCT on human bladder tissue after radical cystectomy with a newly designed MEMS based forward looking OCT probe** [12627-60]
- 12627 1R **Optical coherence tomography angiography for chronic venous insufficiency and venous leg ulcer** [12627-85]

MICROSCOPY AND OTHER DIAGNOSTIC TECHNIQUES

- 12627 1S **Multimodal vibrational and multiphoton nonlinear optical microscopy as a non-invasive tool to prevent human tumor recurrence** [12627-62]
- 12627 1T **Fluorescence lifetime imaging microscopy (FLIM) of human middle ear tissue samples** [12627-63]
- 12627 1U **Investigation on the influence of the skin tone on hyperspectral imaging data interpretation for free flap surgery** [12627-65]
- 12627 1W **An endoscopic approach to limit the depth of laser-induced thermal injury** [12627-67]
- 12627 1X **Using Brillouin and Raman microspectroscopy to diagnose musculoskeletal disorders: from characterizing healthy phenotypes to detecting human osteoarthritic lesions** [12627-117]

MULTISPECTRA AND HYPERSPECTRAL DIAGNOSIS I

- 12627 1Z **Simultaneous fluorescence microscopy and spectroscopy of oral squamous cell carcinoma, oral dysplasia, and normal tissue** [12627-69]
- 12627 20 **Time resolved photon counting CMOS SPAD arrays for clinical imaging and spectroscopy** [12627-72]

OPTICAL SENSORS TRANSLATIONAL BIOPHOTONICS

- 12627 23 **Real-time temperature-control for cw retinal laser therapy in a clinical study** [12627-74]
- 12627 24 **Control of the viability of three-dimensional cultured skins by photobiomodulation** [12627-75]
- 12627 28 **Optimization study of parameters for laser-induced thermal treatment of the esophageal mucosal layer** [12627-79]

MULTISPECTRA AND HYPERSPECTRAL DIAGNOSIS II

- 12627 29 **A laparoscopic multispectral system to visualize tissue oxygenation** [12627-80]
- 12627 2C **Development of a novel, compact, and transportable multispectral imaging device for wound healing monitoring** [12627-84]
- 12627 2D **Vibrational spectroscopy techniques for the study of cardiorenal syndrome in rat models** [12627-116]

POSTER SESSION

- 12627 2E **Changes in blood flow oscillations associated with COVID-19 as measured by wearable laser Doppler flowmetry** [12627-18]
- 12627 2F **Infantile hemangiomas evaluation based on hyperspectral imaging** [12627-23]
- 12627 2G **Differentiation of collagen-related skin diseases through polarimetry and fluorescence** [12627-64]
- 12627 2H **Analysis of bacterial DNA by surface enhanced Raman spectroscopy** [12627-70]
- 12627 2J **Tissue indices for tissue properties extraction in head and neck tumors** [12627-89]
- 12627 2L **Determination of the physiological state of cells by differences in FAD fluorescence intensity** [12627-91]
- 12627 2N **Plasmonic functional assay platform for measuring single cell growth through refractive index sensing** [12627-93]
- 12627 2O **Low-cost and portable plasmonic biosensor for label-free detection of viruses in resource-limited settings** [12627-94]
- 12627 2Q **Characterization of lipid components in human cells by means of ATR FT-IR spectroscopy** [12627-96]
- 12627 2S **Optofluidic lab-on-chip for nucleic acid detection via G-quadruplex-based DNA-nanomachine** [12627-98]
- 12627 2T **Comparison of nonlinear properties of monomer and dimer of bacterial phytochrome from *Deinococcus radiodurans*** [12627-99]
- 12627 2U **Modified optical fiber sensors for intravital monitoring** [12627-100]
- 12627 2V **Multispectral imaging for assessment of Fabry disease** [12627-101]
- 12627 2X **Raman spectroscopy of urine: an exploratory study on stratification of oral cancers and tobacco habitués** [12627-103]
- 12627 30 **Investigation of relationship between parameters of blood microcirculation and gas analysis during hypo- and hyperventilation breathing yoga exercises** [12627-107]
- 12627 31 **Wide-field optical properties estimation of whole limbs in muscle dystrophy murine models via SFDI: a case study** [12627-108]
- 12627 32 **An investigation on the Amide I band in vibrational spectra of gingival crevicular fluid during orthodontic treatments** [12627-109]
- 12627 33 **Towards a flexible polarimetric camera-on-tip miniature endoscope for 3×3 Mueller matrix measurements of biological tissue (Best Student Paper)** [12627-110]

- 12627 34 **Study of lipid involvement in breast cancer by using vibrational imaging on tissue samples from normal and obese patients** [12627-111]
- 12627 36 **A portable surface-enhanced Raman spectroscopy platform for biofluid analysis** [12627-119]
- 12627 37 **Wide-field Raman spectral band imaging of tumor lesions in veterinary medicine** [12627-120]
- 12627 38 **Quantitative morphological analysis of the T-tubular network of ventricular cardiomyocytes using novel image processing tools** [12627-121]

Conference Committee

Symposium Chairs

Ronald Stroka, Ludwig-Maximilians-Universität Munich (Germany)
Alex Vitkin, Ontario Cancer Institute (Canada)

Symposium Co-chairs

Hamid Deghani, University of Birmingham (United Kingdom)
Wang-Yuhl William Oh, Korea Advanced Institute of Science and
Technology (Korea, Republic of)
Peter T. C. So, Massachusetts Institute of Technology (United States)

Conference Chairs

Zhiwei Huang, National University of Singapore (Singapore)
Lothar D. Lilge, University Health Network (Canada)

Conference Programme Committee

Daniel S. Elson, Imperial College London (United Kingdom)
Summer L. Gibbs, Oregon Health & Science University (United States)
Keisuke Goda, The University of Tokyo (Japan)
George S. D. Gordon, The University of Nottingham (United Kingdom)
Frédéric Leblond, Polytechnique Montréal (Canada)
Igor Meglinski, University of Oulu (Finland)
Mark Niedre, Northeastern University (United States)
Daniel Razansky, Universität Zürich (Switzerland)
Michael G. Tanner, Heriot-Watt University (United Kingdom)
Paola Taroni, Politecnico di Milano (Italy)
Gooitzen M. van Dam, University Medical Center Groningen
(Netherlands)
Yijing Xie, King's College London (United Kingdom)
Ping Xue, Tsinghua University (China)
Shuhua Yue, Beihang University (China)
Haishan Zeng, BC Cancer Research Center (Canada)

