

PROCEEDINGS OF SPIE

# *Biomedical Imaging and Sensing Conference*

**Toyohiko Yatagai**  
*Editors*

**17–21 April 2023**  
**Yokohama, Japan**

*Published by*  
SPIE

**Volume 12608**

Proceedings of SPIE 0277-786X, V. 12608

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

Biomedical Imaging and Sensing Conference, edited by Toyohiko Yatagai, Proc. of SPIE  
Vol. 12608, 1260801 · © 2023 SPIE · 0277-786X · doi: 10.1117/12.3011880

Proc. of SPIE Vol. 12608 1260801-1

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](http://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 Imaging and Sensing Conference*, edited by Toyohiko Yatagai, Proc. of SPIE 12608, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510663435  
ISBN: 9781510663442 (electronic)

Published by  
**SPIE**  
P.O. Box 10, Bellingham, Washington 98227-0010 USA  
Telephone +1 360 676 3290 (Pacific Time)  
[SPIE.org](http://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](http://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](http://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*

---

## BIOMEDICAL IMAGING AND SENSING CONFERENCE

---

- 12608 02 **Single optical fibre ultrasound transducer for rotational imaging** [12608-1]
- 12608 03 **Sensitivity enhancement of nickel nanowire-gated FET glucose sensor using graphene film as intermediate layer** [12608-2]
- 12608 04 **Mid-infrared passive spectroscopic imaging for non-invasive blood glucose sensor (1st. report): visualization of glucose omnipresence based on time response differences** [12608-3]
- 12608 05 **Mid-infrared passive spectroscopic imaging for non-invasive blood glucose sensor (3rd. report): broad band (3-20 $\mu$ m) reflective optics spectroscopic imager with microbolometer array sensor** [12608-4]
- 12608 06 **Combination of two in-line digital holograms for high accuracy nanoparticles tracking** [12608-5]
- 12608 07 **Real time and anytime opto-physiological monitoring** [12608-6]
- 12608 08 **Single-shot complex amplitude measurement technique in rhombic Fourier region using tilted reference light** [12608-7]
- 12608 09 **In-vivo animal deep brain imaging using needle-based optical coherence tomography** [12608-8]
- 12608 0A **Mid-infrared passive spectroscopic imaging for non-invasive blood glucose sensor (2nd. report): pea-sized (diameter: 6mm, length: 14mm) one-shot passive spectrometer for smartwatch** [12608-9]
- 12608 0B **Masked coherent diffractive imaging with ADMM-based phase retrieval** [12608-10]
- 12608 0C **Mid-infrared passive spectroscopic imaging for visualizing tooth hardness** [12608-11]
- 12608 0D **Numerical verification of parallel two-step phase-shifting digital holography for single-shot imaging** [12608-12]
- 12608 0E **Surface wave elastography measurements on tissue-mimicking phantoms** [12608-13]
- 12608 0F **Principal component analysis for the protein amide I region of Raman imaging data before/after straight perm of human grey hair** [12608-14]

- 12608 OG **Realization of bio-Raman black hair analysis by automatic signal separation of melanin from other hair components** [12608-15]
- 12608 OH **Mid-infrared passive spectroscopic imaging for monitoring food composition** [12608-16]
- 12608 OI **3D-printed head surface model of a standard brain template for scalp-cortex correlation of fNIRS** [12608-17]
- 12608 OJ **Estimation of growth of thrombus in artificial blood flow using laser light scattering** [12608-18]
- 12608 OK **Development of an IoT-integrated digital droplet nucleic acid detection system for liquid biopsy screening** [12608-19]
- 12608 OL **Integration and evaluation of several droplet imaging quantification methods for a compact fluorescent digital bead imaging device** [12608-20]
- 12608 OM **Development of an image profiling method for high-throughput single extracellular vesicle analysis** [12608-21]
- 12608 ON **Crafting a streamlined isothermal amplification assay for sensitive and rapid nucleic acid detection of glioblastoma** [12608-22]
- 12608 OO **Optimization of design parameters in volumetric beam shaping** [12608-23]
- 12608 OP **Planar light-sheet microscopy with curved Airy beams** [12608-24]
- 12608 OQ **Numerical analysis for image space reconstruction algorithm** [12608-25]
- 12608 OR **Holography with higher-order Stokes correlations** [12608-26]
- 12608 OS **Laser focusing and scanning by 1-bit control of spatial phase modulator for lens-less vascular endoscope** [12608-27]
- 12608 OT **Saturated-excitation image scanning microscopy for super-resolution fluorescence imaging** [12608-28]
- 12608 OU **Estimation on the penetration depth of light propagating near the illuminated area in skin** [12608-29]
- 12608 OV **Image recovery of fluorescent beads by TIE-based computational imaging and phase retrieval** [12608-30]
- 12608 OW **Burst digital holography** [12608-31]
- 12608 OX **Mid-infrared photoacoustic spectral imaging based on ultrasound detection** [12608-32]
- 12608 OY **Focusing through scattering media by transmission matrix measurement using co-axial configuration of SLM** [12608-33]

- 12608 0Z **High-speed 3D color planar lightwave circuit digital holographic microscope towards the observation of mammalian cells** [12608-34]
- 12608 10 **Feature identification of skin diseases and laser therapy with a portable optical coherence imaging system** [12608-35]
- 12608 11 **Chromophore estimation from finite element derived skin tissue models: simulation and experiments** [12608-36]
- 12608 12 **Optical sectioning fluorescence microscopy using variable metalens** [12608-37]
- 12608 13 **Development of measurement system for subsurface scattering light of skin and analysis of its age-related changes** [12608-38]
- 12608 14 **Volume hologram for common-path digital holographic microscopy** [12608-39]
- 12608 15 **In vivo monitoring of hemoglobin derivative concentrations and saturations in rat burn wounds using a red-green-blue camera** [12608-40]
- 12608 16 **Light sheet fluorescence microscopy in NIR II for mouse lung imaging** [12608-41]
- 12608 17 **Autofluorescence imaging enhanced by deep-ultraviolet surface plasmon resonance for label-free bio-sensing** [12608-42]
- 12608 18 **Parallel phase-shifting incoherent digital holography for two-photon holographic microscopy** [12608-43]
- 12608 19 **Mid-infrared photothermal deflection spectroscopy system for non-invasive blood component analysis** [12608-44]
- 12608 1A **High-speed Raman spectroscopic diagnosis guaranteeing accuracy by reinforcement learning** [12608-45]
- 12608 1B **Two-photon speckle excitation fluorescence imaging using non-negative matrix factorization** [12608-46]
- 12608 1C **Laser-scanning optical-frequency-comb microscopy for imaging using various aspects of light information** [12608-47]
- 12608 1D **Digital holography of gold nanoparticles heated in water** [12608-48]
- 12608 1E **Numerical evaluation of fluorescence probe using excitation spectrum of FRET network** [12608-49]
- 12608 1F **RGB camera-based real-time monitoring of tissue oxygen saturation in human skin while varying fraction of inspired oxygen** [12608-50]
- 12608 1G **Comparison of scanning stability analysis with the dual-axis MEMS scanner based on switchable driving mode in optical coherence tomography imaging technology** [12608-51]

- 12608 1H **Investigating opioid-modulated receptor heterodimerization by two-photon fluorescence microscopy** [12608-52]
- 12608 1I **Precision glass molding process enhancing the expanding of chip-on-tip endoscopes** [12608-53]
- 12608 1J **Second-order correlation of randomness for enhanced quality imaging** [12608-54]
- 12608 1K **High-speed fluorescence microscopy for next-generation life science** [12608-55]
- 12608 1L **Mid-infrared (LWIR) passive spectroscopic imaging for medical measurements like non-invasive blood glucose sensor from a distance** [12608-56]
- 12608 1M **Non-interferometric optical diffraction tomography defying matched illumination condition** [12608-57]
- 12608 1N **Deep learning-enabled computational microscopy and diffractive imaging** [12608-58]
- 12608 1O **Toward non-invasive, precise control of internal organs via ultrasound neuromodulation of the autonomic nervous system** [12608-59]
- 12608 1P **Development and application of 4D light-field and quantum imaging technologies** [12608-60]
- 12608 1Q **Holographic microscope illuminates brain activity** [12608-61]
- 12608 1R **Multi-plate continuum laser for pre-resonance coherent Raman scattering** [12608-62]
- 12608 1S **Optimizing transcranial infrared light stimulation for cognitive function enhancement: near-infrared spectroscopy approaches** [12608-63]

# Conference Committee

## *Conference Chair*

**Toyohiko Yatagai**, Utsunomiya University (Japan)

## *Conference Co-chairs*

**Yoshihisa Aizu**, Muroran Institute of Technology (Japan)  
**Osamu Matoba**, Kobe University (Japan)  
**Yasuhiro Awatsuji**, Kyoto Institute of Technology (Japan)  
**Yuan Luo**, National Taiwan University (Taiwan)

## *Conference Program Committee*

**Wonshik Choi**, Korea University (Korea, Republic of)  
**Shi-Wei Chu**, National Taiwan University (Taiwan)  
**Dong Li**, Chinese Academy of Sciences (China)  
**Katsumasa Fujita**, Osaka University (Japan)  
**Yoshio Hayasaki**, Utsunomiya University Center for Optical Research  
& Education (Japan)  
**Masaki Hisaka**, Osaka Electro-Communication University (Japan)  
**Wataru Inami**, Shizuoka University (Japan)  
**Ichiro Ishimaru**, Kagawa University (Japan)  
**Toshiaki Iwai**, Tokyo University of Agriculture and Technology (Japan)  
**Hsiang-Chieh Lee**, National Taiwan University (Taiwan)  
**Xingde Li**, Johns Hopkins University (United States)  
**Takashi Kakue**, Chiba University (Japan)  
**Myung K. Kim**, University of South Florida (United States)  
**Robert Magnusson**, The University of Texas at Arlington (United States)  
**Yuji Matsuura**, Tohoku University (Japan)  
**Izumi Nishidate**, Tokyo University of Agriculture and Technology  
(Japan)  
**Goro Nishimura**, Hokkaido University (Japan)  
**Yusuke Ogura**, Osaka University (Japan)  
**Eiji Okada**, Keio University (Japan)  
**Yukitoshi Otani**, Utsunomiya University (Japan)  
**Yong-Keun Park**, KAIST (Korea, Republic of)  
**Xiangyu Quan**, Kobe University (Japan)  
**Manabu Sato**, Yamagata University (Japan)  
**Shunichi Sato**, National Defense Medical College (Japan)  
**Tatsuki Tahara**, National Institute of Information and Communications  
Technology (Japan)

**Enrique Tajahuerce**, University Jaume I (Spain)  
**Yosuke Tamada**, Utsunomiya University (Japan)  
**Eriko Watanabe**, The University of Electro-Communications (Japan)  
**Peng Xia**, AIST (Japan)  
**Takeshi Yasui**, The University of Tokushima (Japan)