# Multimodal Biomedical Imaging XVII

Fred S. Azar Xavier Intes Qianqian Fang Editors

22–27 January 2022 San Francisco, California, United States

Sponsored and Published by SPIE

Volume 11952

Proceedings of SPIE, 1605-7422, V. 11952

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

Multimodal Biomedical Imaging XVII, edited by Fred S. Azar, Xavier Intes, Qianqian Fang Proc. of SPIE Vol. 11952, 1195201 · © 2022 SPIE · 1605-7422 · doi: 10.1117/12.2635608

Proc. of SPIE Vol. 11952 1195201-1

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 *Multimodal Biomedical Imaging XVII*, edited by Fred S. Azar, Xavier Intes, Qianqian Fang, Proc. of SPIE 11952, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 1605-7422 ISSN: 2410-9045 (electronic)

ISBN: 9781510647756 ISBN: 9781510647763 (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.



**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

v Conference Committee

### MULTIMODALITY MICROSCOPY

11952 02 Combined optical coherence tomography and light sheet fluorescence microscopy for embryonic imaging [11952-8]

### **DEEP LEARNING**

11952 03 Asymmetric decoder design for efficient convolutional encoder-decoder architectures in medical image reconstruction [11952-19]

#### SURGICAL GUIDANCE

- 11952 04Design and analysis of a combined micro-computed tomography and optical structured light<br/>system for breast conserving surgery specimen margin imaging [11952-21]
- Functional guidance of nerve graft surgery using dual-modal photoacoustic and fluorescence imaging of voltage-sensitive dye: ex vivo proof-of-concept study [11952-22]

#### POSTER SESSION

| 11952 06 | Diffusion equation engine deep learning for diffuse optical tomography [11952-24] |
|----------|---|
|          |   |

- 11952 07 All-reflective multi-modal nonlinear microscopy with minimal alignment [11952-25]
- 11952 08BNCNN based diffuse optical imaging [11952-26]
- 11952 09 Cellular assessment of the cornea of transgenic mice models using multi-modal optical coherence microscopy and dual-channel fluorescence microscopy [11952-33]
- 11952 0A Simultaneous multiple frequency and flexible optical channels based DOI system [11952-34]
- 11952 OB A novelty convolutional neural network based direct reconstruction for MRI guided diffuse optical tomography [11952-35]
- 11952 OC Multimodal OCT imaging for intraoperative margins detection for breast conserving surgery [11952-36]

- 11952 0DCo-localized line-field confocal optical coherence tomography (LC-OCT) and confocal<br/>Raman microspectroscopy for ex vivo analysis of skin tissues [11952-38]
- 11952 OE MRI-guided near-infrared spectroscopic tomography (MRg-NIRST): system development for wearable, simultaneous NIRS and MRI imaging [11952-39]

## **Conference Committee**

### Symposium Chairs

Jennifer K. Barton, The University of Arizona (United States) Wolfgang Drexler, Medizinische Universität Wien (Austria)

### Program Track Chairs

Tuan Vo-Dinh, Duke University (United States) Anita Mahadevan-Jansen, Vanderbilt University (United States)

### **Conference** Chairs

Fred S. Azar, InterSystems (United States) Xavier Intes, Rensselaer Polytechnic Institute (United States) Qianqian Fang, Northeastern University (United States)

### Conference Program Committee

Caroline Boudoux, Ecole Polytechnique de Montréal (Canada)
Yu Chen, University of Maryland, College Park (United States)
Gultekin Gulsen, University of California, Irvine (United States)
Kirill V. Larin, University of Houston (United States)
Brian W. Pogue, Thayer School of Engineering at Dartmouth (United States)
Sava Sakadžic, Massachusetts General Hospital (United States)
Vivek J. Srinivasan, University of California, Davis (United States)
Arjun G. Yodh, University of Pennsylvania (United States)