

# ***Multimodal Biomedical Imaging XVIII***

**Fred S. Azar  
Xavier Intes  
Qianqian Fang**  
*Editors*

**28 January 2023  
San Francisco, California, United States**

*Sponsored by*  
SPIE

*Cosponsored by*  
Seno Medical Instruments, Inc. (United States)  
TomoWave Laboratories, Inc. (United States)

*Published by*  
SPIE

**Volume 12371**

Proceedings of SPIE, 1605-7422, V. 12371

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

Multimodal Biomedical Imaging XVIII, edited by Fred S. Azar, Xavier Intes,  
Qianqian Fang, Proc. of SPIE Vol. 12371, 1237101 · © 2023 SPIE  
1605-7422 · doi: 10.1117/12.2676208

Proc. of SPIE Vol. 12371 1237101-1

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 *Multimodal Biomedical Imaging XVIII*, edited by Fred S. Azar, Xavier Intes, Qianqian Fang, Proc. of SPIE 12371, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 1605-7422

ISSN: 2410-9045 (electronic)

ISBN: 9781510658479

ISBN: 9781510658486 (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

v *Conference Committee*

---

## MULTIMODAL MICROSCOPY I

---

- 12371 02 **Multimodal optical coherence tomography and two-photon selective-plane illumination microscopy for embryonic imaging** [12371-5]

---

## DIFFUSE OPTICS

---

- 12371 04 **MRI-guided near-infrared spectroscopic tomographic system for breast cancer imaging: phantom and normal-subject studies** [12371-12]
- 12371 05 **Micro-CT guided deep neural network for 3D reconstructions in widefield diffuse optical tomography** [12371-14]

---

## SURGICAL GUIDANCE

---

- 12371 07 **Multimodal imaging system with ultrasound, photoacoustics, and optical coherence tomography for optical biopsy of melanoma** [12371-21]
- 12371 08 **Comparison of surface dose during whole breast radiation therapy on Halcyon and TrueBeam using Cherenkov imaging** [12371-23]

---

## POSTER SESSION

---

- 12371 09 **Combined multiphoton microscopy and somatostatin receptor type 2 imaging of pancreatic neuroendocrine tumors** [12371-24]
- 12371 0A **Hyperspectral microscopy-based label-free semi-automatic segmentation of eye tissues** [12371-26]

---

## DIGITAL POSTERS

---

- 12371 0B **Spectral unmixing for multispectral fluorescence imaging using prior knowledge of spectral signatures** [12371-28]



# Conference Committee

## *Symposium Chairs*

**Sergio Fantini**, Tufts University (United States)  
**Paola Taroni**, Politecnico di Milano (Italy)

## *Symposium Co-chairs*

**Jennifer K. Barton**, The University of Arizona (United States)  
**Wolfgang Drexler**, Medizinischen 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 Sakadžić**, Massachusetts General Hospital (United States)  
**Vivek J. Srinivasan**, University of California, Davis (United States)  
**Arjun G. Yodh**, University of Pennsylvania (United States)

