

# PROCEEDINGS OF SPIE

## **Advanced Sensor Systems and Applications XV**

**Xinyu Fan**  
**Chang-Seok Kim**  
**Jianzhong Zhang**  
**Minghong Yang**  
*Editors*

**12–13 October 2025**  
**Beijing, China**

*Sponsored by*  
SPIE  
COS—Chinese Optical Society

*Cooperating Organizations*

Tsinghua University (China) • Peking University (China) • University of Science and Technology of China (China) • Zhejiang University (China) • Tianjin University (China) • Beijing Institute of Technology (China) • Beijing University of Posts and Telecommunications (China) • Nankai University (China) • Changchun University of Science and Technology (China) • University of Shanghai for Science and Technology (China) • Capital Normal University (China) • Huazhong University of Science and Technology (China) • Beijing Jiaotong University (China) • China Jiliang University (China) • Shanghai Institute of Optics and Fine Mechanics, CAS (China) • Changchun Institute of Optics, Fine Mechanics and Physics, CAS (China) • Institute of Semiconductors, CAS (China) • Institute of Optics and Electronics, CAS (China) • Institute of Physics, CAS (China) • Shanghai Institute of Technical Physics, CAS (China) • China Instrument and Control Society (China) • Optical Society of Japan (Japan) • Optical Society of Korea (Republic of Korea) • Australian and New Zealand Optical Society • Optics and Photonics Society of Singapore (Singapore) • European Optical Society

*Supporting Organizations*

China Association for Science and Technology (CAST) (China)  
Department of Information of National Nature Science Foundation, China (NSFC) (China)

*Published by*  
SPIE

**Volume 13722**

Proceedings of SPIE 0277-786X, V. 13722

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

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 *Advanced Sensor Systems and Applications XV*, edited by Xinyu Fan, Chang-Seok Kim, Jianzhong Zhang, Minghong Yang, Proc. of SPIE 13722, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510693968

ISBN: 9781510693975 (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 © 2025 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 *Symposium Committees*
- ix *Conference Committee*

---

## REFLECTOMETRY AND ACOUSTIC SENSING

---

- 13722 05 **Sensitivity analysis of distributed refractive index sensing using tapered fiber in optical frequency domain reflectometry** [13722-3]
- 13722 06 **Miniaturized sound source localization system based on optical Fabry-Perot binaural acoustic sensors** [13722-4]

---

## ADVANCED SENSING SYSTEMS

---

- 13722 07 **Performance analysis of Brillouin optical time domain reflectometry (Invited Paper)** [13722-6]
- 13722 09 **Enhanced high-accuracy positioning using phase-modulation for ultralong-range asymmetric interferometer vibration sensor** [13722-8]
- 13722 0A **Direct laser writing of 2D diffraction gratings for on-chip optical sensing** [13722-9]
- 13722 0B **Simultaneous dual-wavenumber detection with coherent anti-Stokes Raman scattering (CARS) microspectroscopy** [13722-10]
- 13722 0C **A high-efficiency endpoint detection algorithm for asymmetric dual Mach-Zehnder interferometer vibration sensing system** [13722-11]

---

## PRECISION MEASUREMENT

---

- 13722 0E **A dual-sensor fusion-based dual-feedback method for deformable mirror surface control** [13722-13]
- 13722 0F **Simultaneous measurement of glycerol concentration in aqueous solution and temperature using fiber optic SMSMS structure and Fourier transform** [13722-14]
- 13722 0G **A wavelet-deep-learning framework for gas detection in TDLAS** [13722-15]
- 13722 0H **High-temperature performance characterization of sapphire fiber microcavity sensors in convective thermal environments** [13722-16]
- 13722 0I **All-dielectric metasurfaces enabling surface-enhanced overtone absorption** [13722-17]

---

#### BIOPHOTONICS AND MEDICAL SENSING

---

- 13722 OJ **Hydrogel whispering-gallery mode microresonators for toxic heavy metals detection in Chinese herbals** [13722-18]
- 13722 OL **AI-assisted fiber optic sensing technology for noncontact blood pressure estimation under special meteorological conditions** [13722-20]

---

#### POSTER SESSION

---

- 13722 ON **A subnanometer resolution photoacoustic spectroscopy sensor based on intensity-differential grating interferometric cavity** [13722-22]
- 13722 OP **Research on high-speed demodulation method for FBG vibration sensors based on adaptive threshold centroid algorithm** [13722-24]
- 13722 OQ **Research on dynamic stray radiation suppression method based on imaging spectroscopy** [13722-25]
- 13722 OR **Temperature compensation of FBG measurement on different steel surfaces under cryogenic environments** [13722-26]
- 13722 OS **Chip-based 532 nm band fluorescence excitation-detection sensing system** [13722-28]