

# PROCEEDINGS OF SPIE

*2019 International Conference on Optical  
Instruments and Technology*

---

## ***Optical Sensor and Applications***

**Xuping Zhang**  
**Hai Xiao**  
*Editors*

**26–28 October 2019**  
**Beijing, China**

*Sponsored by*  
CIS— China Instrument and Control Society (China)

*Cosponsored and Published by*  
SPIE

**Volume 11436**

Proceedings of SPIE 0277-786X, V. 11436

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 *2019 International Conference on Optical Instruments and Technology: Optical Sensor and Applications*, edited by Xuping Zhang, Hai Xiao, Proceedings of SPIE Vol. 11436 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

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

ISBN: 9781510636507  
ISBN: 9781510636514 (electronic)

Published by

**SPIE**

P.O. Box 10, Bellingham, Washington 98227-0010 USA  
Telephone +1 360 676 3290 (Pacific Time): Fax +1 360 647 1445

[SPIE.org](http://SPIE.org)

Copyright © 2020, Society of Photo-Optical Instrumentation Engineers.

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 copying fees. The Transactional Reporting Service base fee for this volume is \$21.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online 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. The CCC fee code is 0277-786X/20/\$21.00.

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:** *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article 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

xii	<i>Authors</i>
ix	<i>Symposium Committees</i>
xi	<i>Conference Committee</i>
xiii	<i>Introduction</i>
xv	<i>Conference Organizers</i>

---

## OPTICAL SENSOR AND APPLICATIONS

---

11436 02	<b>Variational mode decomposition-based endpoint detection for distributed fiber interferometric vibration sensing systems (Invited Paper) [11436-2]</b>
11436 03	<b>Performance enhancement for phase-sensitive OTDR based on multi-spatial resolution analysis (Invited Paper) [11436-3]</b>
11436 04	<b>A multiple events recognition scheme based on improved feature vectors for fiber optic perimeter security system [11436-4]</b>
11436 05	<b>Influence of wafer materials on the response speed of extrinsic optical fiber Fabry-Perot high temperature sensors (Invited Paper) [11436-6]</b>
11436 06	<b>Temperature accuracy enhanced dual-end distributed temperature sensor employing Rayleigh compensation algorithm [11436-9]</b>
11436 07	<b>An EMD-based filtering algorithm for the long period fiber grating sensing [11436-11]</b>
11436 08	<b>Analysis on the interpolation of the weighted mean temperature and evaluation of GPT2w model in coastal areas of China [11436-13]</b>
11436 09	<b>Application of spectral droplet analysis method in flammable liquids identification [11436-18]</b>
11436 0A	<b>Analysis the multiple-order coupling points in distributed polarization coupling measurement used graphical methods [11436-21]</b>
11436 0B	<b>Interferometric fiber optic surface plasmon resonance sensor for temperature and strain measurement [11436-25]</b>
11436 0C	<b>Ultra-high temperature fiber growth technology based on CO<sub>2</sub> laser-heated technology [11436-27]</b>

- 11436 OD **Distributed optical fiber acoustic sensing method based on dual-chirped pulses and cross-correlation analysis** [11436-28]
- 11436 OE **Fabrication and sensing properties of fiber Mach-Zehnder sensor based on CO<sub>2</sub> laser fusion** [11436-30]
- 11436 OF **Reflectivity-tunable Bragg grating reflectors based on polarization-maintaining few-mode fibers** [11436-31]
- 11436 OG **A weak double-peak fiber Bragg grating temperature sensor** [11436-33]
- 11436 OH **The effect of metal layer microstructure on optical fiber SPR sensor: a simulation study** [11436-36]
- 11436 OI **PDMS-coated fiber optic interferometer based on no-core fiber for multi-parameter measurements** [11436-42]
- 11436 OJ **Signal-pump power matching in the forward pumped fiber Raman amplifier of the remote interferometric optical fiber sensing system with phase modulation** [11436-43]
- 11436 OK **Simultaneous generation of multi-frequency microwave signals based on four-wave mixing in semiconductor laser with external cavity (Invited Paper)** [11436-48]
- 11436 OL **Research on crack propagation identification of aluminum alloy based on micro-cavity array fiber** [11436-49]
- 11436 OM **Multispectral photoacoustic Doppler velocimetry with intensity modulated high repetition supercontinuum laser pulses** [11436-52]
- 11436 ON **Novel distributed fiber Raman sensor and its application (Invited Paper)** [11436-53]
- 11436 OO **High temperature calibration of Raman distributed sensor based on dynamic multi-segment fiber temperature** [11436-54]
- 11436 OP **Hybrid structured fiber-optic Fabry-Perot interferometer for simultaneous strain and temperature measurement base on phase demodulation** [11436-55]
- 11436 OQ **Distributed salinity sensor based on Brillouin dynamic grating (Invited Paper)** [11436-60]
- 11436 OR **Pedestrian detection and recognition using lidar for autonomous driving** [11436-64]
- 11436 OS **Optical fiber temperature and strain sensing system based on high accuracy time delay measurement** [11436-65]
- 11436 OT **Analysis method for the operation health of all-fiber optical current transformer** [11436-66]
- 11436 OU **Automatic segment assembly method of shield tunneling machine based on multiple optoelectronic sensors** [11436-68]
- 11436 OV **A transition edge sensor signal simulator to evaluate the performance of superconducting quantum interference device amplifier** [11436-73]

- 11436 OW **Multi-point sensor based on SMS fiber structure** [11436-74]
- 11436 OX **Modeling method and discriminant criterion for single-particle image** [11436-75]
- 11436 OY **Pattern recognition of fiber disturbance based on support vector machine in polarization optical time domain reflectometry** [11436-79]
- 11436 OZ **Birefringence and polarization properties of a spun fiber around conductor with electrical currents** [11436-80]
- 11436 10 **Differential evolution algorithms for grating parameters and spatial stress decoupling of phase-shifted fiber Bragg grating** [11436-81]
- 11436 11 **Application of plasma absorption method in transient radiation-induced loss analysis of optical fibers** [11436-82]
- 11436 12 **Refractive index sensitivity of zinc oxide-coated long period fiber grating inscribed in a two-mode fiber** [11436-201]