

# PROCEEDINGS OF SPIE

## *Optoelectronic Devices and Integration IX*

**Xuping Zhang**  
**Baojun Li**  
**Changyuan Yu**  
**Xinliang Zhang**  
*Editors*

**12–16 October 2020**  
**Online Only, 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)  
• Japan Optical Society (Japan) • Korea Optical Society (Korea, Republic of) • Australia Optical Society  
(Australia) • Singapore Optical Society (Singapore) • European Optical Society

*Supporting Organizations*

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

*Published by*  
SPIE

**Volume 11547**

Proceedings of SPIE 0277-786X, V. 11547

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 *Optoelectronic Devices and Integration IX*, edited by Xuping Zhang, Baojun Li, Changyuan Yu, Xinliang Zhang, Proceedings of SPIE Vol. 11547 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510639096

ISBN: 9781510639102 (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

---

## FIBER-BASED DEVICES FOR SENSING AND COMMUNICATIONS I

---

- 11547 07 **Highly sensitive smart cushion embedded with SMS structure for contactless vital signs and activity monitoring** [11547-5]

---

## FIBER-BASED DEVICES FOR SENSING AND COMMUNICATIONS II

---

- 11547 08 **Classification of interference-fading suppressed  $\Phi$ -OTDR signal using optimal peak-seeking and machine learning (Invited Paper)** [11547-6]
- 11547 0A **A simplified matched filter-based approach for carrier frequency offset estimation in CO-OFDM** [11547-8]

---

## INTEGRATED OPTICAL DEVICES I

---

- 11547 0F **Design and fabrication optofluidic tunable lens by 3D printing** [11547-13]
- 11547 0G **Two-stage XOR electro-optic directed logic gates based on a reflective-type microring resonator** [11547-14]

---

## INTEGRATED OPTICAL DEVICES II

---

- 11547 0K **Design and modeling of Mach-Zehnder type electro-optic modulators: balanced and unbalanced interferometers** [11547-18]

---

## OPTOELECTRONIC DEVICES

---

- 11547 0O **Broadband nonlinear manipulation of ultrafast optical pulses by dispersion engineering (Invited Paper)** [11547-22]
- 11547 0P **A compact imaging spectrometer based on random dispersion and up-conversion luminescence (Invited Paper)** [11547-23]
- 11547 0U **Fast thermo-optic switch using direct current flow through waveguide in SOI** [11547-28]

- 11547 0V **Photonic crystal waveguide modulator with embedded p-n junction** [11547-29]
- 11547 0W **Towards reconfigurable optoelectronic hardware accelerator for reservoir computing** [11547-30]

---

**POSTER SESSION**

---

- 11547 0X **Characteristic analysis of spatial light coupling with silicon photonic grating coupler** [11547-31]
- 11547 0Y **Transparent ZnO nanostructured thin-film flexible UV photodetectors** [11547-33]
- 11547 0Z **TM modes with compact confinement and long propagation length in graphene hyperbolic metamaterial cladded hybrid plasmonic waveguides** [11547-34]
- 11547 10 **Bragg gratings composed of hollow hybrid plasmonic waveguides with low loss** [11547-35]
- 11547 11 **Analysis and optimization of cylindrical vector beams focusing through all-dielectric concave grating lens with negative-index** [11547-36]
- 11547 12 **Low-voltage organic field-effect transistors photonic memory with solution-processed blocking dielectric layer and photosensitive charge trapping layer** [11547-37]
- 11547 13 **Polymer anti-solvent additives for high-performance perovskite photodetector** [11547-38]
- 11547 15 **Theoretical and experimental analysis of tapering large-diameter glass capillary for optical fiber components** [11547-40]
- 11547 16 **Highly dispersive Ge-doped coupled ring fiber for high-order OAM modes** [11547-41]
- 11547 18 **Possibilities and limitations of electronic control over radiation parameters of all-fibre mode-locked lasers** [11547-43]
- 11547 1B **High-performance perovskite photodetector with the additive of antisolvent to improve the quality of the perovskite films** [11547-46]
- 11547 1C **Synthesis of periodic and aperiodic arbitrary waveforms in a SOA-fibre laser** [11547-47]
- 11547 1F **A high dynamic range MOEMS accelerometer based on multi-order diffraction method** [11547-50]
- 11547 1G **Serpentiform structured freestanding metallic mesh electrode for high-performance transparent and stretchable supercapacitor** [11547-51]
- 11547 1H **Nanoscale light guiding in dielectric nanowire-loaded nano-rib hybrid Bloch surface waveguide** [11547-52]

- 11547 1J **Enhanced output power of InGaN/GaN light-emitting diodes with a multilayered structure of AlGaN/GaN electron blocking layer** [11547-54]
- 11547 1K **Design of a Ka-band MMIC Lange coupler** [11547-55]
- 11547 1L **Ge-doped air-core ring fiber supporting >400 radially fundamental OAM modes across O, E, S, C, L bands** [11547-56]
- 11547 1M **A multi-wavelength Brillouin-erbium fiber laser with triple-Brillouin-frequency spacing** [11547-57]
- 11547 1N **A ballistocardiography monitor based on optical fiber interferometer** [11547-58]
- 11547 1P **BCG signal processing based on advanced LMS filter for optical fiber monitor** [11547-60]
- 11547 1Q **Compact and broadband polarization rotator based on stair-shaped waveguide assisted by subwavelength gratings** [11547-61]
- 11547 1S **Multilayer photonic reservoir computing architecture using time division multiplexing for parallel computation** [11547-63]
- 11547 1T **Performance enhancement of waveguide-coupled Ge-on-Si photodetector with additional p-i-n junction** [11547-64]
- 11547 1V **Research on the properties of indium tin oxide films for compact optical modulators** [11547-67]
- 11547 1W **Annular chalcogenide photonic crystal fiber for broadband mid-IR optical vortex modes supercontinuum generation** [11547-68]
- 11547 1X **Fiber-based frequency transfer between NIM and MTC** [11547-69]