

PROCEEDINGS OF SPIE

Photonic Instrumentation Engineering VI

Yakov G. Soskind
Editor

5–7 February 2019
San Francisco, California, United States

Sponsored and Published by
SPIE

Volume 10925

Proceedings of SPIE 0277-786X, V. 10925

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.

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 *Photonic Instrumentation Engineering VI*, edited by Yakov G. Soskind
Proceedings of SPIE Vol. 10925 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510624924

ISBN: 9781510624931 (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

Copyright © 2019, 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 \$18.00 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. 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/19/\$18.00.

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

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

vii *Authors*
ix *Conference Committee*

SESSION 1 DESIGN, DEVELOPMENT, AND FABRICATION OF PHOTONIC INSTRUMENTS I

- 10925 02 **Optimization for as-built performance (Invited Paper)** [10925-1]
- 10925 03 **Structural, Thermal, and Optical Performance (STOP) analysis of the NASA ARCSTONE instruments** [10925-2]
- 10925 05 **Lens design using grid-based surface optimization** [10925-4]

SESSION 2 APPLICATIONS OF PHOTONIC INSTRUMENTS

- 10925 06 **Sub-nanosecond time-gated camera based on a novel current-assisted CMOS image sensor (Invited Paper)** [10925-5]
- 10925 07 **Focus adjustable motion-blur compensation method using deformable mirror** [10925-6]
- 10925 08 **Active fiber ring enhanced absorption gas spectroscopy using multi-longitudinal mode tunable laser in the NIR** [10925-7]
- 10925 09 **Photothermal microscopy characterization of multiphoton annealing of defects in thin-film coatings for high-power lasers** [10925-9]
- 10925 0A **Label-free 3D super-resolution nanoscope with large field-of-view** [10925-10]
- 10925 0B **Multispectral imaging system for the structural analysis of highly transparent technical surfaces** [10925-11]

SESSION 3 METROLOGICAL INSTRUMENTATION I

- 10925 0D **Characterization of gradient index optical components using experimental ray tracing** [10925-13]
- 10925 0E **In-process monitoring of laser ablation on thin steel membranes by multispectral shape-from-shading** [10925-14]

10925 0F **Specifying polarimetric tolerances of a high-resolution imaging multiple-species atmosphere profiler (HiMAP)** [10925-15]

SESSION 4 METROLOGICAL INSTRUMENTATION II

10925 0I **High-resolution wave front phase sensor for silicon wafer metrology** [10925-18]

10925 0K **Absolute calibration of a Shack-Hartmann wavefront sensor for measurements of wavefronts** [10925-20]

SESSION 5 METROLOGY, CHARACTERIZATION, AND FABRICATION OF PHOTONIC INSTRUMENTS I

10925 0L **Thin-film characterization with a dual-channel dispersion-encoded imaging low-coherence interferometry approach** [10925-21]

10925 0O **Chromatic line confocal technology in high-speed 3D surface-imaging applications** [10925-24]

10925 0P **An economical solution for high-throughput low-noise multi-channel spectroscopy** [10925-25]

SESSION 6 METROLOGY, CHARACTERIZATION, AND FABRICATION OF PHOTONIC INSTRUMENTS II

10925 0S **Influence of numerical aperture (NA) on micro-reflectance spectroscopy** [10925-28]

SESSION 7 DESIGN, DEVELOPMENT, AND FABRICATION OF PHOTONIC INSTRUMENTS II

10925 0U **True OEM terahertz systems for industrial applications (Invited Paper)** [10925-30]

10925 0V **Multi-tone modulated continuous-wave lidar** [10925-31]

10925 0W **Performance analysis of linearly swept frequency modulated continuous-wave lidar (Invited Paper)** [10925-32]

10925 0X **Wavelength-locking of a semiconductor laser using an electronic technique** [10925-33]

SESSION 8 SENSORS AND RUGGEDIZED SYSTEMS

10925 0Z **Hybrid sensor based on microstructured hollow-core fiber for simultaneous measurement of strain and temperature** [10925-35]

- 10925 10 **A compact DUV spectrometer for wide-temperature entry, descent, and landing sensing applications** [10925-36]
- 10925 11 **Simulation study of optical detection of small particles by light scattering-type sensor with double-side mirror reflectors** [10925-37]
- 10925 12 **Vector Brillouin optical time-domain analysis with Raman amplification and optical pulse coding** [10925-38]

SESSION 9 DESIGN, DEVELOPMENT, AND FABRICATION OF PHOTONIC INSTRUMENTS III

- 10925 13 **Lens in a voice coil: a compact design approach for z-scanners (Invited Paper)** [10925-39]
- 10925 14 **A frequency modulated laser interferometer for nanometer-scale position sensing at cryogenic temperatures** [10925-40]

POSTER SESSION

- 10925 16 **Electro-optic-based pressure measurement and transmitter using lithium niobate (LiNbO₃) Mach-Zehnder modulator for industrial application** [10925-42]
- 10925 17 **Polarized wavefront measurement using an electrically tunable focused plenoptic camera** [10925-44]
- 10925 18 **New microcontroller unit improving stability and functionality of the optical chopper for atmospheric LIDAR** [10925-45]
- 10925 19 **Development of separation inspection technique for micro-cracks and particles using non-contact stress-induced light scattering method** [10925-46]
- 10925 1A **Combination of lock-in detection with dual-comb spectroscopy** [10925-47]
- 10925 1B **Microspectroscopy of nanomaterials, biological species, and live cells** [10925-49]
- 10925 1C **Characterization of performance of back-illuminated sCMOS cameras for microscopy applications versus conventional sCMOS and EMCCD cameras** [10925-50]