## PROCEEDINGS OF SPIE

## AOPC 2022: Optoelectronics and Nanophotonics

Buwen Cheng Jin Guo Sen Qian Editors

18-19 December 2022 ONLINE, China

Sponsored by Chinese Society for Optical Engineering (CSOE) (China)

Technical Sponsor SPIE

Organized by
Tianjin University (China)
University of Electronic Science and Technology of China (China)
Nanjing University of Science and Technology (China)
Beijing Institute of Space Mechanics and Electricity (China)
Science and Technology on Low-light-level Night Vision Laboratory (China)
Science and Technology on Electro-Optical Information Security Control (China)

Published by SPIE

**Volume 12556** 

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 SPIEDigitalLibrary.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 *AOPC 2022: Optoelectronics and Nanophotonics*, edited by Buwen Cheng, Jin Guo, Sen Qian, Proc. of SPIE 12556, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URI).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510662261

ISBN: 9781510662278 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) SPIE.org

3FIL.UIY

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. 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.



**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

vii Conference Committee

## OPTOELECTRONIC DEVICES AND INTEGRATION

12556 02	Resonant frequency decay in graphene nanomechanical resonators fabricated by focused ion beam lithography [12556-2]
12556 03	Fabrication of graphene nanomechanical resonators using focused ions beam lithography [12556-3]
12556 04	Phase-change metasurface for switchable waveplates [12556-4]
12556 05	Inverse design of a multifunctional MMI waveguide for simultaneous wavelength demultiplexing and power splitting [12556-5]
12556 06	Silicon reconfigurable polarization-selective modulation for on-chip polarization-multiplexed photonic systems [12556-7]
12556 07	Characterization and modeling of the BSI SPAD in 55nm CMOS process [12556-8]
12556 08	High coupling efficiency and ultra-wide bandwidth fiber-to-chip interface for lithium niobate photonic integrated circuits [12556-9]
12556 09	A hybrid solid-state beam scanner for LiDAR applications [12556-10]
12556 0A	High throughput fabrication of surface gratings on VCSEL using displacement Talbot lithography [12556-11]
12556 OB	Silicon and silicon nitride based bilayer polarization-insensitive optical filter [12556-12]
12556 OC	Research on coupling process and technology of lensed fiber and optical chip [12556-13]
12556 0D	Liquid crystal embedded dielectric metalens for active focal length tuning at the microwave range [12556-14]
12556 OE	Efficient design of structural parameters and materials of plasmonic fano-resonant metasurfaces by a tandem neural network [12556-15]
12556 OF	Inverse design of the multimode Bragg grating based on time-domain layer peeling method [12556-16]
12556 0G	Highly efficient on-chip mode conversion based on adjoint shape optimization [12556-17]

12556 OH	Compact polarization beam splitter in silicon photonics [12556-18]
12556 OI	Fast waveguide geometry extraction using an optical measurement method [12556-19]
12556 OJ	Two-dimensional beam steering based on dispersive optical phased array [12556-20]
12556 OK	Research and optimization of virtual studio's lighting system with LED curtain wall [12556-21]
12556 OL	Highly-efficient absorber based on a patterned ultrathin Ge-on-insulator slab for photodetection [12556-22]
12556 OM	Study on calibration method of filter for linear beam smoke detector [12556-24]
12556 ON	Study on corrosion process and mechanism of fluoride laser glass fiber [12556-25]
12556 0O	Bandwidth enhancement of traveling wave photodetector with inductive gain peaking [12556-26]
12556 OP	A general design approach for inverted tapers [12556-27]
12556 OQ	High-efficiency spot-size converter for thin-film lithium niobate modulators [12556-29]
12556 OR	Determination of optimal resonant optical power for SOI integrated optical gyro system [12556-31]
12556 OS	Single chip silicon single sideband modulator with high sideband suppression ratio [12556-32]
12556 OT	A graph-driven placement framework for Si photonic circuits [12556-34]
12556 OU	A broadband TM-pass polarizer based on graphene-incorporated rib-loaded LNOI waveguide [12556-37]
12556 0V	Design of an on-chip ultra-small thermo-optic tunable SOI waveguide microdisk resonator for optical information storage [12556-38]
12556 0X	Process reliability improvement technology of micro high precision fiber coil for integrated fiber optic gyroscope [12556-41]
12556 OY	Noise analysis in coherent phase demodulated analog photonics transmission link under different power levels [12556-43]
12556 OZ	New method of measurement on the extinction ratio of silicon photonics Mach–Zehnder IQ-modulators [12556-44]
12556 10	Design and simulation of invisibility device based on geometrical optics [12556-45]
12556 11	Developing an accelerated life test method for LED source and failure analysis [12556-48]

12556 12	Research on single channel FMCW LiDAR integrated module [12556-50]
12556 13	Design of broadband spectrum sampling filter for on-chip computational spectrometers [12556-51]
12556 14	High-performance transparent and flexible supercapacitor electrode based on nanopetal-structured MnO <sub>2</sub> [12556-53]
12556 15	A flexible on-chip phase calibration method for optical phased array [12556-54]
12556 16	Low temperature thermal strain of the IRFPA and the creep lifetime evaluation of solder joints [12556-55]
12556 17	Impact of driver frequency peaking on system level performance when integrated with coherent modulator [12556-56]
12556 18	Photonic matched filter based broadband DSSS system [12556-57]
12556 1A	Low-loss and high stability standard single mode fiber edge couplers for silicon photonics [12556-59]
12556 1B	An improved integrated coherent receiver optical-electronic testing system [12556-60]
12556 1C	Research on the electrostatic discharge damage of CCD detectors [12556-61]
12556 1D	Polarization mode coupling in polarization maintaining fiber induced by electric-arc technology and its quasi-distributed sensing applications [12556-62]
12556 1E	Impact of nonlinear effects on the silicon-based waveguides and microring resonators [12556-64]
	NANOPHOTONICS
12556 1F	Research and optimization of virtual studio's lighting system with LED curtain wall [12556-23]
12556 1G	Rapid and facile characterization of dislocations in cross-sectional GaAs/Si films using electron channeling contrast imaging [12556-66]
12556 1H	Study of infrared optical properties of polydisperse aggregated bioparticles based on optimized BCCA model [12556-67]
12556 11	Flexible transparent electrochromic display with fine pixels [12556-68]
12556 1J	Design and theoretical research of plasmon induced transparency in metal-dielectric-metal waveguide [12556-69]
12556 1K	Double bow-tie antenna based 2D MoTe2 detector for terahertz wave detection [12556-70]

12556 1L	Vertical graphene/MoS2 van der Waals heterostructure photodetector [12556-71]
12556 1M	Design of polarization-independent multilayer dielectric grating with broadband [12556-72]
12556 1N	Design of two-dimensional grating for high precision precision machine tool measurement [12556-73]
12556 1O	Metamaterial enhanced novel plasmonic biosensor for specific detection of SARS-CoV-2 spike protein $\left[12556\text{-}74\right]$
12556 1P	Determination of bimetallic film's thickness and optical constants based on SPR phase detection [12556-75]
12556 1Q	Determination the characteristic parameter of nano-film based on spectroscopic ellipsometry by improved adaptive genetic algorithm [12556-76]
12556 1R	Exceptional point in a terahertz graphene metasurface [12556-77]
	MICRO-OPTICS AND MOEMS
12556 1S	Ge <sub>2</sub> Sb <sub>2</sub> Se <sub>4</sub> Te <sub>1</sub> -based optical switching with directional coupler structure used for all-optical synapse [12556-1]