PROCEEDINGS OF SPIE

Smart Photonic and Optoelectronic Integrated Circuits 2024

Sailing He Laurent Vivien Editors

29 January – 1 February 2024 San Francisco, California, United States

Sponsored and Published by SPIE

Volume 12890

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 *Smart Photonic and Optoelectronic Integrated Circuits* 2024, edited by Sailing He, Laurent Vivien, Proc. of SPIE 12890, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510670402

ISBN: 9781510670419 (electronic)

Published by

SPIE

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

SPIE.org

Copyright © 2024 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

	METAMATERIALS I
12890 02	Integrated metasurfaces for advanced solid-state-lighting (Invited Paper) [12890-3]
	NEURAL NETWORKS
12890 03	Enhancing and up-scaling of integrated photonic 4F convolution neural networks [12890-6]
12890 04	Convolutional neural networks for temperature robust medium chemical concentration detection with micro-ring resonators [12890-7]
12890 05	Deep photonic networks for on-chip dispersion control and optimization [12890-8]
	PHOTONIC INTEGRATED CIRCUITS AND DEVICES
12890 06	Silicon nitride photonic integrated circuits for optical coherence tomography (Invited Paper) [12890-10]
12890 07	Development and optimization of CMOS-compatible AIN-based photonic devices for 1.55 µm applications: fabrication, characterization, and potential for integrated optics [12890-12]
	QUANTUM PHOTONICS I
12890 08	Source to detector simulation of quantum photonic integrated circuits [12890-14]
	SENSING
12890 09	Multivariate design and data analysis for plasmonic sensing (Invited Paper) [12890-17]

	ADVANCED DESIGN AND FABRICATION
12890 OA	Fabrication aware design of sensitive photonic devices (Invited Paper) [12890-21]
	HYBRID PHOTONICS
12890 OB	Hybrid InP/SiN photonic integrated circuits for RF systems and optical sensing (Invited Paper) [12890-28]
12890 OC	Recent progress on integrated magneto-optical isolators (Invited Paper) [12890-29]
	ADVANCED PHOTONIC DEVICES FOR NIR AND MIR
12890 0D	Si-rich silicon nitride for nonlinear signal processing applications (Invited Paper) [12890-58]
12890 OE	Chaotic-cavity surface-emitting laser array for optical wireless communication and low-speckle illumination (Invited Paper) [12890-38]
	SILICON PHOTONICS RELIABILITY
12890 OF	Reliability challenges of Ge-based photodetectors (Invited Paper) [12890-37]
12890 OG	Lifetime-limiting mechanisms of integrated IR sources for silicon photonics (Invited Paper) [12890-33]
	METAMATERIALS II
12890 OH	Topological optimization of electrically tunable silicon-organic metasurfaces (Invited Paper) [12890-41]
	BEAM STEERING AND OPTICAL PHASE ARRAY
12890 01	System trade-offs in a swept source FMCW LiDAR with dispersive OPA beam steering (Invited Paper) [12890-43]
12890 OJ	Advanced photonic-assisted antenna array: efficient beam steering system for radar application [12890-44]
12890 OK	Integrated optical phased arrays: augmented reality, biophotonics, 3D printing, and beyond (Invited Paper) [12890-45]

12890 OL	High density, high point-rate line-scanned LiDAR receiver design and application benefits [12890-48]
	PROGRAMMABLE PHOTONICS CIRCUITS AND DEVICES II
12890 OM	Reconfigurable photonics enabled by functional oxides (Invited Paper) [12890-53]
	QUANTUM PHOTONICS II
12890 ON	Photon-accelerated millimeter-wave sub-1nm CMOS technology: comparison of performance for quantum, optical, and terahertz processors and RF ASICs [12890-57]