

PROCEEDINGS OF SPIE

Smart Photonic and Optoelectronic Integrated Circuits 2023

**Sailing He
Laurent Vivien**
Editors

**31 January – 2 February 2023
San Francisco, California, United States**

Sponsored and Published by
SPIE

Volume 12425

Proceedings of SPIE 0277-786X, V. 12425

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Smart Photonic and Optoelectronic Integrated Circuits 2023, edited by Sailing He,
Laurent Vivien, Proc. of SPIE Vol. 12425, 1242501 · © 2023 SPIE
0277-786X · doi: 10.1117/12.2678718

Proc. of SPIE Vol. 12425 1242501-1

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 *Smart Photonic and Optoelectronic Integrated Circuits 2023*, edited by Sailing He, Laurent Vivien, Proc. of SPIE 12425, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510659551
ISBN: 9781510659568 (electronic)

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

SPIE. DIGITAL LIBRARY
SPIDigitalLibrary.org

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*

PHOTON-PHONON INTERACTION

- 12425 02 **All-optical processing of microwave signals using cavity optomechanics (Invited Paper)**
[12425-7]

PASSIVE PHOTONIC DEVICES AND CIRCUITS

- 12425 03 **Integrated-optic chromatic dispersion compensator composed of arrayed-waveguide gratings and delay lines** [12425-14]
- 12425 04 **Silicon photonics micro-ring resonator-based SR latch for optical memory applications**
[12425-16]

SUB-WAVELENGTH STRUCTURES AND METAMATERIALS

- 12425 05 **Physics of resonant optical lattices: experimental leaky bands and symmetry-blocked radiant channels modeled by Rylov's formalism (Invited Paper)** [12425-10]
- 12425 06 **Silicon photonic mode multiplexers based on subwavelength metamaterials and on-chip beamforming (Invited Paper)** [12425-13]

METASURFACES

- 12425 07 **Advanced computational framework for the design of ultimate performance metasurfaces (Invited Paper)** [12425-17]

NIR AND MIR PHOTONIC DEVICES

- 12425 08 **Nanophotonics-enabled mid-infrared microspectrometers for chemical identification and related topics (Invited Paper)** [12425-22]
- 12425 09 **Towards compact fire infrared radiance spectral tracker (c-FIRST) (Invited Paper)** [12425-24]

OPTICAL PHASED ARRAY - LIDAR

- 12425 0A **FMCW chip-scale LiDARs for safer and smarter mobility of people and goods (Invited Paper)** [12425-25]
- 12425 0B **Array design using rotational symmetry for high performance optical phased arrays** [12425-28]

INTEGRATED OPTICAL SENSORS

- 12425 0C **Silicon photonics-based laser doppler vibrometer for non-contact photoacoustic sensing** [12425-35]
- 12425 0D **Prediction of medium chemical concentration with micro-ring resonators and deep learning** [12425-36]

HYBRID/HETEROGENEOUS INTEGRATION

- 12425 0E **Organic-on-silicon photonic platform for advanced imagers, microdisplays and sensors** [12425-38]
- 12425 0F **>20dB phase noise reduction by locking an off-the-shelf external cavity laser having sub-kHz linewidth to an on-chip wavelength reference in Si₃N₄ using an electronic feedback loop on the diode injection current** [12425-53]

MICRO- AND NANO-OPTICAL SYSTEMS

- 12425 0G **MOEMS Fabry-Pérot interferometers with ALD TiO₂ anti-stiction coating for pull-in failure prevention (Invited Paper)** [12425-40]
- 12425 0H **Infrared and terahertz spectrally adaptive filters based on MEMS technologies (Invited Paper)** [12425-41]

PHOTONIC INTEGRATED CIRCUITS

- 12425 0I **Power conservation version of application-specific photonic integrated circuit** [12425-46]
- 12425 0J **High density photonic integration on an InP membrane (Invited Paper)** [12425-48]

POSTER SESSION

- 12425 0K **Optimization and modeling for optical phased array** [12425-27]

- 12425 OL **RF circuit design using millimeter wave photonic CMOSFETs for nonlinear optical computing, modeling, and simulation** [12425-49]
- 12425 OM **Whispering gallery modes of a triatomic photonic molecule** [12425-52]

Conference Committee

Symposium Chairs

Sonia M. García-Blanco, Universiteit Twente (Netherlands)
Bernd Witzigmann, Friedrich-Alexander-Univ. Erlangen-Nürnberg
(Germany)

Symposium Co-chairs

Ulrich T. Schwarz, Technische Universität Chemnitz (Germany)
Karin Hinzer, University of Ottawa (Canada)

Program Track Chairs

Yakov Sidorin, Quarles & Brady LLP (United States)
Jean-Emmanuel Broquin, Université Grenoble Alpes (France)

Conference Chairs

Sailing He, Zhejiang University (China) and KTH Royal Institute of
Technology (Sweden)
Laurent Vivien, Centre de Nanosciences et de Nanotechnologies
(France)

Conference Program Committee

Timo Aalto, VTT Technical Research Center of Finland Ltd. (Finland)
Carlos A. Alonso-Ramos, Centre de Nanosciences et de
Nanotechnologies (France)
Pavel Cheben, National Research Council Canada (Canada)
Ray T. Chen, The University of Texas at Austin (United States)
Jaime Gómez Rivas, Technische Universiteit Eindhoven (Netherlands)
Hugo Enrique Hernandez-Figueroa, Universidade Estadual de
Campinas (Brazil)
Chennupati Jagadish, The Australian National University (Australia)
Stefan A. Maier, Imperial College London (United Kingdom)
Ashok Maliakal, Acacia Communications, Inc. (United States)
Lorenzo Pavesi, Università degli Studi di Trento (Italy)
David V. Plant, McGill University (Canada)
Ali Serpengüzel, Koç Üniversitesi (Turkey)
Bertrand Szelag, CEA-LETI (France)
Augustine M. Urbas, Air Force Research Laboratory (United States)
Alan X. Wang, Baylor University (United States)
Jian Wang, Huazhong University of Science and Technology (China)

Qian Wang, Huawei Technologies Company, Ltd. (China)
Lin Yang, Institute of Semiconductors, Chinese Academy of Sciences
(China)
Rui Q. Yang, The University of Oklahoma (United States)