PROCEEDINGS OF SPIE

Emerging Applications in Silicon Photonics III

Callum G. Littlejohns Marc Sorel Editors

6–8 December 2022 Birmingham, United Kingdom

Sponsored by SPIE

Cooperating Organizations Fraunhofer UK Research Limited (United Kingdom) Innovate UK KTN (United Kingdom) Photonics Leadership Group (United Kingdom) Photonics 21 Censis (United Kingdom) Technology Scotland (United Kingdom) The Association of Laser Users (AILU), (United Kingdom) Future Photonics Hub (United Kingdom)

Published by SPIE

Volume 12334

Proceedings of SPIE 0277-786X, V. 12334

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

Emerging Applications in Silicon Photonics III, edited by Callum G. Littlejohns, Marc Sorel, Proc. of SPIE Vol. 12334, 1233401 · © 2023 SPIE · 0277-786X doi: 10.1117/12.2670980 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 *Emerging Applications in Silicon Photonics III*, edited by Callum G. Littlejohns, Marc Sorel, Proc. of SPIE 12334, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510657403 ISBN: 9781510657410 (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.



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

v Conference Committee

ARTIFICIAL INTELLIGENCE AND ELECTRONICS INTEGRATION

- 12334 02 Monolithically integrated CMOS electronics in zero-change silicon photonics (Invited Paper) [12334-3]
- 12334 03 Silicon photonics for energy-efficient neuromorphic computing (Invited Paper) [12334-4]

HEALTHCARE AND SENSING

- 12334 04Using photonic integrated circuits to improve micro-electro-mechanical systems inertial
sensors: an update (Invited Paper) [12334-6]
- 12334 05 Towards integrated position sensors with nanometer precision (Best Paper Award) [12334-8]

| | LIDAR |
|----------|--|
| 12334 06 | Adaptive delay lines implemented on a photonics chip for extended-range, high-speed absolute distance measurement [12334-15] |
| | SILICON PHOTONICS |
| 12334 07 | Dual-frequency sweeping light source based on four-wave mixing in silicon-on-insulator nano waveguide [12334-17] |
| 12334 08 | Enhancing throughput of disorder-based broadband spectrometer using correlated disorder [12334-19] |
| | MATERIAL INTEGRATION I |

12334 09 Integrated lasers on silicon for optical communications (Invited Paper) [12334-22]

12334 0A Performance of optical IOCore miniature silicon photonic transceiver in immersion cooling environment (Invited Paper) [12334-30]

Conference Committee

Symposium Chairs

Tariq Ali, University of Birmingham (United Kingdom)
Graham T. Reed, Optoelectronics Research Center (United Kingdom)
Simon Andrews, Fraunhofer UK Research Ltd. (United Kingdom)
Najwa Sidqi, Knowledge Transfer Network Ltd. (United Kingdom)

Conference Chairs

Callum G. Littlejohns, University of Southampton (United Kingdom) **Marc Sorel**, University of Glasgow (United Kingdom)

Conference Program Committee

Katarzyna Balakier, European Space Agency (France)
Claire Besancon, III-V Laboratoire (France)
Antonella Bogoni, CNIT - Photonic Networks & Technologies National Laboratory (Italy)
Thalía Domínguez Bucio, University of Southampton (United Kingdom)
Ying Lia Li, Zero Point Motion (United Kingdom)
Richard C. A. Pitwon, Resolute Photonics Ltd. (United Kingdom)
Miloš A. Popovic, Boston University (United States)
Graham T. Reed, Optoelectronics Research Center (United Kingdom)