

PROCEEDINGS OF SPIE

Smart Photonic and Optoelectronic Integrated Circuits XVII

**Louay A. Eldada
El-Hang Lee
Sailing He**
Editors

**11–12 February 2015
San Francisco, California, United States**

Sponsored and Published by
SPIE

Volume 9366

Proceedings of SPIE 0277-786X, V. 9366

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

Smart Photonic and Optoelectronic Integrated Circuits XVII, edited by Louay A. Eldada, El-Hang Lee, Sailing He,
Proc. of SPIE Vol. 9366, 936601 · © 2015 SPIE · CCC code: 0277-786X/15/\$18 · doi: 10.1117/12.2190462

Proc. of SPIE Vol. 9366 936601-1

The papers included 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. The papers published in these proceedings 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 this book:

Author(s), "Title of Paper," in *Smart Photonic and Optoelectronic Integrated Circuits XVII*, edited by Louay A. Eldada, El-Hang Lee, Sailing He, Proceedings of SPIE Vol. 9366 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628414561

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 © 2015, 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/15/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.



SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print. Papers are published as they are submitted and meet publication criteria. A unique citation identifier (CID) number is assigned to each article at the time of the first 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, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four 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. The complete citation is used on the first page, and an abbreviated version on subsequent pages.

Contents

v	<i>Authors</i>
vii	<i>Conference Committee</i>

ADVANCES IN SILICON PHOTONICS

9366 06	Multi-parameter extraction from SOI photonic integrated circuits using circuit simulation and evolutionary algorithms [9366-5]
---------	---

SMART PHOTON MANIPULATION SYSTEMS

9366 09	Optodic bonding of optoelectronic components in transparent polymer substrates-based flexible circuit systems [9366-8]
---------	---

NOVEL PHOTONIC INTEGRATED CIRCUITS

9366 0A	Novel distributed feedback lightwave circuit elements [9366-9]
9366 0B	Heterogeneous 2D and 3D integrated circuits for temporal, spectral, and spatial information processing (Invited Paper) [9366-10]
9366 0C	Simple and compact tunable semiconductor lasers based on novel half-wave coupler (Invited Paper) [9366-11]

OPTOFLUIDIC SENSING SYSTEMS

9366 0D	Undisturbed interferometric sensing through a fluid interface by electrically-tunable lenses and micro mirrors (Invited Paper) [9366-12]
---------	---

ADVANCED HYBRID PICS

9366 0G	Design, fabrication and demonstration of heterogeneously III-V/Si laser with a compact optical vertical interconnect access (Invited Paper) [9366-15]
9366 0H	Heterogenous integration: the more-than-Moore path to silicon photonic microsystems (Invited Paper) [9366-16]
9366 0I	III-V/Si hybrid integrated devices for optical interconnect (Invited Paper) [9366-17]

PICS FOR OPTICAL INTERCONNECTS

- 9366 0J **Fan-in/out polymer optical waveguide for a multicore fiber fabricated using the Mosquito method** [9366-18]
- 9366 0K **Graded refractive index optics based on dual-layer ultrathin films: theory, design and applications in integrated photonics (Invited Paper)** [9366-19]
- 9366 0L **Bend insensitive graded index multimode polymer optical waveguides fabricated using the Mosquito method** [9366-20]

SMART PHOTONIC REMOTE SENSING SYSTEMS

- 9366 0M **SPADAS: a high-speed 3D single-photon camera for advanced driver assistance systems** [9366-21]
- 9366 0O **Image sensor innovations for low light levels with active imaging features** [9366-27]

POSTER SESSION

- 9366 0R **Epitaxial growth of luminescent β -FeSi₂ on modified Si(111) surface by silver** [9366-25]

Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Akin, Meriem, 09	Villa, F., 0M
Akiyama, Kensuke, 0R	Wallrabe, U., 0D
Anil, Mehmet A., 0A	Wang, Qian, 0G, 0K
Bellisai, S., 0M	Wang, Yixiao, 09
Bogaerts, W., 06	Wu, Lin, 0C
Bronzi, D., 0M	Xiong, Xiaohai, 0C
Büttner, L., 0D	Yoo, S. J. Ben, 0B
Chen, Kaixuan, 0I	Zappa, F., 0M
Cheng, Jianxin, 0I	Zhang, Jianhao, 0I
Czarske, J., 0D	Zhang, Sen, 0C
Dağ, Ceren B., 0A	Zhu, Yuntao, 0I
Fang, Alexander, 0H	Zou, Li, 0C
Fereyre, Pierre, 0O	Zou, Y., 0M
Fiers, M., 06	
Fish, Gregory, 0H	
Fu, Xin, 0I	
Funakubo, Hiroshi, 0R	
He, Jian-Jun, 0C	
Huang, Qiangsheng, 0I	
Ishigure, Takaaki, 0J, 0L	
Jogschies, Lisa, 09	
Kay, Anthony, Yew Seng, 0G	
Krishnamurthy, Vivek, 0G	
Lee, Chee Wei, 0G	
Leithold, C., 0D	
Liao, Xiaolu, 0C	
Lim, Kim Peng, 0G, 0K	
Liu, Jin, 0I	
Liu, Liu, 0I	
Loh, Ter Hoe, 0G,	
Meng, Jianjun, 0C	
Ng, Doris Keh Ting, 0G, 0K	
Overmeyer, Ludger, 09	
Powell, Gareth, 0O	
Pu, Jing, 0G	
Radner, H., 0D	
Rissing, Lutz, 09	
Roelkens, Günther, 0I	
Ruocco, A., 06	
Serpengüzel, Ali, 0A	
Shi, Yaocheng, 0I	
Stürmer, M., 0D	
Suganuma, D., 0J	
Takahashi, Asami, 0L	
Tang, Kun, 0G	
Tisa, S., 0M	
Tosi, A., 0M	
Van Vaerenbergh, T., 06	
Vanslembrouck, M., 06	

Conference Committee

Symposium Chairs

David L. Andrews, University of East Anglia
(United Kingdom)
Alexei L. Glebov, OptiGrate Corporation (United States)

Symposium Co-chairs

Jean-Emmanuel Broquin, IMEP-LAHC (France)
Shibin Jiang, AdValue Photonics, Inc. (United States)

Program Track Chair

Yakov Sidorin, Quarles & Brady LLP (United States)

Conference Chairs

Louay A. Eldada, Quanergy Systems, Inc. (United States)
El-Hang Lee, Inha University (Korea, Republic of)
Sailing He, KTH Royal Institute of Technology (Sweden)

Conference Program Committee

Ray T. Chen, The University of Texas at Austin (United States)
Shanhui Fan, Stanford University (United States)
Chennupati Jagadish, The Australian National University (Australia)
Jürgen Jahns, FernUniversität in Hagen (Germany)
Joachim Piprek, NUSOD Institute LLC (United States)
David V. Plant, McGill University (Canada)
Andrew W. Poon, Hong Kong University of Science and Technology
(Hong Kong, China)
Ali Serpengüzel, Koç Üniversitesi (Turkey)
Qian Wang, A*STAR - Data Storage Institute (Singapore)
Michael R. Watts, Massachusetts Institute of Technology
(United States)
Dan-Xia Xu, National Research Council Canada (Canada)
Lin Yang, Institute of Semiconductors (China)

Session Chairs

- 1 Smart Nanophotonic Systems
Louay A. Eldada, Quanergy Systems, Inc. (United States)
- 2 Advances in Silicon Photonics
Richard M. Osgood Jr., Columbia University (United States)
- 3 Smart Photon Manipulation Systems
Ali Serpengüzel, Koç Üniversitesi (Turkey)
- 4 Novel Photonic Integrated Circuits
Lin Yang, Institute of Semiconductors (China)
- 5 Optofluidic Sensing Systems
Qian Wang, A*STAR - Data Storage Institute (Singapore)
- 6 Advanced Hybrid PICs
Lin Yang, Institute of Semiconductors (China)
- 7 PICs for Optical Interconnects
Louay A. Eldada, Quanergy Systems, Inc. (United States)
- 8 Smart Photonic Remote Sensing Systems
Qian Wang, A*STAR - Data Storage Institute (Singapore)
- 9 Photonic Logic Devices
Louay A. Eldada, Quanergy Systems, Inc. (United States)