

PROCEEDINGS OF SPIE

Physics and Simulation of Optoelectronic Devices XXXI

**Bernd Witzigmann
Marek Osiński
Yasuhiko Arakawa**
Editors

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

Published by
SPIE

Volume 12415

Proceedings of SPIE 0277-786X, V. 12415

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

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 *Physics and Simulation of Optoelectronic Devices XXXI*, edited by Bernd Witzigmann, Marek Osinski, Yasuhiko Arakawa, Proc. of SPIE 12415, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510659353
ISBN: 9781510659360 (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*

SESSION 1 LIGHT EMITTING DIODES

- 12415 02 **Polarization induced doping for carrier transport in graded III-nitride layers: a simulation study** [12415-4]
- 12415 03 **Impact of the IR LED temperature on the throughput of optical wireless communication links** [12415-5]

SESSION 2 SEMICONDUCTOR LASERS I

- 12415 04 **Multiple pump-probe experiments reveal the ultrafast gain recovery in model active semiconductor media** [12415-8]

SESSION 3 ACTIVE MATERIALS

- 12415 05 **Electroabsorption characteristics of semi-insulating indium phosphide as applied to optoelectronic modulation** [12415-14]
- 12415 06 **Strain-balanced InGaAs/GaAsSb type-II superlattices on InP for extended short-wavelength infrared detection** [12415-11]
- 12415 07 **Potential of hydrogenated microcrystalline silicon-germanium for low thermal budget near infrared sensors** [12415-12]

SESSION 4 PHOTODETECTION

- 12415 08 **Theoretical study of impacts of traps on optical response of side-coupled InGaAs waveguide photodetectors** [12415-16]
- 12415 09 **Design and optimization of NUV-enhanced 4H-SiC separate-absorption-charge-multiplication avalanche photodiodes** [12415-17]
- 12415 0A **Design risk for fabrication stability of silicon single-photon avalanche diodes with deep N-well implantation** [12415-18]

- 12415 0B **Equivalent circuit modeling of traveling-wave superconducting-nanostripe single-photon detectors for silicon quantum photonic integrated circuits** [12415-19]
- 12415 0C **Parametric study on the electro-optical performances of curved CMOS BSI image sensors** [12415-20]

SESSION 5 SEMICONDUCTOR LASERS II

- 12415 0D **Full parameter extraction of a temperature-insensitive quantum well DFB laser using an optical injection technique** [12415-23]
- 12415 0E **Isochrons in tunable photonic oscillators and applications in precise positioning** [12415-24]

SESSION 6 OPTICAL SENSING

- 12415 0F **Mie resonance structures for sensing applications** [12415-26]
- 12415 0G **Amorphous silicon photonic optical phased array for beam steering** [12415-28]
- 12415 0H **Plasmonics gas sensor bases on electromagnetic induced transparency (EIT) in MIR** [12415-29]
- 12415 0I **Study and analysis of the tunable plasmonic sensor based on surface conductivity of graphene** [12415-30]

SESSION 7 ELECTROMAGNETICS

- 12415 0J **Speed efficiency optimization for GPU accelerated rigorous coupled-wave analysis program** [12415-31]
- 12415 0K **Black-box simulation method: train the optical model from output** [12415-32]

POSTER SESSION

- 12415 0L **Post-fabrication performance of nested hollow-core fibers with perturbed cladding structures** [12415-42]
- 12415 0M **Tuning the structural and photophysical behavior of non-toxic CsSnCl₃ using reduced graphene oxide for optoelectronic applications** [12415-43]
- 12415 0N **Impact of linear alloy on strain coupled bilayer InAs/GaAs_{1-y}Sb_y quantum dot heterostructures** [12415-45]

- 12415 0O **GPU libraries speed performance analysis for RCWA simulation matrix operations** [12415-48]
- 12415 0P **Two-step machine learning assisted extraction of VCSEL parameters** [12415-49]
- 12415 0Q **High efficiency multi-taper coupler based optical modulator** [12415-51]
- 12415 0R **Modulation transfer function simulation methodology on CMOS image sensors using add-on structures for near infrared applications** [12415-54]

DIGITAL POSTER

- 12415 0S **End-to-end sensor system modeling and validation for AR/VR/MR applications** [12415-55]