

PROCEEDINGS OF SPIE

# ***Physics and Simulation of Optoelectronic Devices XXVII***

**Bernd Witzigmann  
Marek Osiński  
Yasuhiko Arakawa**  
*Editors*

**5–7 February 2019  
San Francisco, California, United States**

*Sponsored and Published by*  
SPIE

**Volume 10912**

Proceedings of SPIE 0277-786X, V. 10912

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](http://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 XXVII*, edited by Bernd Witzigmann, Marek Osiński, Yasuhiko Arakawa, Proceedings of SPIE Vol. 10912 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

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

ISBN: 9781510624665  
ISBN: 9781510624672 (electronic)

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](http://SPIE.org)

Copyright © 2019, 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](http://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/19/\$18.00.

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](http://SPIDigitalLibrary.org)

---

**Paper Numbering:** *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article 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	<i>Authors</i>
ix	<i>Conference Committee</i>

---

## NANO-EMITTERS AND NON-CLASSICAL LIGHT

---

10912 05	<b>Photonic engineering providing conditions for direct exciton macroscopic coherence at elevated temperatures</b> [10912-4]
----------	--

---

## III-NITRIDE LASERS AND LEDs

---

10912 0D	<b>Inhomogeneous spectral broadening in deep ultraviolet light emitting diodes</b> [10912-12]
10912 0E	<b>InGaN/GaN <math>\mu</math>LED SPICE modelling with size-dependent ABC model integration</b> [10912-13]

---

## LASERS AND LEDs I

---

10912 0G	<b>VENUS: a comprehensive electro-thermo-opto VCSEL simulator (Invited Paper)</b> [10912-15]
10912 0H	<b>Low-noise x-band tunable microwave generator based on external cavity lasers</b> [10912-16]
10912 0I	<b>Characterization of MBE-grown 1.55-<math>\mu</math>m GaSb-based multiple-quantum-well lasers at cryogenic temperatures</b> [10912-17]

---

## LASER DYNAMICS

---

10912 0M	<b>Stable and unstable Nozaki-Bekki holes in a long laser</b> [10912-21]
10912 0N	<b>Theoretical investigation on effects of group-velocity dispersion on mid-infrared quantum-cascade lasers with Fabry-Perot and ring cavities</b> [10912-22]
10912 0O	<b>Coexisting periodic regimes in semiconductor lasers with optical feedback</b> [10912-23]

---

## ELECTROMAGNETICS AND PLASMONICS

---

- 10912 0Q **Revisiting beamforming under the prism of inverse methods** [10912-25]
- 10912 0T **Ellipso-polarimetric schemes for improved surface plasmon resonance detection** [10912-28]

---

## LASERS AND LEDs II

---

- 10912 0U **Hybrid modeling of quantum light emitting diodes: self-consistent coupling of drift-diffusion, Schrödinger-Poisson, and quantum master equations (Invited Paper)** [10912-29]
- 10912 0V **Carrier lifetime of heavily p-doped base in light-emitting transistors and transistor lasers** [10912-30]
- 10912 0X **Wide-temperature-range characterization of 1.55- $\mu\text{m}$  phosphorus-free multiple-quantum-well lasers grown by MBE on InP** [10912-32]

---

## PHOTODETECTION

---

- 10912 0Y **Minimization of dark counts in PureB SPADs for NUV/VUV/EUV light detection by employing a 2D TCAD-based simulation environment** [10912-33]
- 10912 0Z **A comparative study of methods and algorithms for spatially resolved spectral value reconstruction with multispectral resolving filter-on-chip CMOS sensors** [10912-34]

---

## SENSORS

---

- 10912 13 **Bimetallic surface plasmon resonance photonic crystal fiber biosensor using refractory plasmonic material** [10912-40]
- 10912 14 **Design and analysis of low-cost high-sensitive surface plasmon resonance-based biosensor** [10912-41]

---

## OPTICAL SYSTEMS SIMULATION

---

- 10912 15 **Fully tensorial elastic-wave mode solver for stimulated Brillouin scattering simulations in integrated photonics** [10912-42]
- 10912 16 **Exploring the impacts of long-period corrugation and phase gratings on a cascade of phase-shifted lithium niobate waveguides with the combined theoretical and experimental approaches** [10912-43]
- 10912 17 **Indoor positioning and intuitive advertising using visible light communication** [10912-44]

10912 18 **The design of universal logic gates using microring resonator structures** [10912-45]

---

**POSTER SESSION**

---

- 10912 19 **Signal and crosstalk analysis using optical convolution of transmitted optical signals** [10912-46]
- 10912 1A **Optical simulation for illumination using GPGPU ray tracing** [10912-47]
- 10912 1B **Design and analysis of surface-plasmon resonance (SPR) sensor to measure electric field using angle interrogation** [10912-48]
- 10912 1C **Circularly polarized lasing of ultraviolet plasmonic gammadion nanocavity** [10912-49]
- 10912 1D **Thermal properties and extinction of a wire-grid polarizer** [10912-50]
- 10912 1F **Metallo-dielectric Yagi-Uda nanoantennas based on rectangular shaped elements** [10912-52]
- 10912 1G **X-ray luminescence in undoped and bismuth-doped single crystal hybrid lead halide perovskites** [10912-53]
- 10912 1H **Multi-functional plasmonic biosensor based on alcohol-filled PCF** [10912-54]
- 10912 1I **Design of photonic crystal fiber for efficient supercontinuum generation** [10912-55]
- 10912 1J **Compact polarization splitter based on plasmonic micro-structured fiber** [10912-56]
- 10912 1K **Optical design of dual mode seeker for short-wave infrared and four quadrant detectors in missile application** [10912-57]
- 10912 1L **Compact seeker design by using piezo actuator in missile application** [10912-58]
- 10912 1M **Saturation effects in nonlinear loop mirror lasers: square wave operation** [10912-59]
- 10912 1N **Designing artificial neural networks for band structures computations in photonic crystals** [10912-60]
- 10912 1O **Fabrication and simulation of silver nanostructures on different types of porous silicon for surface enhanced Raman spectroscopy** [10912-61]
- 10912 1Q **Optical propagation through layered anisotropic materials using effective medium theory** [10912-63]