

PROCEEDINGS OF SPIE

Integrated Optics: Devices, Materials, and Technologies XXI

**Sonia M. García-Blanco
Gualtiero Nunzi Conti**
Editors

**30 January–1 February 2017
San Francisco, California, United States**

Sponsored and Published by
SPIE

Volume 10106

Proceedings of SPIE 0277-786X, V. 10106

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 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 *Integrated Optics: Devices, Materials, and Technologies XXI*, edited by Sonia M. García-Blanco, Gualtiero Nunzi Conti, Proceedings of SPIE Vol. 10106 (SPIE, Bellingham, WA, 2017) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510606531

ISBN: 9781510606548 (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

Copyright © 2017, 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/17/\$18.00.

Printed in the United States of America Vm7 i ffUb '5gg: WJUH'g' bWZi bXYf' JW'bgf' Zfca 'GD-9.

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

**SPIE. DIGITAL
LIBRARY**
SPIEDigitalLibrary.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>
xi	<i>Conference Committee</i>

SESSION 1 RARE-EARTH ION-DOPED DEVICES

10106 03	Glass and glass-ceramic photonic systems (Invited Paper) [10106-2]
10106 04	Spectroscopy of erbium-doped potassium double tungstate waveguides [10106-3]
10106 05	Co-integration of two DFB lasers on glass for millimeter-wave generation [10106-4]
10106 06	Temperature-dependent absorption and gain of ytterbium-doped potassium double tungstates for chip-scale amplifiers and lasers [10106-5]

SESSION 2 NONLINEAR INTEGRATED OPTICS

10106 08	Low-temperature crack-free Si₃N₄ nonlinear photonic circuits for CMOS-compatible optoelectronic co-integration [10106-7]
10106 0A	Feasibility study of optical parametric amplification using CMOS compatible ring resonators [10106-9]
10106 0B	Integrated nonlinear optics: lithium niobate-on-insulator waveguides and resonators [10106-10]

SESSION 3 NOVEL DEVICES I

10106 0C	Integrated polymer polarization rotator based on tilted laser ablation [10106-12]
10106 0D	Cost-effective, compact and high-speed integrable multi-mode interference modulator [10106-13]
10106 0F	Ultra-low-power stress-optics modulator for microwave photonics [10106-67]

SESSION 4 PHOTONIC INTEGRATION I	
10106 OG	Hybrid III-V/silicon photonic integrated circuits for high bitrates telecommunication applications (Invited Paper) [10106-15]
10106 OJ	Monolithic integration of hybrid III-V/Si lasers and Si-based modulators for data transmission up to 25Gbps [10106-18]
10106 OK	A photonic integrated signal processor (Invited Paper) [10106-19]
SESSION 5 SENSORS I	
10106 OM	Fabrication of Bragg grating sensors in UV-NIL structured Ormocer waveguides [10106-21]
10106 ON	SOI-based centimeter-scale Mach-Zehnder interferometers for fluid sensing [10106-22]
SESSION 6 PHOTONIC INTEGRATION II	
10106 OP	Recent advances in hybrid VO₂/Si devices for enabling electro-optical functionalities (Invited Paper) [10106-24]
10106 OQ	Monolithic photonic integration technology platform and devices at wavelengths beyond 2µm for gas spectroscopy applications (Invited Paper) [10106-25]
10106 OR	Ultra-low-loss and broadband mode converters in Si₃N₄ technology [10106-26]
SESSION 7 SENSORS II	
10106 OT	Spectroscopic sensing with silicon nitride photonic integrated circuits (Invited Paper) [10106-28]
10106 OU	Optofluidic sensor engineering towards plutonium concentration measurements [10106-29]
10106 OX	Integrated lab-on-a-chip sensor using shallow silicon waveguide multimode interference (MMI) device [10106-32]
SESSION 8 NOVEL MATERIALS	
10106 OY	Multiplexing photonic devices integrated on a silicon/germanium platform for the mid-infrared (Invited Paper) [10106-33]
10106 10	Development of sol-gel saturable absorber for integrated Q-switched lasers [10106-35]
10106 12	Light-driven liquid microlenses [10106-37]

SESSION 9 PLASMONICS I	
10106 13	Multilayered metal-insulator plasmonic nanocavities: toward tunable multi-resonance nano-devices for integrated optics (Invited Paper) [10106-38]
10106 14	Titanium nitride based hybrid plasmonic-photonic waveguides for on-chip plasmonic interconnects [10106-39]
10106 15	A directional coupling scheme for efficient coupling between Si₃N₄ photonic and hybrid slot-based plasmonic waveguides [10106-40]
10106 16	Butt-coupled interface between stoichiometric Si₃N₄ and thin-film plasmonic waveguides [10106-41]
SESSION 10 PLASMONICS II	
10106 17	Nonlinear optical modulation in a plasmonic Bi:YIG Mach-Zehnder interferometer [10106-42]
10106 19	Plasmonics-enabled metal-semiconductor-metal photodiodes for high-speed interconnects and polarization sensitive detectors [10106-44]
10106 1A	Surface plasmon resonance sensor using vari-focal liquid lens under angular interrogation [10106-45]
SESSION 11 NOVEL DEVICES II	
10106 1B	Engineering complex nanolasers: from spaser quantum information sources to near-field lasers (Invited Paper) [10106-46]
10106 1C	Observing quantum interference in 3D integrated-photonic symmetric multiports [10106-47]
10106 1D	4-channel interferometry with a zig-zag array of mid-infrared integrated waveguides [10106-48]
10106 1G	Near-field investigation of Bloch surface wave based 2D optical components [10106-51]
POSTER SESSION	
10106 1I	Implementation of 3-bit binary to Excess-3 code converter using Mach-Zehnder interferometer [10106-52]
10106 1J	Resonant routing of optical pulses in coupled-cavity structures [10106-53]
10106 1K	Characterization of glass planar waveguides prepared by copper ion exchange method [10106-54]

- 10106 1L **Design and simulation of 20-channel 50-GHz Si₃N₄-based arrayed waveguide grating applying AWG-parameters tool [10106-55]**
- 10106 1M **New waveguide shape for low loss and high uniformity y-branch optical splitter [10106-56]**
- 10106 1N **Polymer planar waveguide Bragg gratings: fabrication, characterization, and sensing applications [10106-57]**
- 10106 1U **Photonic nanojet properties of dielectric microcylinders [10106-64]**
- 10106 1W **Laws of nature for forces: the discovery of Cubal laws and constant [10106-66]**
- 10106 1X **Simulation of 20-channel, 50-GHz, Si₃N₄-based arrayed waveguide grating applying three different photonics tools [10106-68]**