PROCEEDINGS OF SPIE

Integrated Photonics: Materials, Devices, and Applications

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18–20 April 2011
Prague, Czech Republic

Sponsored and Published by
SPIE

Volume 8069

Proceedings of SPIE, 0277-786X, v. 8069

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Please use the following format to cite material from this book:
Author(s), "Title of Paper," in *Integrated Photonics: Materials, Devices, and Applications*, edited by Ali Serpengüzel, Giancarlo C. Righini, Alfred Leipertz, Proceedings of SPIE Vol. 8069 (SPIE, Bellingham, WA, 2011) Article CID Number.

ISSN 0277-786X
ISBN 9780819486585

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

Printed in the United States of America.

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

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Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent 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:

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Introduction

Optical science and photonics engineering are developing at a faster pace. The optoelectronic and photonic engineer of the 21st century will make use of the tools available to design ever improved photonic devices and systems, whereas the optical and photonic scientist of the 21st century will be busy supplying novel materials, fabrication methods, and applications. Beginning with the new millennium, countries are officially including optics and photonics in their research and development plans and programs to cover application fields from automotive and home lighting to information and communications technologies, from life sciences and health to multidimensional displays, from remote sensing to nondestructive diagnostics, and from material processing to renewable energy. More and more academic degree programs are being offered in optical sciences and photonics engineering all over the world. Soon, this novel discipline will grow out of the more conventional science and engineering departments and establish itself as the discipline of the 21st century.

The scope of this conference on integrated photonics materials, devices, and applications has been to bring together optical scientists and photonics engineers who work on the different aspects of this fascinating science and technology in academia, industry, government laboratories, and research centers throughout the planet. The aim was to provide an interdisciplinary update and review of innovations in integrated photonic materials, devices, and applications, as well as theoretical, experimental, and numerical tools that support these innovations. The conference included topics such as very large scale integrated (VLSI) photonics, discrete photonic devices, quantum photonic devices and materials, photonic atoms and crystals, photonic atoms and waveguides, novel photonic materials, fabrication methods, and applications.

Integrated photonics comes about with the VLSI of photonics based on micro- and nanodevices and waveguides. Discrete photonic devices are to be assembled on optical printed circuit boards (PCBs). Quantum photonic structures are investigated for novel application areas as well as for contribution to the fundamental science. Ordered photonic atoms leading to photonic crystals, and disordered ones leading to photonic glasses, are fascinating. Novel materials, fabrication techniques, and applications are abundant.

Although this volume includes a fraction of our ever shrinking planet's research and development efforts in the vast field of integrated photonics, we hope that these papers by world renowned experts pave the path for all of us towards the upcoming photonics integration.

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