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Front Matter: Volume 6898

, "Front Matter: Volume 6898," Proc. SPIE 6898, Silicon Photonics III, 689801
(11 March 2008); doi: 10.1117/12.791605

SPIE.

Event: Integrated Optoelectronic Devices 2008, 2008, San Jose, California,
United States

PROCEEDINGS OF SPIE

Silicon Photonics III

Joel A. Kubby
Graham T. Reed
Editors

21–24 January 2008
San Jose, California, USA

Sponsored and Published by
SPIE

Volume 6898

Proceedings of SPIE, 0277-786X, v. 6898

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Author(s), "Title of Paper," in *Silicon Photonics III*, edited by Joel A. Kubby, Graham T. Reed, Proceedings of SPIE Vol. 6898 (SPIE, Bellingham, WA, 2008) Article CID Number.

ISSN 0277-786X

ISBN 9780819470737

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

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Introduction

Silicon has a legendary history as the material of choice for microelectronic integration, but has not been the material of choice for optoelectronic integration. That is now beginning to change with the emergence of silicon photonics. Silicon photonic devices have been demonstrated with the capability to emit, modulate, guide, and detect light and can be combined with microelectronics to form electronic and photonic integrated circuits. Silicon photonic circuits and devices are now being fabricated in commercial CMOS foundries, enabling these devices to leverage the \$500 billion fabrication infrastructure for integrated circuits. The previous barrier of silicon's indirect bandgap has been overcome through the integration of germanium and III-V materials to form novel in-plane silicon lasers. The Raman effect and nano-engineering of crystalline silicon have also been used to obtain light from silicon and an electrically pumped monolithic silicon laser is on the horizon.

The decrease in waveguide bend radius made possible in silicon due to its high-index contrast, together with increased levels of optical and microelectronic integration, may lead to a new formulation of Moore's Law for silicon photonics. We are now seeing the convergence of communications and computing directly on-chip. The progress in the past few years has been staggering, and one area of particular focus of recent work has been the move toward integration of electronic and photonic functionality in the same silicon layer.

In addition to on-chip communications and signal processing, silicon photonics is also being used to form laboratories on a chip that can detect single biological molecules and protein binding events. The past year has been an exciting time for silicon photonics! We hope you will enjoy the papers detailing these advancements that are included in these conference proceedings.

Joel A. Kubby
Graham T. Reed