

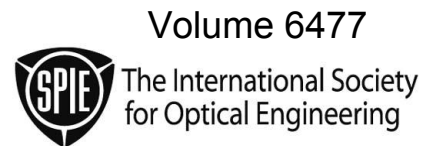
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Silicon Photonics II

Joel A. Kubby
Graham T. Reed
Editors

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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 introduction 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 photonics 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 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. 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 this conference proceeding.

Joel A. Kubby
Graham T. Reed

