Editorial

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This special issue on "Silicon Photonic Integrated Devices" is a collection of invited papers on highly integrated silicon photonic devices for communications and sensing. Silicon photonics comprises a planar arrangement of optical waveguides and other elements on a silicon substrate. On this platform one can make optical splitters/combiners, filters, switches, modulators, photodetectors, and more. One can even monolithically integrate transistors, although for economic reasons, this is becoming less common and instead 2D and 3D hybrid optical-electronic integration technologies are being employed.

When silicon photonics was first developed, it was primarily considered as an inexpensive way to combine optics and electronics. There was a strong emphasis on silicon photonics being "CMOS compatible". However, silicon photonics has proven to be very useful on its own. It has demonstrated very high yields, very compact devices due to its high index contrast in two dimensions, and very high performance. Only a couple of companies today offer silicon photonics commercial products, but this is likely to change significantly in the next several years.

The first two articles give overviews of silicon photonic devices for optical communications. The next three articles focus on various designs of high-speed optical modulators in silicon photonics. The next article discusses interconnect designs. The next article discusses silicon photonic devices for analog applications. The last article focuses on sensors.

We are confident that you will enjoy these articles on this fast-maturing field. They will help you better understand the process as silicon photonics makes its transition from the research lab to real commercial products.

We would like to thank the hard work of my fellow Guest Editors, Michal Lipson and Haiseng Rong and the Staff, Dennis Couwenberg and Tara Dorrian.

Sincerely,
Chris Doerr
(Guest Editor)