

Magneto-optical nonreciprocal devices in silicon photonics

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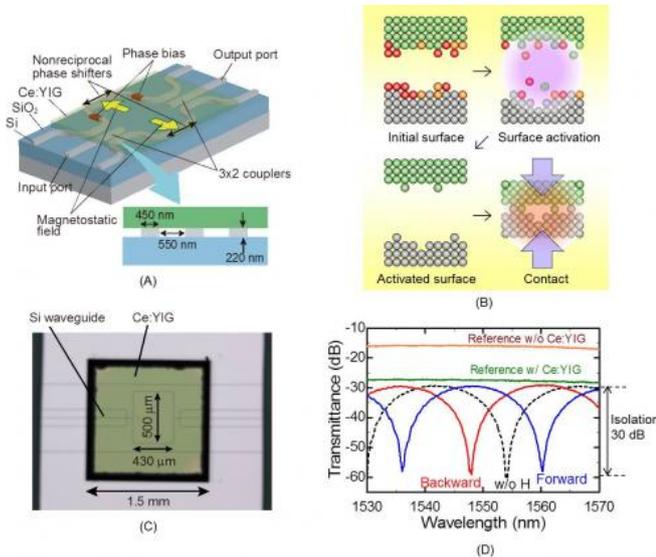


Figure caption: (A) Schematic illustration of an SOI waveguide optical isolator based on MZI, (B) Process of direct bonding technique, (C) Microscope image of a fabricated optical isolator, (D) Measured fiber-to-fiber transmittance of the fabricated optical isolator as a function of the wavelength.

In a paper published in *Science and Technology of Advanced Materials* today, researchers demonstrated the first optical isolator on silicon waveguide platforms.

As the recent demand for optical interconnections is increased, much attention has been paid to [silicon photonics](#) because of the small device footprint and CMOS compatible process. An optical isolator is essential for protecting optical active devices from reflected light even in short-distance transmission systems.

However, the bottleneck of integrated optical isolator lies in difficulty in growing magneto-optical garnet crystals on commonly used optical waveguide platforms such as [silicon](#).

Yuya Shoji and Tetsuya Mizumoto of Tokyo Institute of Technology, approached the problem using a direct bonding technique which realizes direct contact of different [materials](#). The authors have demonstrated the first optical isolator on silicon waveguide platforms.

In this paper published in *Science and Technology of Advanced Materials*, they describe the direct bonding, design of the waveguide isolator, and recent progress on a silicon isolator with an optical isolation of 30 dB and a four port optical circulator. They also introduce approaches done by other research groups in the paper.

Compared to the state-of-the-art deposition approach, the bonding technique is advantageous because a single-crystalline magneto-optical garnet having a large magneto-optical effect can be used.

More information: "Magneto-optical non-reciprocal devices in silicon photonics," Yuya Shoji and Tetsuya Mizumoto 2014 *Sci. Technol. Adv. Mater.* 15 014602 [DOI: 10.1088/1468-6996/15/1/014602](#)

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