

INTEGRATED MICROLENS COUPLER FOR PHOTONIC INTEGRATED CIRCUITS

Tech ID: 33035 / UC Case 2023-076-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Silicon photonics is increasingly used in an array of communications and computing applications. In many applications, photonic chips must be coupled to optical fibers, which remains challenging due to the size mismatch between the on-chip photonics and the fiber itself. Existing approaches suffer from low alignment tolerance, sensitivity to fabrication variations, and complex processing, all of which hinder mass manufacture.

To address these problems, researchers at UC Berkeley have developed a coupling mechanism between a silicon integrated photonic circuit and an optical fiber which uses a microlens to direct and collimate light into the fiber. Researchers have demonstrated that this device can achieve low coupling loss at large alignment tolerances, with an efficient and scalable manufacturing process analogous to existing manufacture of electronic integrated circuits. In particular, because the beam is directed above the silicon chip, this method obviates dry etching or polishing of the edge of the IC and allows the silicon photonics to be produced by dicing in much the same way as present electronic integrated circuits.

SUGGESTED USES

Coupling of photonic integrated circuits (such as silicon photonics) to optical fibers.

ADVANTAGES

This coupling method offers low coupling loss ($\leq 0.9\text{dB}$), broadband operation (good performance in both O and C bands), negligible polarization-dependent loss, large alignment tolerance ($\pm 2\mu\text{m}$), and small footprint ($\leq 700\mu\text{m}$). Additionally, these couplers can be manufactured efficiently at wafer scale and can be applied to photonic chips which are diced like electronic chips.

RELATED MATERIALS

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OTHER INFORMATION

KEYWORDS

Photonics, Microlens, Integrated
circuits, Fiber optic communications,
Fiber optic coupling

CATEGORIZED AS

- » **Optics and Photonics**
- » All Optics and Photonics
- » **Communications**
- » Networking
- » Optical
- » **Computer**
- » Hardware

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