

Experimental demonstration of high-precision optical interference in Mach-Zehnder-type photonic crystal waveguide

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Excellent optical interference was experimentally demonstrated in the near infrared region using asymmetric Mach-Zehnder (MZ) type GaAs-based two-dimensional photonic crystal (2DPC) slab waveguides with directional couplers (DCs)[1], as shown in Fig. 1. As one of two MZ arm lengths changed in units of the lattice constant, the output intensities exhibited sinusoidal curves in excellent agreement with coupled-mode theory. In another experiment where the DCs were operated by two incident optical beams with externally controlled phase's difference, a sinusoidal change was observed also in output intensities according to the theory of the DC. These results were obtained by virtue of excellent nano-fabrication of the 2DPC structures and pave the way to successful operation of a PC-based ultra-small symmetrical MZ (SMZ) all-optical switch.

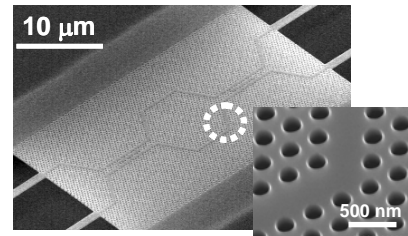


Fig. 1: SEM image of MZI.

[1] Y. Sugimoto et al. *Appl. Phys. Lett.* **83**, 3236 (2003).