

## Two-dimension side-coupled photonic crystal filter

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Photonic crystal bandgap filter (PBGF) composed of a waveguide side coupled to two single-mode resonators placed on both sides of the waveguide respectively<sup>1</sup>. In the PBGF the resonators are at a longitudinal distance of  $2a$  ( $a$  is the lattice constant) from the waveguide for the balance between the Q-factor and the reflection efficiency<sup>1</sup>. A flat-top reflection spectrum corresponding to this optical system is obtained if the phase retardation between the two neighboring resonators is set to  $\pi/2$ <sup>2</sup>. In order to probe the signal efficient the fiber grooves are etched beside the filter structure and make a right angle to avoid probing the leakage of incoming light. The taper is designed to couple more light into the PBGF<sup>3</sup>. The experiment results have shown the same outline with the FDTD simulation data but experience the shift of peak position by about 10 nm. The discrepancies are attributable to perpendicular losses at this ridge waveguide interface and the perpendicular cavity losses.

[1] L. L. Lin, Z. Y. Li and B. Lin. Physical Review B, 72, 165330 (2005).

[2] H. H. Li, K. Xu, J. Wu, J. T. Lin Selin H. G. Teo, A. Q. Liu. APCOT, Singapore, June 25-28 (2006).

[3] A. Mekis, and J. D. Joannopoulos. Journal of Lightwave Technology, 19, 861(2001).

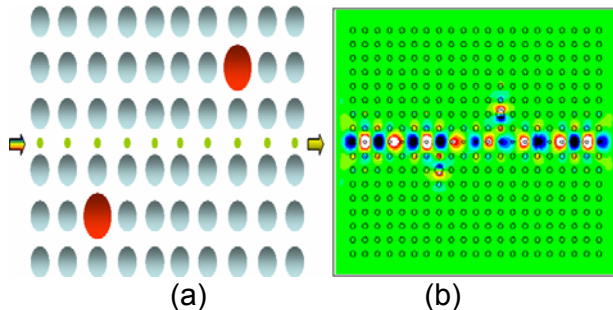


Figure 1: (a) Schematic diagram of the PBGF, (b) dynamic simulation of the PBGF.

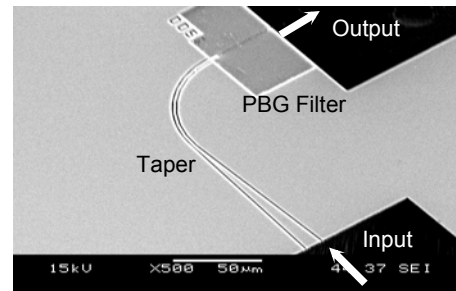


Figure 3: Scanning electron micrographs of the whole device.

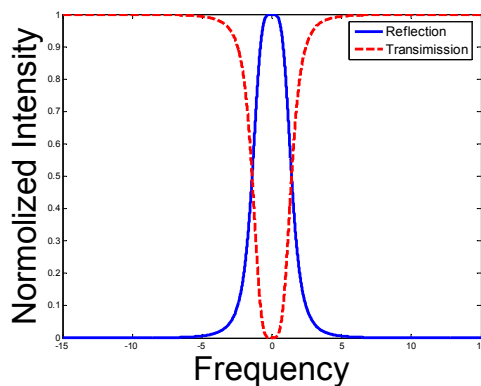


Figure 2: schematic of experiment setup.

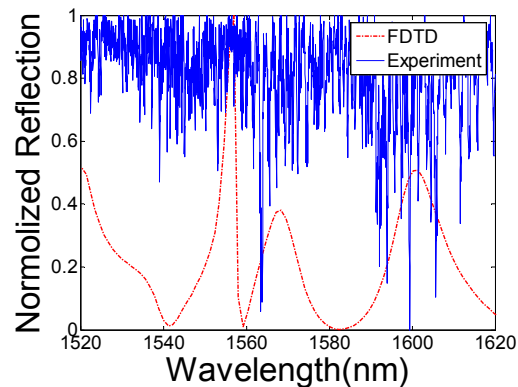


Figure 4: Reflection spectrum of the PBGF.