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Manipulating light by photonic crystal cavities

- Developing technologies for optical integrated circuits -

Motivation

Light enables us to realize a fast and large capacity network, but it is very difficult to realize all-optical one due to difficulties of low power light-controlling-light and direct manipulation of light. Photonic crystal nano-cavity is a promising candidate to solve these difficulties.

Originality

We propose a new way to change a light wavelength by tuning a distance of two photonic crystal cavities while the light is confined in them. And, we realize all optical switches and memories operating with very low energy about 100 fJ by Si photonic crystal.

Impact

The wavelength converter operates in the very wide band like never before, and it can be an unique device which can convert mechanical energy to optical energy.
The optical switches and memories realize an ultra compact and ultra low power operation optical circuits.

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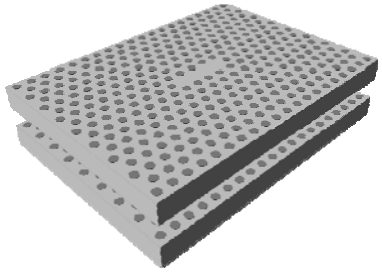
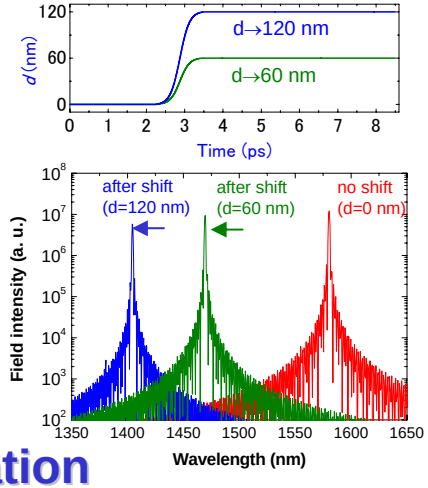
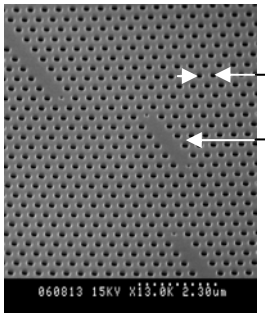
Wavelength conversion

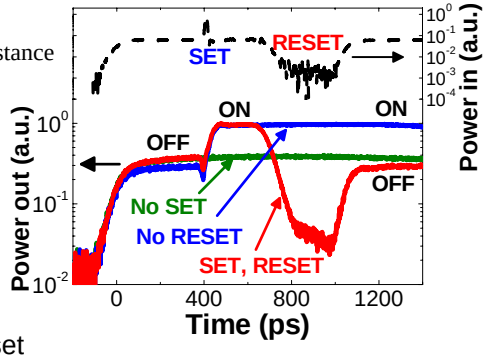


Light wavelength can be tuned by modulating a distance between two photonic crystal cavities



Optical memory operation





Output signal is turned ON after the set pulse is input.