All Optical Control of Light by Photonic Crystal Nanocavities

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Recently, various aspects of the performance of photonic crystals have rapidly progressed, such as waveguide loss and cavity Q. Thanks to these advances, various forms of all-optical control of light is becoming possible using photonic crystals. In this talk, I will first review our recent achievement in ultrasmall and ultrahigh-Q nanocavities. Next I will show the realization of all-optical switches and bistable memories using photonic-crystals nanocavities. Third, we will discuss possible applications of these functions. One is the application for all-optical digital processing chips. Second is dynamic control of light which leads to interesting novel ways of controlling fundamental properties of light, such as adiabatic wavelength conversion and optomechanical energy conversion.