

## COE講演会

日時:平成17年11月18日(金)10時~12時

場所:理学部H棟6階 中セミナー室(H601)

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題目:Photonic band gap materials

要旨:An introduction to the 1D, 2D, and 3D photonic band gap materials will be presented. Original results on the investigation of 3D photonic crystals based on synthetic opals will be discussed. We determined the photonic band-gap structure of synthetic opals by combining the measured angle-resolved transmission spectra and optical frequency-resolved diffraction patterns. Under monochromatic illumination, the diffraction patterns were observed as symmetrical sets of spots, each being a colored fingerprint of the photonic band gap for a certain direction.

The spot color gives information about the energy of the band gap, while the angular spot position on the screen informs of the direction along which the band gap occurs. The white light diffraction patterns registered in different geometries are analyzed for one dimensional (1D) disorder in hexagonal closely packed layers normal to the growth axis of opals. The data analysis is performed in terms of the suggested diffraction theory of photonic crystals, taking into account the effects

of random 1D packing of growing layers. A good quantitative agreement between the experimental data and calculations has been obtained for all diffraction patterns, including the angular and spectral dependencies of the radiation intensity. We have also estimated the statistical parameters of the opal structure composed of fcc lattice twins of random lengths along the sample growth axis. The long-wavelength diffraction edge is found for the principal scattering geometries.

Our results provide a basis for three-dimensional light control by photonic crystals.

問い合わせ先:田島節子(H314)