

Ultra-transparency and Nontrivial Flat Band in Photonic Crystals

(22 July 2014)

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Photonic crystals and metamaterials have enormously enriched human's ability to control electromagnetic waves. Based on these new materials, unprecedented applications such as optical waveguides and chips, cloaking, illusion optics, and optical blackholes have been proposed. In this talk, the speaker will discuss some of the latest research results in photonic crystals. First, certain bands in photonic crystals may be regarded as homogeneous effective nonlocal media, which could expand Brewster's angle from a single incident angle to a wide range of incident angles, and lead to ultra-transparency at a single frequency. Second, a type of photonic crystals designed to exhibit ultra-transparency in the whole optical regime for normal incidence. Third, a nontrivial flat band achieved without utilizing defects or localized resonances as required by normal flat band structures. These findings may open unprecedented possibilities for novel optical devices.