

Abstract Submitted  
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**Band gap of a 3D dyed polystyrene photonic crystal from optical absorption.** NA YOUNG HA, University of Pennsylvania, JEONG WEON WU, Ewha Womans University — Three-dimensional (3D) photonic crystals (PCs), fabricated from colloidal spheres doped with organic dye and whose optical absorption overlaps with the photonic band gap (PBG), have been studied to determine the relation between the PBG widening and the increased contrast in refractive indices. In this work, we report on the identification of the role of the optical absorption of the dye in determining the PBG shape of a 3D dyed PC, which is fabricated from colloidal dyed-polystyrene spheres consisting of an inner core and an outer shell. In analyzing the optical reflection spectra of 3D dyed PCs, an analytical electromagnetic wave scattering theory was rigorously employed, with the dispersive and absorptive optical responses of the composite dyes fully taken into account. It was subsequently found that the characteristic PBG shape of the 3D dyed PC, when measured in the reflection spectra, results from two superimposed contributions with distinct origins, i.e., a Bragg reflection and a high reflection associated with the strong dye absorption.

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