Photonic band gap formation in inverted colloidal crystals

문준혁, 조영상, 이기라[1], 양승만*
한국과학기술원 생명화학공학과; [1]LG화학기술연구소
(smyang@kaist.ac.kr*)

Photonic crystals are a synthetic crystal whose refractive index is periodically modulated on a scale with the wavelengths of visible and infrared light. Due to multiple interference of lightwaves scattered from each unit cell, these crystals exhibit partial and complete photonic band gaps (PBGs) which is analogous to the electronic band gaps in a semiconductor. Among them, colloidal particles have been widely used and easily fabricated into face-centered-cubic (fcc) lattices of sphere. Moreover, the colloidal crystals have been used as a template for inverted opal structures. The morphology of inverted opals can be controlled by filling ratio and surface property of the particles.
Here, we investigated in detail the PBGs of inverted opals with various morphologies. Specifically, we simulated the PBGs for inverted opals with hollow shell or interconnected window. Furthermore, we fabricated the inverted opals with optimized morphologies.