

Fabrication of 3D Periodic Nanostructures by Using Reusable Colloidal Phase Masks

전태윤^{1,2}, 전환철^{1,2}, 이수연^{1,2}, 박성규³, 심태섭^{1,2},
양승만^{1,2,*}

¹KAIST; ²광자유체집적소자연구단; ³재료연구소
(smyang@kaist.ac.kr*)

Periodic 3D nanostructures have been widely used for various applications because of their unique properties, including mechanical strength, regular porosity, and optical properties. However, conventional fabrication methods for fabricating 3D nanostructures have some crucial limitations. For example, holographic lithography and phase shift lithography using PDMS/PUA grating structures have limitations on complexities of the fabrication procedure, expensive fabrication cost and limited geometrical shapes. Here, we demonstrate a facile and cost-effective method for the fabrication of periodic 3D nanostructures over large areas using a reusable colloidal phase mask. The hexagonally ordered colloidal particles, which were embedded in the PDMS polymer could function as phase shift elements to produce the interference patterns of light. The geometrical features of the polymeric 3D nanostructures could be easily controlled. Furthermore, we investigated a potential for the use of the resulting 3D nanostructures as templates for fabricating ZnO inverse replicas and plasmonic structures.