

Colloidal Crystal based Softlithographic Nanopatterning and Its Applications

박오옥*, 최홍균, 이행근, 김문호¹, 임상혁¹
한국과학기술원; ¹엘지화학
(ookpark@kaist.ac.kr*)

Here, we present on the fabrication of various nano-patterns via soft lithography technique based on three-dimensionally (3D) ordered colloidal crystals. First, it is essential to prepare the robust, high-quality 3D-colloidal-crystals master mold which would be achieved by utilizing colloidal suspension with a water-soluble polymer. Then, the surface pattern of the 3D colloidal crystals can be successfully transferred onto a polymer film via soft lithography. Various hexagonally arrayed nanostructure patterns are easily fabricated, including close-packed and non-close-packed two-dimensional hemi spherical lens arrays and honeycomb structures, by the structural modification of the 3D-colloidal-crystal templates. Close-packed lens pattern onto surface of glass substrate of organic light emitting devices has been applied in order to enhance efficiency and it successfully showed ~40% enhanced out-coupling efficiency. Non-close-packed lens patterns can be applied as antireflection coatings which is similar to the antireflective moth-eyes nanostructure. The replicated hexagonally arrayed structures can be also used as templates for producing colloidal crystals with two-dimensional super-lattices.