Direct Fabrication of Hexagonally Ordered Ridged Nanoahrcitectures via Dual Interference Lithography for Efficient Sensing Applications

전환철[1,2], 전태윤[1,2], 심태섭[1,2], 양승만[1,2,*]
[1]KAIST; [2]광자유체집적소자연구단
(smyang@kaist.ac.kr*)

Recently, great attention for developing large-area three-dimensional (3D) nanostructures with sub-micrometer scale periodicity have been attracted because of their potentials for various applications, including photonic or plasmonic crystals, and regular templates for sensing platforms. Here, we report a direct and rapid fabrication method of the novel hexagonally ordered ridged nanostructure (HORN) arrays with controllable number of stacks on the surfaces along the third dimension using dual interference lithography (IL), derived from both a novel top-cut prism and a substrate underneath polymer film. After isotropic metal deposition on the polymeric nanostructures, corresponded metallic HORN arrays showed tunable SERS signals depending on the number of nanogaps between adjacent metallic stacks with large-scale sample homogeneity. In addition, our freely suspended ridged nanostructures showed a potential for particle-based SERS platforms obtained by dissolving the sacrificial layer to detach arrays from the substrate.