Fabrication of Porous Plasmonic Nanostructure by Using Inverse Opal

유수연, 문준혁, 강태욱†
서강대학교
(twkang@sogang.ac.kr†)

The sensitivity of plasmonic detection generally depends on the number of electromagnetic 'hotspots' in the probed volume of an incident light. Three-dimensional (3D) plasmonic nanostructure is known to be more sensitive than its one- or two-dimensional counterpart due to the larger number of such hotspots. Top-down fabrication methods such as optical and electron beam lithography (EBL), have been widely used to create 3D plasmonic nanostructures without porosity. Here, we propose facile synthesis of 3D plasmonic inverse opal (IO) in which plasmonic thin layer is uniformly coated with a porous inverse opal structure by direct electrochemical reduction. The pore size of IO can be tuned by controlling over the size of polystyrene bead. The physical properties of the resulting plasmonic IO after the electrochemical reduction are systematically characterized by SEM and UV-vis spectroscopy. The detection of several molecules in either gas or liquid phase is carried out.