Fabrication of Free-Standing Inverse Photonic Crystals with Metal Organic Frameworks

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Metal organic frameworks (MOFs) are class of porous polymeric materials consisting of metal ions linked with organic ligand by coordination bond. These materials have great potential for gas storage, chemical separation, catalyst or sensor due to distinct features including high porosity, high specific surface area, tremendous structural diversity and chemical tailorabiliy. So, interests of researchers for MOFs have been greatly increased since these were reported. In this study, we proposed fabrication route of free-standing inverse photonic crystals with MOFs for sensing or catalytic applications. At first, colloidal crystal films of PS particles were coated on inner surface of vial through convective self-assembly process. Precursor solution was infiltrated into colloidal crystal templates under vacuum and composite structure of PS colloidal arrays and metal-organic frameworks (MOF-5 crystals) were fabricated by evaporating solvent at 90℃ for 24 hours. After removal of templates by THF solution, inverse photonic crystal films of MOFs could be fabricated. Flake type particles of MOFs also could be harvested by sonication during washing step. MOF photonic crystal particles with hierarchical pores were well fabricated.