

Abstract Submitted
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Fabrication of inorganic photonic crystals from interference lithography JUN HYUK MOON, SHU YANG, Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, Pennsylvania 19104 — We have fabricated 3D FCC-like microstructure using multi-beam interference pattern. This polymeric structure was used as a sacrificial template. Silica was deposited into the pores by alternating exposure to water and silicon tetrachloride vapors under atmospheric pressure and at room temperature. This inorganic structure can provide a platform for the deposition of high refractive index materials such as silicon, germanium, and titania. We investigate the photonic bandgap property of this structure as a function of refractive index as well as filling ratio. Using a two-parameter level-set approach, we find that the FCC-like structure has multiple complete photonic bandgaps at 2-3 and 7-8 bands, respectively, while the bandgap width is sensitive to the morphology of coated-structure. Our calculation results suggest that the complete-filled structure possessed a wider photonic bandgap between 2 and 3 bands than the incompletely-coated core-shell structure.

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