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The Hierarchical Morphology of Dielectric Mirrors MICHAEL BIRNKRANT, CHRISTOPHER LI, A. J. Drexel Nanotechnology Institute and Department of Materials Science and Engineering, Drexel University, Philadelphia, PA, LALGUDI NATARAJAN, VINCENT TONDIGLIA, Science Applications International Corporation, 4301 Colonel Glenn Highway, Dayton, OH, PAMELA LLOYD, UES Incorporated, 4401 Dayton-Xenia Rd., Dayton, OH, RICHARD SUTHERLAND, Science Applications International Corporation, 4301 Colonel Glenn Highway, Dayton, OH, TIMOTHY BUNNING, Materials Manufacturing Directorate, Wright-Patterson Airforce Base, OH — Active hierarchically structured volume reflection gratings can be fabricated by combining top-down and bottom-up nanomanufacturing techniques. In a typical process holographic photopolymerization (HP) formed lamellar structures of ∼200 nm in thickness confining a block copolymer (BCP) to ∼100 nm domains. The BCP self assembles into a variety of ordered structures with a period of ∼20 nm. A lamellar-in-lamellar structure was achieved and by varying the BCP structure more complex cylinder-in-lamellar and sphere-in-lamellar structures are envisioned. The HP and BCP phase separation/crystallization dichotomy during the formation of hierarchical dielectric mirrors will be discussed.

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