

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Holographic patterning of block copolymers MICHAEL BIRNKRANT, CHRISTOPHER LI, Drexel University, 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 — The combination of a top down (holographic patterning (HP)) and a bottom up (Block Copolymer (BCP) self assembly) fabrication techniques resulted in a series of hierarchical nanostructures. This produced a long range uniform layered structure with a periodicity of ~ 200 nm from HP and a finer structure on ~ 10 nm scale due to BCP self assembly. The difference in refractive indexes of the BCP and crosslinked network results in a transmission spectrum with $\sim 100\%$ background transmission and a modest reflection notch in the visible region. Furthermore, upon heating, the BCP HP produces a red shift in the reflected wavelength of the material, which reverses upon cooling. Thus, combining HP and BCP offers a unique means to fabricate novel multifunctional optical components.

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Date submitted: 19 Dec 2006

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