Abstract Submitted
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Non-liftoff block copolymer nanolithography of magnetic nanodot arrays A. BARUTH, M.D. RODWOGIN, A. SHANKAR, M.A. TORIJA, M.J. ERICKSON, M.A. HILLMYER, C. LEIGHTON, University of Minnesota — Nanolithographic techniques based on self-assembled block copolymer templates offer exceptional potential for fabrication of large-area nanostructure arrays from a wide variety of functional materials. Despite significant progress with control of the template ordering, and development of pattern transfer schemes, significant issues exist with common techniques such as lift-off and etching. Here, we demonstrate successful execution of a nanolithographic process based on climate-controlled solvent annealing of easily degradable cylinder-forming poly(styrene-*b*-lactide) block copolymer films that avoids both lift-off and the most challenging aspects of etching. Essentially, we use an overfill/planarize/etch-back "Damascene-type" process, exploiting the large Ar ion beam etch rate contrast between polystyrene and typical metals. The process is demonstrated via formation of a large-area array of 12 nm thick, 25 $\pm$ 3 nm diameter $Ni_{80}Fe_{20}$ nanodots ($\sim$0.4 x 10^{12} dots/in^2) with hexagonally-close-packed local order. Extensive microscopy, magnetometry, and electrical measurements provide detailed characterization of the pattern formation and fidelity. We argue that this generic approach can be applied to a wide variety of materials and is scalable to even smaller feature sizes. Funded by NSF MRSEC.

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