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Control over block copolymer interfaces and profiles in thin films for pattern transfer applications CHUNLIN HE, MARK STOYKOVICH, University of Colorado at Boulder, UNIVERSITY OF COLORADO AT BOULDER TEAM — Block copolymer lithography provides an attractive route to the fabrication of nanoscale structures such as nanowires and nanodots. The chemical and thermal stability of the block copolymer morphology in thin films is critical for the generation of robust templates for subsequent pattern transfer and fabrication processes, and can be improved by cross-linking of the block copolymer domains. Atom transfer radical polymerization was used to synthesize PS/PMMA block copolymers with cross-linkable units capable of reacting through an acid-catalyzed mechanism or by photoinitiation with UV exposure. The cross-linked nanostructures have been shown to exhibit enhanced solvent and thermal stability. We have subsequently developed approaches to decouple the self-assembly process from the cross-linking reaction, enabling the design of block copolymer structures in thin films with diverse structural and interfacial control in three-dimensions (3D). In one example, using a layer-by-layer approach, we have self-assembled block copolymer morphologies with a 3D undercut profile to assist in lift-off processes for pattern transfer to metal nanostructures.

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