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Controlling the self-assembly of block copolymer materials in thin-films EUNGNAK HAN, Department of Materials Science & Engineering,University of Wisconsin-Madison, KARL STUEN, PAUL NEALEY, Department of Chemical & Biological Engineering, University of Wisconsin-Madison, PADMA GOPALAN, Department of Materials Science & Engineering, University of Wisconsin-Madison — We present a simple and efficient strategy towards surface modification for controlling the self-assembly of P(styrene-b-methylmethacrylate) diblock copolymer (BCP) in thin films. Photo-patternable, substrate-independent neutral surface was created to achieve vertical orientation of block copolymer (BCP) microdomains. A random copolymer of styrene (f= 0.58-0.63), methylmethacrylate (f= 0.41-0.46) and glycidyl methacrylate (f= 0.01-0.02) was synthesized. The copolymer uses photo-crosslinking reaction of epoxy groups by photoacid generator to formulate the neutral surface. Ultra-thin (2-6 nm) crosslinked film was created as a neutral interfacial layer between the block copolymer and the substrate. The composition of the copolymer was fine tuned to tailor the wetting behavior and hence the domain orientation (parallel or perpendicular to the substrate) in the top self-assembled block copolymer film. The effectiveness of the new neutral polymer on a range of substrates such as glass and gold coated silicon wafer and for both symmetric and asymmetric BCPs is demonstrated.

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