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Tuning Surface Interactions to Control Thin Film Block Copolymer Orientation ALAMGIR KARIM, RONALD JONES, DUANGRUT JULTHONGPIPUT, MICHAEL FASOLKA, ERIC AMIS, Polymers Division, NIST, SUSHIL SATIJA, Center for Neutron Research, NIST, SUSHIL SATIJA COLLABORATION — We tune polymer-substrate surface interactions in order to control the orientation and ordering of diblock copolymers of polystyrene – polymethylmethacrylate (PS-b-PMMA) ultrathin films. To this end we utilize UV to alter the surface energy of a SAM coated substrate and anneal spin coated thin films of high molecular weight (approx. 50kDa) PS-b-PMMA. We have previously utilized a combinatorial approach of substrate surface energy vs. diblock film thickness to map out the distribution of surface topography measured by optical microscopy (such as island and hole formation regions), and observed a switch in symmetry of topography with surface energy variation across a "neutral" region. In the present work, we report results pertaining to the neutral surface energy substrate conditions. We utilize AFM, neutron reflection, SEM and TEM to characterize the morphology of ordered structures on the controlled surface energy substrates. The advantage of the present work is the relative ease of surface energy control with UV and the tunability of surface energy to potentially match neutral boundary conditions for a broad set of block copolymers with different chemical blocks components.

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