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Directed Assembly of Block Copolymer Ordering on Rough and Patterned Flexible Substrates ARZU HAYIRLIOGLU, MANISH KULKARNI, ALAMGIR KARIM, The University of Akron — Directed self-assembly of block copolymer (BCP) thin film on flexible substrates has potential in fabrication of flexible electronic devices due to its nanometer scale pattern formation capability. We studied the BCP ordering properties of polystyrene-b-poly(methyl methacrylate) (PS-b-PMMA) films on a flexible substrate, where the PS-b-PMMA films are initially coated on a smooth poly(dimethylsiloxane) (PDMS) substrate, whose surface energy (SE) was tuned between (20-69) mJ/m2 by UV-ozone (UVO) exposure. This range of SE allows for controlled wettability and orientation of the BCP overlayer. Further, we replicated different patterned media and observed perpendicular lamellar BCP orientation and parallel cylindrical BCP orientation on patterned flexible PDMS in the wetting SE regime. Rough surface structures created by silica xerogels were replicated on PDMS. RMS roughness of the xerogels is tuned by controlling sol-gel catalyst concentration and aging time. Effect of the aspect ratio of the rough PDMS substrates on the orientation of BCP films was studied. Surface morphology of the BCP films was studied by optical microscopy and Atomic Force Microscope (AFM), while orientation of the film's interior was studied using Grazing-Incidence Small Angle X-ray Scattering (GISAXS)

Manish Kulkarni
The University of Akron

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