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Orientation Control of Microphase-Separated Domains of Block Copolymer Thin Films Placed on Surfaces with Tunable Roughness YOUNGWOON CHOO, HYO SEON SUH, TAEHEE KIM, KI-BUM KIM, KOOKHEON CHAR, Seoul National University — The orientation of microphase-separated domains of diblock copolymer (BCP) thin films deposited on surfaces with controlled roughness was investigated. To generate the controllable surface roughness, either ordered nanoparticle (NP) monolayers or hydrogen silsesquioxane (HSQ) patterns produced by the Atomic Image Projection E-beam Lithography (AIPEL) was realized on the substrate. The AIPEL employed in this study is the E-beam lithographic technique based on the lattice of crystalline materials used as a mask. We controlled the scale of ordered roughness by varying the size of NPs or the lattice image by adjusting the magnification in AIPEL. Furthermore, the shape of HSQ patterns could change from dot arrays to line/spacing patterns by AIPEL. On the surfaces with controlled roughness, we could obtain BCP films with perpendicularly orientated and long-ranged microdomains. The effect of size and shape of the substrate roughness on the orientation and long-range order of BCP microdomains will be discussed.

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