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Transition Behavior of Block Copolymer Thin Films DU YEOL RYU, CHANGHAK SHIN, HYUNGJU AHN, JUNE HUH, Yonsei University, Korea, KWANG-WOO KIM, Pohang Accelerator Laboratory, Korea, THOMAS RUSSELL, University of Massachusetts, Amherst, YONSEI UNIVERSITY COLLABORATION, POHANG ACCELERATOR LABORATORY COLLABORATION, UNIVERSITY OF MASSACHUSETTS COLLABORATION — The phase transitions in block copolymers (BCPs), like the order-to-disorder transition, occur when the enthalpic term of free energy of mixing is equal to the entropic term. In thin films, interactions at the substrate/polymer and polymer/air interfaces influence this free energy balance, resulting in a change in the transition behavior. Here, we report on the transition behavior of BCP thin films. The thickness dependence of the transition temperature shows that interfacial interactions enhance the orientation of the lamellar microdomain parallel to the film surface even in 40L0 in thickness, where L0 is the equilibrium period of the BCP in the bulk. In thin film geometry, this phenomenon can be attributed to the fact that a preferential interaction of one component with the substrate leads to an amplification of a periodic variation in the composition and a shift of transition temperature.

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