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Coupling of Lithium-Polymer Complexes and Electric Field: Routes to Enhance the Alignment of Block Copolymer Thin Films JIA-YU WANG, JULIE LEISTON-BELANGER, SURESH GUPTA, University of Massachusetts, Amherst, TING XU, Cold Neutrons for Biology and Technology (CNBT) at NIST — Recently, the unexpected experimental results indicated that lithium ionic impurities in block copolymer thin films might assist applied electric filed to overcome the interfacial interactions so that the alignment of microdomains was enhanced.1 But some questions are still open: whether lithium ions aid in overcoming interfacial interactions, what is the nature of the interactions of the lithium ions with the polymer chains, and what is the driving forces in this process? We designed a method to introduce lithium chloride into polystyrene-block-poly(methyl methacrylate) (PS-b-PMMA) copolymer thin films. The IR results show that lithium-PMMA complexes in copolymers were formed. These lithium-PMMA complexes markedly enhanced the dielectric constant of PMMA block. Thus the critical electric field strength for aligning the microdomains is significantly decreased so that the external electric field can overcome the interfacial interactions and increase the alignment of microdomains. The addition of ionic salts into one block of a diblock copolymer opens up a potential route to fabricate the long-range ordered nanostructures of block copolymer thin films. [1] Xu T.; Goldbach J. T.; Leiston-Belanger J.; Russell T. P. Colloid Polym. Sci., 2004, 282, 927.

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