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Ionic Complexation Enhanced Block Copolymer Alignment with an Electric Field JIA-YU WANG, University of Massachusetts, Amherst, THOMAS P. RUSSELL, University of Massachestts, Amherst — Alignment of microdomains in block copolymer (BCP) films by an electric field offers the possibility of fabricating ordered nanostructures that are use as templates, scaffolds and masks. In polystyrene-*block*-poly(methyl methacrylate) (PS-*b*-PMMA) copolymer films, the formation of lithium-PMMA complexes, as a result of the added lithium salts, markedly enhanced the alignment of BCP microdomains under an electric field, due to the increased dielectric contrast and the weakened surface interactions which reduced the critical field strength. The formation of lithium-PMMA complexes also increases the segmental interaction, χ_{eff}, between PS and PMMA blocks with lithium-PMMA complexes, evidenced by a disorder-to-order transition (DOT) and an order-to-order transition (OOT) from spheres to cylinders. The increased χ_{eff} drove the system into a stronger phase separation, leading to a transition in the reorientation mechanism of lamellar microdomains from a disruption and reformation to a grain rotation mediated by movement of defects. The formation of large grains amplified the ability of the electric field to overcome the interfacial interactions and eliminate defects. Consequently, the complete alignment of BCP microdomains can be achieved.

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