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Control of Block Copolymer Morphology through End-functional Groups GYUHA JO, MOON JEONG PARK, Pohang Univ of Sci & Tech — Recently, poly(ethylene oxide) (PEO)-containing polymer electrolytes have attracted significant attention to be applied for lithium batteries. As the realization of high mechanical strength from the polymer electrolyte becomes of critical importance in high-energy lithium batteries, much effort has been devoted to developing PEO-based block copolymers comprising mechanically robust polymer chains. Interest in this topic has been further stimulated by multiple observations of significant electrolytic conductivity enhancement imparted by microphase separation of block copolymers. In the present study, we report an intriguing methodology for modulating the morphology of poly(styrene-ethylene oxide) (PS-PEO) block copolymers with a single ionic group tethered at the chain end of PEO. Unique intra- and inter-chain interactions deduced from the end functional group afforded enriched nanostructures, i.e. disorder, lamellae, hexagonal cylinder, and gyroid, with significant differences in conductivities depending on lithium salt concentration. In particular, a gyorid morphology with a twofold-enhanced lithium ion transport efficiency was found for the end-functionalized PS-PEO block copolymer, attributed to the structural advantages of the gyroid having co-continuous ionic channels.

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