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Additive Driven Self Assembly and Photo-induced Ordering in Poly(ethylene glycol)monomethyl ether monomethacrylate-block-Poly(ethyl methacrylate) Copolymers CHENG LI, JAMES WATKINS, Umass Amherst — Recent work in our labs has shown that blending of hydrogen-bond donating polymers, small molecules or nanoparticles with a block copolymer that contains poly(ethylene oxide) (PEO) can enhance microphase segregation strength and yield well ordered morphologies. While PEO crystallization in these polymers is suppressed by strong interactions between the additive and the PEO segments at high additive loadings, crystallization of the PEO block in the absence of these interactions or at low additive loadings is highly undesirable for many applications. To remedy this issue, poly[poly(ethylene glycol) monomethyl ether monomethacrylate]-block-poly(ethyl methacrylate) was prepared using reversible addition-fragmentation chain transfer polymerization(RAFT). This block copolymer is a phase mixed, non-crystallizable system at room temperature. We find that incorporation of organic additives with multiple carboxylic acid groups such as mellitic acid induces phase segregation in this system. Furthermore, the use of additives in which the hydrogen bond donating group is protected with an acid labile group in combination with a photo acid generator enables photo-induced microphase segregation of the composite to yield well ordered films.

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