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Analysis of the kinetics of filler segregation in granular block copolymer microstructure BONGJOON LEE, Carnegie Mellon University, MARKUS BLEUEL, NIST Center for Neutron Research, DAVID OTT, MICHAEL BOCKSTALLER, Carnegie Mellon University, CARNEGIE MELLON UNIVERSITY TEAM — To realize the application of block copolymers in areas ranging from dynamically tunable photonic crystals to solid-state electrolytes, it is important to understand the role of additives in the evolution of microstructure (i.e. grain size and shape as well as distribution) during thermal processing. Previous studies have revealed the interaction of filler species (such as homopolymers or particle additives) to drive the segregation of filler into grain boundary regions, thereby stabilizing grain boundary and arresting grain growth. In this contribution we present a novel approach based on combined Ultra-Small Angle Neutron Scattering (USANS) and electron microscopy analysis (involving large area image reconstruction) to quantitatively determine the kinetics of filler segregation and its affect on grain size evolution in block copolymer blends. Calculation of the scattering length density of the grain boundary network is shown to provide detailed information about the rate and time dependence of filler segregation. For the particular case of a poly(styrene-b-isoprene)/d-polystyrene blends system is is found that 2 vol% of filler segregation during the early stage of thermal annealing is sufficient to arrest grain growth.

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