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Additive-Driven Assembly of Block Copolymer and Nanoparticles: Influence of Nanoparticle Size and Loading[1] YUE GAI, Univ of Mass - Amherst, YING LIN[2], 3M, JAMES WATKINS[3], Univ of Mass - Amherst — Additive-driven assembly of block copolymer (BCP)/nanoparticle (NP) composites in which functionalized NPs exhibiting strong hydrogen bond interactions with one domain of the BCP has been shown to strengthen phase segregation and yield well-ordered materials at high NP loadings. Here we report a systemic study of how phase behavior and NP distribution in BCP/ Au NP composites are influenced by the NP size, NP loading and block copolymer domain size. 2nm, 5nm, 9nm and 15nm diameter Au nanoparticles at loadings ranging from 10% to 50% weight percent, in polystyrene-block-poly (2-vinyl pyridine) block copolymers with domain spacing ranging from 14 nm to 75 nm were used in the investigation. We find that strong interactions enable the incorporation of larger diameter NPs with respect to domain size as compared to systems in which interactions between the NP and BCP are weak or enthalpically neutral.

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