Abstract Submitted
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Phase Stability in Nanoparticle/Homopolymer Thin Film Mixtures JENNY KIM, PETER GREEN, University of Michigan — We examined the phase behavior of thin film mixtures of polystyrene (PS), of degree of polymerization P, with Au nanoparticles, onto which with PS chains of varying degrees of polymerization, N, were attached. Scanning transmission electron microscopy (STEM), secondary ion mass spectrometry (SIMS) and Rutherford backscattering spectrometry (RBS) measurements indicate that when the total nanoparticle radius (particle core + grafted chains), R_{np}, was comparable to or larger than the radius of gyration of the host chains, $R_g(P)$, the system were miscible. However, for $R_{np} < R_g(P)$, the system was incompatible. Scanning force microscopy (SFM) measurements showed evidence of surface roughening, prior to phase separation. Under conditions where $N << P$ and $R_{np} < R_g$, the system was immiscible and the nanoparticles segregated to both interfaces. These results will be discussed in light of current simulations and theory.

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