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Nanoparticle-arrested phase separation of polymer blends LE LI, XUAN DING, CAROLINE MIESCH, P.K. SUDEEP, TODD EMRICK, RYAN HAYWARD, THOMAS RUSSELL, Polymer Science and Engineering Department, University of Massachusetts Amherst — Under appropriate conditions, polymer blends undergo demixing by a spinodal decomposition (SD) mechanism, leading to an interpenetrating, bicontinuous morphology with a characteristic wavelength that coarsens over time to reduce interfacial energy. Nanoparticles added to the polymer mixture can segregate to one of the phases or to the interfaces between the phases. Jamming of the nanoparticles within one of the domains or at the interface can arrest this phase separation process, trapping the interpenetrating morphology. We have studied the thermodynamics and kinetics of phase separation of polystyrene/poly(vinyl methyl ether) (PS/PVME) blends in the presence of CdSe nanoparticles and nanorods. For appropriate choices of particle size, shape and ligand coverage, nanoparticles were found to effectively arrest spinodal phase separation in the bicontinuous state.

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