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Dispersion of Soft Nanoparticles in a Chemically Identical Polymer Matrix DILRU RATNAWEERA, D. BASKARAN, University of Tennessee, Knoxville TN 37996, D. HOLLEY, M. RUPPEL, Chemical Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, J. MAYS, University of Tennessee, Knoxville TN 37996, V. URBAN, Biology and Soft Matter Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, MARK DADMUN, University of Tennessee, Knoxville, TN 37996 and Chemical Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831 — The mechanical, thermal and rheological properties of polymers can be improved by embedding organic nanoparticles (NPs). However, controlling the dispersion of NPs is often challenging due to thermodynamic and kinetic incompatibilities between particles and matrices. The current work focuses on the dispersion of chemically identical NPs in a polystyrene matrix. These NPs were made through a micro-emulsion technique using styrene and divinylbenzene (DVB) monomers. Polystyrene nanoparticles with controlled interfacial roughness and targeted styrene densities were achieved by controlling DVB volume fraction during synthesis. The dispersion of these NPs in deuterated polystyrene matrices was followed by Small Angle Neutron Scattering as a function of NP concentration and matrix molecular weight. At low NP concentrations, individual NPs are well distributed in the matrix, while aggregates were formed at higher concentrations in high molecular weight polymer matrices. Shape of the aggregates as well as the minimum concentration of NPs required to form aggregates were affected by the surface roughness and softness of the NPs.

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