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Solubility and Mixing Enthalpy of Ideal Nanoparticles in a Polymer Melt JONATHAN SEPPALA, MICHAEL MACKAY, University of Delaware — Polymer nanocomposites, where the nanoparticles are smaller than the radius of gyration of the polymer, exhibit unusual mechanical properties such as a Non-Einstein-Like viscosity drop. The dispersion and solubility of the nanoparticles play a critical role which we study with small angle neutron scattering of cross-linked polystyrene nanoparticles in deuterated linear polystyrene chains. This system has a positive Second Virial Coefficient indicating favorable solubility, as well as a negative enthalpy of mixing, which is contrary to blends of protonated and deuterated linear polystyrene. This indicates a stable suspension of well dispersed nanoparticles which is apparently required for a decrease in the melt viscosity, contrary to theoretical predictions and many experimental observations with larger particles.

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