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Evidence of re-entrant behavior in polymer-nanoclay systems HOSEEIN BAGHDADI, SURITA BHATIA, University of Massachusetts Amherst — Polymer-clay systems are of interest in a variety of applications, including nanocomposites, personal care products, and oil field products. Rheology and dynamic light scattering capture re-entrant behavior of laponite-polymer systems. Neat laponite at basic pH and concentrations of 2 weight percent or greater forms a viscoelastic isotropic solid due to electrostatic repulsions. This phase appears to be a colloidal glass of laponite particles. We show that that addition of low molecular weight poly(ethylene oxide) (PEO) melts the glass due to a depletion force. The depletion force speeds up dynamics in the system resulting in a low viscosity solution. A re-entrant viscoelastic solid is formed with the addition of high molecular weight PEO due to the polymer chains bridging between laponite particles. In addition we present non-linear rheological behavior below and above the transition. As expected the transition from a low to high viscosity solution scales with size of the polymer mean square end-to-end distance and gap between laponite particles.

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