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Polymer Dynamics in Single Wall Carbon Nanotube / Polystyrene Nanocomposites MINFANG MU, RUSSELL COMPOSTO, Department of Material Science and Engineering, University of Pennsylvania, USA, NIGEL CLARKE, Department of Chemistry, Durham University, UK, KAREN WINEY, Department of Material Science and Engineering, University of Pennsylvania, USA
— Polymer nanocomposites provide access to new regimes of polymer dynamics in which the impenetrable filler particles are comparable to and frequently smaller than the end-to-end distances of the polymer. In this study, single wall carbon nanotubes (SWCNTs) / polystyrene (PS) nanocomposite was prepared by a coagulation method. Rheological properties were measured in the linear viscoelastic regime and tracer diffusion coefficients were determined using an elastic recoil detection (ERD) method. The tracer diffusion coefficient first decreases and then increases with increasing SWCNT loading. Across this same range of filler concentration, the plateau modulus and the cross-over frequency are approximately constant. The transition from decreasing to increasing tracer diffusion corresponds approximately with the onset to rheological percolation and appears to increase with decreasing matrix molecular weight. A model is under development to describe the polymer dynamics is polymer nanocomposites.

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