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Small Angle Neutron Scattering Study of Oligo(ethylene glycol) Grafted Polystyrene in Aqueous Solutions G. CHENG, Y.B. MELNICHENKO, G.D. WIGNALL, F. HUA, K. HONG, P.F. BRITT, J.W. MAYS[1], ORNL, Oak Ridge, TN 37830 — Considerable efforts have been made to understand the cooperative interactions of living organisms using synthetic polymers. A typical example is poly(ethylene glycol) (PEG) in water where two fundamental interactions (hydrophobic and hydrophilic) are present and control its conformation and phase behavior. By manipulation these interactions in a systematic way, one gains better understanding of many phenomena of water soluble macromolecules. To this end, polystyrene grafted with short EG side chains have been synthesized by nitroxide-mediated radical polymerization and temperature induced phase separation and conformation changes of $(EG)_4$ densely grafted polystyrene in aqueous solutions have been investigated by Small Angle Neutron Scattering (SANS) and Dynamic Light Scattering (DLS). While large clusters are detected by DLS in the solutions, SANS data indicate individual polymer assumes a prolate ellipsoid. With increasing temperature, the attractive interaction between ellipsoids increases while slight intra-chain contraction occurs. The particle however stays the same near the LCST and collapse into a sphere at temperatures far above the LCST.

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