Colloidal Phase Separation of Concentrated PNIPAm Solutions

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In the concentration range of 1−6 wt %, solutions of a thermosensitive polymer (poly-*N*-isopropylacrylamide (PNIPAm), $M_w = 1.4 \times 10^5$ g·mol^{-1}) are shown to phase separate in the form of dense stable colloids of nearly pure polymer. Diffuse wave spectroscopy and small-angle neutron scattering both provide consistent measurements of the colloidal size as a function of temperature. Results are in agreement with a Cahn regime of spinodal decomposition blocked at an early stage, prior to a growth that would lead to a macroscopic phase separation. [Early results of this work were presented at the 231st American Chemical Society National Meeting, Symposium on Amphiphilic Polymers, Atlanta, GA, 2006, March 26−30.]