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Telechelic amphiphilic polymers: assembly in water and at the air/water interface

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Associative polymers exhibit a rich rheology when dissolved or dispersed in water. The quintessential associative polymers are poly(ethylene oxides) (PEO) bearing hydrophobic groups at each end. Our research interests have focused on another water-soluble polymer, poly(N-isopropylacrylamide) (PNIPAM) and its hydrophobically-modified derivatives. Like PEO, PNIPAM is a non-ionic polymer soluble in water at room temperature. We succeeded recently in preparing telechelic PNIPAM samples of narrow molecular weight polydispersity that bear an octadecyl group at each chain end and carried out a systematic study of the assembly of this polymer as a function of concentration, from the dilute to the concentrate regimes and as a function of temperature (10 to 40 ^{o}C) using static and dynamic light scattering measurements, microcalorimetry, and fluorescence spectroscopy for investigations of dilute solutions. In the concentrated regime, telechelic PNIPAM forms gels which were examined under oscillatory shear.