

Cosolvency of a Poly(methyl methacrylate)/Water/2-propanol system and re-collapsing behavior of PMMA nanoparticle gel in the system

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We investigated the phase behavior of Poly(methyl methacrylate) (PMMA) in water/2-propanol cosolvent system and compared it with PMMA particle gel's re-collapsing behavior. Nanometer-sized PMMA gel particles were prepared by precipitation polymerization and their swelling behavior were determined using photon correlation spectroscopy(PCS). With increasing water fraction in 2-propanol solution, PMMA gel particles exhibit re-collapsing behavior within cosolvency range of PMMA/water/2-propanol system. The modified double lattice model (MDL) and the Flory-Rhener theory were employed to calculate the Helmholtz energy of mixing and elastic contributions, respectively. The advantage of this work is to be suitable for qualitatively predicting the re-collapsing swelling behavior of the given system.