

Ternary Phase Diagrams and Re-entrant Transitions of Linear and Cross-Linked Poly(N-isopropylacrylamide) in Water/2-Propanol Solutions

오석영, 배영찬^{1,*}

한양대학교; ¹한양대학교 화학공학과

(ycbae@hanyang.ac.kr*)

We investigated the phase transitions of linear and cross-linked poly(N-isopropylacrylamide) (PNIPA) solutions in water/2-propanol mixtures. A type shift from 0 to 1 ternary phase diagrams with increasing temperature was observed using thermo-optical analysis (TOA). A co-nonsolvency effect was identified through closed-immiscibility gaps at lower temperatures, and these phase separation composition boundaries induced the reentrant swelling behavior of PNIPA gel solutions. The volume changes of nanometer-sized PNIPA gel particles were measured by the photon correlation spectroscopy (PCS) technique. Unexpected thermal fluctuations in the upper critical solution temperature (UCST) region due to structural or configurational heterogeneity originated from the formation of strong water/2-propanol complexes. Good correspondence between the phase transition behavior of linear PNIPA solutions and the swelling behavior of cross-linked PNIPA was observed experimentally.