

Physical Properties of Nano-Sized Poly-N-Isopropylacrylamide Hydrogels

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Abstract : In this study, we synthesized and characterized nano-sized Poly- N-isopropylacrylamide (PNIPAM) hydrogels. N-isopropylacrylamide (NIPAM) micro and macro gels are known as a thermosensitive colloidal structure, and they respond to changes in the environmental conditions such as temperature and pH. Here, nano-sized gels were synthesized via precipitation copolymerization method. N,N-methylenediacrylamide (BIS) and ammonium persulfate APS were used as crosslinker and initiator, respectively. 8-Hydroxypyrene-1,3,6- trisulfonic Acid (Pyranine, Py) molecules were used for arranging the particle size and thus physical properties of the nano-sized hydrogels. Fluorescence spectroscopy, atomic force microscopy and light scattering methods were used for characterizing the synthesized hydrogels. The results show that the gel size was decreased with increasing amount of ionic molecule from 550 to 140 nm due to the electrostatic behavior of the ionic side groups of pyranine. Light scattering experiments demonstrate that lower critical solution temperature (LCST) of the gels shifts to the lower temperature with decreasing size of gel due to the hydrophobicity-hydrophilicity balance of the polymer chains.

Keywords : hydrogels, lower critical solution temperature, nanogels, poly(n-isopropylacrylamide)

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