

The effects of copolymer and polymer crosslinker of thermo-responsive hydrogel swelling behavior

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We synthesized various nano-sized hydrogels to investigate the effect of crosslinker chain length and comonomers based on Poly N-isopropylacrylamide (PNIPAM) thermoresponsive polymer systems. The chemicals are selected considerably to control the characteristic volume phase transition temperature and swelling capacity of hydrogel. The crosslinkers used in this study are N,N'-methylenebisacrylamide (BIS), Poly(ethyleneglycol) diacrylate (PEGDA) 575 and 700. The comonomers are ethylacrylate (EA), 2-hydroxyethyl methacrylate (HEMA) and 2-hydroxyethyl acrylate (HEA) which are listed in order of hydrophobicity to hydrophilicity. The polymer type crosslinker showed less swelling capacity than short chain crosslinker with no significant transition temperature change. In addition, the increase in the comonomer feed ratio leads to an immediate change in the transition temperature and swelling ratio. The three cases of statistical thermodynamic models are proposed which represent the intermolecular energy contribution of all the substances.