Effect of 3-mercaptopropionic acid on polymerization of thermo-responsive poly(N-isopropylacrylamide)

Abstract

Poly(N-isopropylacrylamide) (PNIPA) is a thermally sensitive polymeric material. The temperature-sensitive nature of PNIPA makes it an attractive candidate for controlled drug delivery devices. A series of temperature-responsive NIPA were produced by free radical polymerization using various amount of 3-mercaptopropionic acid (MPA) as chain transfer agent. The effect of chain transfer agent on the lower critical solution temperature (LCST) and chemical structure of PNIPA was characterized by using UV-vis spectrophotometer and Fourier transform infrared spectroscopy (FTIR), respectively. It was found that, with increasing MPA content, the typical band of the PNIPA in respective FTIR spectrum was shorter or getting narrower due to the decrease in the strength of respective bond in the PNIPA structure. Furthermore, the increase in MPA volume in the polymerization increased the LCST of PNIPA. The various amounts of 3-MPA ratios to monomer preparation have shown that hydrophobic modification of carboxylated PNIPA.