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Systematic Studies of Phase Transitions in Thermo-Responsive Polymers Used in Targeted Drug Delivery JANA E BRADLEY, Univ of Missouri - Columbia, DANIEL DENMARK, SARATH WITANACHCHI¹, University of South Florida — Thermo-responsive polymers such as poly-N-isopropylacrylamide (PNIPAM) can undergo reversible phase transitions in aqueous solutions under varying temperatures. They are ideal candidates for the polymer shell of a targeted drug delivery capsule. Concentration and pH can affect the lower critical solution temperature (LCST) of the PNIPAM polymer and its physical properties. In this work, a systematic study of the factors that influence the LCST of the PNIPAM polymer mixed with Fe₃O₄ nanoparticles (MNPs) during thermal bath heating is presented. A series of PNIPAM solutions with varying concentrations of PNIPAM with MNPs were prepared and characterized using scanning electron microscopy. In-situ transmission measurements were used to determine the LCST of PNIPAM concentrations. A systematic decrease in the LCST was observed as the concentration of PNIPAM was increased. In addition, the impact of pH on the LCST of PNIPAM was examined by increasing the basicity of the PNIPAM solutions by adding adjusted KOH pellets. An increase in the thermal stability of the LCST was observed when the basicity of the PNIPAM solution was increased. The results from this study provide valuable information towards using these thermo-responsive polymers in targeted drug delivery.

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