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Kinetics of the coil-to-globule transition in aqueous solution of poly (N-isopropoylacrylamide)[1] REZA FARASAT, University of Alabama at Birmingham — In an aqueous solution, poly (N-isopropoylacrylamide) (PNIPAM) undergoes a reversible coil-to-globule phase transition that occurs above the lower critical solution temperature (LCST). The transition is driven by temperature-dependent molecular interactions that include hydrogen bonding and hydrophobic association. By increasing the temperature above LCST, the PNIPAM-water bonds break, and the polymer coils collapse to globules. The process is accompanied by an endothermic thermal effect which is detectable by Differential Scanning Calorimetry (DSC). A 10 wt. % solution of PNIPAM in water was prepared and subjected to DSC experiments under different heating rates (from 0.5 to 16°C min^{-1}). With increasing the heating rate, the transition temperature as well as the DSC peak shift to higher temperature. The DSC data have been analyzed by an isoconversional method to evaluate the temperature dependence of the effective activation energy of the process. The resulting dependencies have been interpreted in terms of a nucleation kinetics model. The process has also been studied under nanoconfinement by introducing the PNIPAM solution into the silica nanopores. The results obtained under nanoconfinement are compared to those obtained for the bulk solution.

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