Title: Spectroscopic Study of the Dynamical Behavior and Interactions in Supramolecular and Macromolecular Systems

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Abstract: In this thesis, the temperature-induced phase transition in liner polymer solutins and hydrogels of semi-interpenetrating (SIPNs) and interpenetrating (IPNs) polymer networks was studied with respect to various composition, network architecture and procedure. Thermoresponsive linear polymers based on poly(vinyl methyl ether) (PVME) in water and with terc-buthyl based additives, IPNs of polyacrylamide (PAAm), poly(*N* –isopropylacrylamide) (PNIPAm), poly(*N* –vinylcaprolactam) (PVCL) and IPNs and SIPNs of poly(*N*,*N* –diethylacrylamide) (PDEAAm) were investigated by the methods of nuclear magnetic resonance spectroscopy (NMR), differential scanning calorimetry (DSC), optical microscopy (OM) and swelling experiments. The effect of polymer concentration and presence of additives on the dynamics during the phase separation as well as interactions between the water and the polymer in aqueous solutions of PVME and PVME/additives were established. The increasing content of hydrophilic PAAm component in SIPNs and IPNs shifts the transition toward higher temperatures and fraction of polymer units with significantly reduced mobility as well as the enthalpy change, are reduced. The macroscopic transition parameters such as critical temperature, temperature range and transition extent and microscopic behavior of individual polymer groups are influenced by the architecture and reverse sequence in the preparation of IPNs and SIPNs. For the most of studied hydrogels, a part of water molecules bound to collapsed structures was detected showing restricted mobility.

Keywords: polymer hydrogel, interpenetrating networks, polymer solution, phase transition, NMR