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Effect of Polymer Concentration and Cross-linking Density on Microgel Size and Shrinking Capacity KIRIL STRELETZKY, IMAAN BEN-MERZOUGA, JOHN MCKENNA, Cleveland State University — Hydroxypropylcellulose (HPC) is a polysaccharide with temperature dependent water solubility. HPC chains can be chemically cross linked into stable nanoparticles called microgels. The structure and dynamics of microgels depend on polymer and salt concentration, crosslinking density, and solution temperature. HPC has easily accessible lower critical solution temperature. At T_c=41°C, HPC in solution undergoes a reversible transition at which chains form metastable clusters that fall apart when temperature is lowered below T_c. HPC microgels undergo a similar transition in which, however, microgel clusters stay intact below and above T_c. In this transition microgels shrink/swell on average by a factor of eight, a property with a potential for application in targeted drug delivery. Dynamic Light Scattering was used to study microgels in thermal equilibrium. Due to a complexity of microgel spectra the line shape analysis algorithm was employed. Comparison of differently synthesized HPC microgels revealed that higher polymer concentration results in smaller microgels with lower shrinking capacity. The effective cross-linking density that yields relatively monodisperse microgels was determined. The angular dependence of scattering demonstrated that microgels are largely spherical particles. Finally, studying microgels at different temperatures allowed to monitor the shrinking/swelling behavior.

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