Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Effect of heating rate, polymer concentration, and cross-linking density on volume phase transition of microgels KIRIL A. STRELETZKY, JOHN T. MCKENNA, IMAAN BENMERZOUGA, Cleveland State University — The structure and dynamics of crosslinked hydroxypropylcellulose nanoparticles (microgels) was studied by dynamic light scattering below and above the volume phase transition temperature Tv. Microgels were synthesized at different polymer, salt concentration and varying cross-linking density. The microgel size was found to strongly depend on polymer concentration. The effective cross linking density affected the monodispersity of microgels. Both nearly exponential and highly non-exponential spectra were systematically analyzed by spectral time moment analysis below and above Tv. The angular dependence of the spectra was studied to check the diffusive nature of the observed spectral modes. The analysis below Tv revealed one or two faster modes (depending on synthesis parameters) with diffusive characteristics and apparent radii of 20-30 and 150-650nm and in some cases a slower mode which was independent of the scattering angle and reminiscent of the slow polymer mode observed in identical non-crosslinked solutions. The analysis of the data above Tv yielded strong dependence on the heating rate. One step fast heating resulted in disappearance of the smaller microgel particles and deswelling of large ones down to 80-150nm. Under slow multistep heating both microgel-identified modes remain present while the larger microgels grow in size to 800-900nm.

Kiril A. Streletzky
Cleveland State University

Date submitted: 20 Nov 2009 Electronic form version 1.4