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 $T_v$. 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 $T_v$. The angular dependence of the spectra was studied to check the diffusive nature of the observed spectral modes. The analysis below $T_v$ 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 $T_v$ 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.