Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Structure, Dynamics, Loading Capacity, and Volume Phase Transition of Polymer Nanoparticles KIRIL STRELETZKY, JOHN MCKENNA, IMAAN BENMERZOUGA, PUBUDU PEIRIS, MEKKI BAYACHOU, Cleveland State University — Microgel nanoparticles were synthesized in aqueous solutions of neutral polymer hydroxypropylcellulose (HPC) through self- association of amphiphilic HPC molecules and subsequent cross linking. Dynamic Light Scattering (DLS) was used to study the transport properties of HPC microgels below and above the volume phase transition. Highly non-exponential, multimodal microgel spectra were observed and successfully analyzed by spectral time moment analysis. The structure and dynamics of microgels was found to depend on polymer and salt concentration, crosslinking density, solution temperature, and the rate of heating. HPC microgels undergo a reversible volume phase transition in which microgel volume swells/deswells by as much as a factor of thirty. The study 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 though sometimes two different particulate sizes are present. Finally, flow- injection amperometry was used to evaluate the loading capacity of microgels. Preliminary results show the moderate injection agent uptake that varies with temperature dependent size of particles.

Kiril Streletzky
Cleveland State University

Date submitted: 21 Nov 2008 Electronic form version 1.4