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Study of Temperature Sensitive Polymeric Microgels with Light Scattering and Spectrophometry JANNA MINO, JUSTIN FLAHERTY, KIRIL STRELETZKY, Cleveland State Univ — Hydroxypropylcellulose (HPC) polymer can be cross-linked to form microgel nanoparticles that undergo a temperature dependent volume phase transition. We studied the structure and dynamics of HPC microgels and HPC polymer that microgels were made from using Dynamic (DLS) and Static Light Scattering (SLS) and Spectrophotometry. Our results determined the transition behavior of the microgels and polymer as temperatures were varied from T_{room} to above the transition temperature T_C =41C. The HPC microgels showed a reversible deswelling by a factor of 4-8 volume as temperature was brought above T_C. The deswelling is caused by HPC chains becoming more hydrophobic at the T_C and aggregating together to diminish water contact. SLS measurements yielded the relative molecular weight M_W of microgels and M_W of polymer. We also found the change of microgels' M_W and R_g/R_h with increase of solution temperature (T): M_W decreased steadily from 20C to 40C (possibly due to microgels losing water) and then increased with T rising to 50C (possibly due to loose polymer chains fusing into microgels). The R_g/R_h ratio ranged from 0.4 to 0.7, consistent with a soft sphere and hard sphere models. The transition in polymer was found to be sharper than in microgels and the M_W of the polymer clusters above the transition was found to be 30 times larger then M_W of microgels. The light scattering study of microgels was complemented by Atomic Force Microscopy.

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