Abstract Submitted
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Swelling, Compressibility, and Phase Behavior of Soft Ionic Microgels[1] ALAN DENTON, Dept. of Physics, North Dakota State University — Soft colloids have inspired great attention recently for their rich and tunable materials properties. Particular interest has focused on microgels – microscopic cross-linked polymer gel particles that, when dispersed in water, become swollen and can acquire charge through dissociation of counterions. Electrostatic interparticle interactions strongly influence the structure and thermodynamics of ionic microgel suspensions*. Permeability to solvent molecules and small ions creates a competition between elastic and electrostatic forces that determines equilibrium particle sizes. Swelling can be controlled by adjusting temperature, pH, and salt concentration, with applications to chemical/biosensing and targeted drug delivery. By combining molecular dynamics and Monte Carlo simulation with Poisson-Boltzmann theory of electrostatics and Flory-Rehner theory of swollen polymer networks, we investigate swelling and compressibility of ionic microgel particles and implications for thermodynamic phase behavior of bulk suspensions at concentrations approaching and exceeding hard-sphere close packing. Predictions for particle size and osmotic pressure are compared with available experimental data.

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