Abstract Submitted
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Osmotic equilibrium of colloidal nanoparticles transiently confined in an optical trap[1] JINXIN FU, Georgia Institute of Technology, H. DANIEL OU-YANG, Lehigh Universtiy — Equilibrium number density profile of colloidal particles in a potential force field depends on the particle number density, the force field and interactions between the particles. Einstein described the particle number density profile by an osmotic equilibrium equation relating colloidal osmotic pressure and the potential force in his 1905 paper on the Brownian motion. For a dilute suspension of colloids, when particle interactions are negligible, the osmotic equilibrium equation can be used to determine unknown potential energy profiles from the Boltzmann distribution of the particle number density. Using a known potential energy profile, one can determine the colloidal osmotic pressure as a function of particle density, i.e., the osmotic equation of state, from the density profiles of interacting colloids. We use particle density profiles determined by confocal imaging of fluorescent polystyrene nanoparticles transiently confined in an optical trap to determine the colloidal osmotic equation of state for colloids in the presence of KCl and neutral polymers. The osmotic compressibility and chemical potentials of the colloids are calculated from the osmotic equation of state to predict colloidal stability and phase transitions.

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