

Abstract Submitted
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Generalized sedimentation equilibrium: Measuring colloidal osmotic pressure of nanoparticle suspension by optical trapping JINXIN FU, H. DANIEL OU-YANG, Lehigh University — Generalized sedimentation equilibrium is achieved through the force balance between the osmotic pressure of colloidal nanoparticles and the trapping pressure by a focused IR laser beam. According to Einstein's diffusion theory for suspended particles at equilibrium state, the osmotic pressure of the colloidal particles can be obtained by the spatial integration of the product of the external force field and the particle number density. In our experiment, both the trapping force and the number density of the particles are measured by an optical bottle method. The measured osmotic pressure (P-N curve) of polystyrene nanospheres in the presence of KCl and PEG is found to decrease with increasing KCL concentration and PEG concentration, which is attributed to the screening of the surface charges of the nanoparticles by KCl ions, and the attractive depletion interaction by the polymer (PEG), respectively. Our experimental results can be used to predict the phase separation of colloidal nanoparticles.

Jinxin Fu
Lehigh University

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