Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Dielectrophoresis force of colloidal nanoparticles[1] HAO HUANG, Department of Chemical and Biomolecular Engineering, Lehigh University, DANIEL OU-YANG, Department of Physics, Lehigh University — Dielectrophoresis (DEP) is the motion of a polarizable colloidal particle in a nonuniform electric field. The magnitude of the DEP force is known to be proportional to the gradient of E^2. The DEP force also depends on the relative polarizability of the particle to that of the surrounding medium. Due to its ease of use, DEP has been proposed for a variety of applications to manipulate colloidal particles in a microfluidic setting. However, accurate measurements of the DEP force on colloidal nanoparticles are lacking. A new method is proposed to measure accurately the DEP potential force of colloidal nanoparticles by using confocal fluorescence imaging to determine the density distributions of dilute colloidal nanoparticle in a DEP potential force field. The DEP potential field can be calculated from the particle density distributions since the spatial distribution of the particle number density follows the Boltzmann distribution of the DEP potential energy. The validity of the measured DEP force is tested by examining the force as a function of the E field strength and particle size. The classic MaxwellWagnerOKonski is found to be inadequate to fully describe the frequency dependence of the DEP force.

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Date submitted: 06 Nov 2015 Electronic form version 1.4