Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

The impact of electrostatic correlations on Dielectrophoresis of Non-conducting Particles[1] ELAHEH ALIDOOSTI, HUI ZHAO, University of Nevada Las Vegas — The dipole moment of a charged, dielectric, spherical particle under the influence of a uniform alternating electric field is computed theoretically and numerically by solving the modified continuum Poisson-Nernst-Planck (**PNP**) equations accounting for ion-ion electrostatic correlations that is important at concentrated electrolytes (Phys. Rev. Lett. 106, 2011). The dependence on the frequency, zeta potential, electrostatic correlation lengths, and double layer thickness is thoroughly investigated. In the limit of thin double layers, we carry out asymptotic analysis to develop simple models which are in good agreement with the modified PNP model. Our results suggest that the electrostatic correlations have a complicated impact on the dipole moment. As the electrostatic correlations length increases, the dipole moment decreases, initially, reach a minimum, and then increases since the surface conduction first decreases and then increases due to the ion-ion correlations. The modified PNP model can improve the theoretical predictions particularly at low frequencies where the simple model can't qualitatively predict the dipole moment.

[1]This work was supported, in part, by NIH R15GM116039.

Hui Zhao
University of Nevada Las Vegas

Date submitted: 01 Aug 2017 Electronic form version 1.4