Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Simulations of particle structuring driven by electric fields YI HU, Northwestern University, PETIA VLAHOVSKA, Brown University, MICHAEL MIKSIS, Northwestern University — Recent experiments (Ouriemi and Vlahovska, 2014) show intriguing surface patterns when a uniform electric field is applied to a droplet covered with colloidal particles. Depending on the particle properties and the electric field intensity, particles organize into an equatorial belt, pole-to-pole chains, or dynamic vortices. Here we present 3D simulations of the collective particle dynamics, which account for electrohydrodynamic flow and dielectrophoresis of particles. In stronger electric fields, particles are expected to undergo Quincke rotation and impose disturbance to the ambient flow. Transition from ribbon-shaped belt to rotating clusters is observed in the presence of the rotation-induced hydrodynamical interactions. Our results provide insight into the various particle assembles discovered in the experiments.

Yi Hu
Northwestern University

Date submitted: 27 Jul 2015 Electronic form version 1.4