Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Simulations of electrically induced particle structuring on spherical drop surface YI HU, Northwestern Univ, PETIA VLAHOVSKA, Brown University, MICHAEL MIKSIS, Northwestern Univ — 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 electrical field intensity, particles organize into an equatorial belt, pole-to-pole chains, or dynamic vortices. Here we present a model to simulate the collective particle dynamics, which accounts for the electrohydrodynamic flow and particle dielectrophoresis due to the non-uniformity of local electrical field. In stronger electric fields, particles are expected to undergo Quincke rotation, inducing rotating clusters through inter-particle hydrodynamical interaction. We discuss how the field intensity influences the width, orientation and periodicity of the particle clusters. Our results provide insight into the various particle assembles discovered in the experiments.

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Date submitted: 01 Aug 2016 Electronic form version 1.4