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Influence of Electrolyte Concentration on the Aggregation Of Colloidal Particles Near Electrodes in Oscillatory Fields SCOTT BUKOSKY, SUKHLEEN SAINI, WILLIAM RISTENPART, Dept. Chemical Engineering, University of California Davis — Micron-scale particles suspended in various aqueous electrolytes have been widely observed to aggregate near electrodes in response to oscillatory electric fields, a phenomenon believed to result from electrically induced flows around the particles. Most work has focused on a narrow range of ionic strengths. Here we demonstrate that an applied field causes micron-scale particles in aqueous NaCl to rapidly aggregate over a wide range of ionic strengths, but with significant differences in aggregation morphology. Optical microscopy observations reveal that at higher ionic strengths (∼1 mM) particles arrange as hexagonally closed-packed (HCP) crystals, but at lower ionic strengths (∼0.05 mM) the particles arrange in randomly closed-packed (RCP) structures. We interpret this behavior in terms of two complementary effects: an increased particle diffusivity at lower ionic strengths due to increased particle height over the electrode and the existence of a deep secondary minimum in the particle pair interaction potential at higher ionic strength that traps particles in close proximity to one another. The results suggest that electrically induced crystallization will readily occur only over a narrow range of ionic strengths.

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