

Abstract Submitted
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The influence of frequency dependent impedance properties on electrohydrodynamic aggregation of colloidal particles T.J. WOEHLE, C.S. DUTCHER, N.H. TALKEN, W.D. RISTENPART, Dept. Chemical Engineering and Materials Science, Univ. California Davis — Colloidal particles suspended in dilute electrolytes have been widely observed to aggregate laterally along electrodes in response to oscillatory electric fields, a phenomenon that has been generally attributed to electrohydrodynamic fluid flow. Fundamental aspects of the aggregation behavior, however, remain unclear. Recently, our group has observed a second order transition in the order parameter for colloidal aggregates for a variety of electrolytes over the frequency range of 100 to 500 Hz. Here we explore the frequency dependence on several parameters related to the electrochemical cell impedance, including the AC current density, an apparent DC current offset, and the current-voltage phase angle. We report the AC current density increases by at least 10% from 100 Hz to 500 Hz for both NaCl and KCl aqueous solutions, a range commensurate with the observed second order transition. We investigate how the frequency dependent impedance properties affect the aggregation of colloidal particles and discuss the implications for controlling the crystallinity of the colloidal aggregates.

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