

Abstract Submitted  
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**Partial Coalescence of Oppositely Charged Drops** J.C. CREASEY, B.S. HAMLIN, W.D. RISTENPART, Univ. Calif. at Davis — Oppositely charged drops fail to coalesce above a critical field strength, despite the attractive force between the opposite charges [1]. Here we investigate the coalescence behavior at intermediate field strengths for charged water drops in oil, and we report that under many conditions the droplets undergo partial coalescence, i.e., a smaller daughter droplet is expelled. This partial coalescence is highly sensitive to the ionic strength of the droplets. For a given field strength, there exists a critical ionic strength above which the drops completely fail to coalesce and below which they partially coalesce. We explore the roles of charge density, drop size, inertia and viscous drag on the partial coalescence behavior and we interpret the results in terms of a competition between the respective time scales for hydrodynamic motion and ionic conduction. [1] Ristenpart, Bird, Belmonte, Dollar & Stone, *Nature*, in press (2009).

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