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Measurement of Charge Transfer to Aqueous Droplets In High Voltage Electric Fields ERIC ELTON, ETHAN ROSENBERG, WILLIAM RISTENPART, Dept. Chemical Engineering and Materials Science, University of California Davis — When water droplets contact electrodes in insulating oils, the electrodes impart a net charge to the droplet. Under sufficiently high field strengths, the droplet moves back and forth between electrodes, in effect "bouncing" between them. Although the droplets clearly acquire charge, the exact mechanism by which charge transfer occurs remains unclear. Here we present evidence that the charge transfer process for a given droplet varies strongly with the number of previous bounces. Simultaneous high speed video and high resolution electrometry were used to quantify the effect of droplet composition, ionic strength, electrode material, and applied voltage. We show that bounce-to-bounce variation in charge transfer is a strong function of ionic strength and pH, and we establish that the amount of charge transferred systematically drifts in magnitude with time. Taken together, the results suggest that electrochemical reactions play a key role in modulating the charge transferred to the drop.

William Ristenpart
Dept. Chemical Engineering and Materials Science,
University of California Davis

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