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Charge Transfer into Aqueous Droplets via Kilovolt Potentials B.S. HAMLIN, E.R. ROSENBERG, W.D. RISTENPART, Dept. Chemical Engineering and Materials Science, Univ. California Davis — When an aqueous droplet immersed in an insulating oil contacts an electrified surface, the droplet acquires net charge. For sufficiently large field strengths, the charged droplet is driven back and forth electrophoretically between the electrodes, in essence "bouncing" between them. Although it is clear that the droplet acquires charge, the underlying mechanism controlling the charge transfer process has been unclear. Here we demonstrate that the chemical species present in the droplet strongly affect the charge transfer process into the drop. Using two independent charge measurement techniques, high speed video velocimetry and direct current measurement, we show that the charge acquired during contact is strongly influenced by the droplet pH. We also provide physical evidence that the electrodes undergo electroplating or corrosion for droplets with appropriate chemical species present. Together, the observations strongly suggest that electrochemical reactions govern the charge transfer process into the droplet.

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