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Crater Formation on Electrodes during Charge Transfer with Aqueous Droplets or Solid Particles ERIC S. ELTON, ETHAN R. ROSENBERG, WILLIAM D. RISTENPART, University of California Davis — We report that metallic electrodes are physically pitted during charge transfer events with water droplets or other conductive objects moving in strong electric fields (>1 kV/cm). *Post situ* microscopic inspection of the electrode shows that an individual charge transfer event yields a crater approximately 1 to 3 microns wide, often with features similar to splash coronae. We interpret the crater formation in terms of localized melting of the electrode via resistive heating concurrent with dielectric breakdown through the surrounding insulating fluid. A scaling analysis indicates that the crater diameter scales as the inverse cube root of the melting point temperature T_m of the metal, in accord with measurements on several metals ($660°\text{C} \leq T_m \leq 3414°\text{C}$). The process of crater formation provides a possible explanation for the longstanding difficulty in quantitatively corroborating Maxwell's prediction for the amount of charge acquired by spheres contacting a planar electrode.

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