

Abstract Submitted
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Granular “electrophoresis”: in situ measurement of charge and size of freely-falling grains SCOTT WAITUKAITIS, The University of Chicago, GUSTAVO CASTILLO, Universidad de Chile, SEBASTIAN GONZALEZ, University of Twente, HEINRICH JAEGER, The University of Chicago — We present measurements of tribocharged, chemically identical grains falling from a hopper. Tribocharging is the transfer of electrical charge between contacting surfaces. Granular interactions are governed by contacts, and not-surprisingly tribocharging can have important effects on bulk granular behavior. What is surprising is that this occurs even in grains of the same material. Typically same chemistry tribocharging (SCT) correlates with the particle size distribution: larger particles charge positively and smaller particles negatively. However, the detailed mechanism of SCT remains elusive. We have developed an experimental technique to make *in situ* measurements of the particle size and charge on small ($\sim 100\text{-}500\ \mu\text{m}$) grains. With high speed videography of freely-falling grains we resolve particle sizes down to a few microns, charges as small as a few thousand electrons, and forces as small as a few picoNewtons. Our results confirm the qualitative charge segregation observed in previous SCT experiments and provide quantitative measurement for theoretical comparison.

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