

# Contact electrification: Mechanism(s) and Applications

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*Abstract*— Contact electrification (CE) is the transfer of charge between two surfaces that are brought into contact, with or without friction and/or applied potential, and then separated. Although CE is, in the absolute sense, a small effect involving approximately only one in ten thousand surface atoms separating charge, it can give rise to surface charge densities sufficient to cause breakdown of air or even common insulators. Despite a long history of scientific investigation and everyday importance (from electric shocks and explosions to photocopying and electrostatic spray-painting), the mechanisms of contact electrification remain poorly understood. In the first part of my talk, I will discuss new analytical tools with which to study the kinetics of CE in quantitative detail. The results of this work shed new light on the mechanism underlying CE in metal/polymer and polymer/polymer systems. Understanding why and how various materials charge, allows for using CE to organize matter at colloidal and mesoscopic length-scales. The second part of my talk will illustrate how electrostatic forces developed by contact charging can drive the formation of unusual assemblies of small particles, and how it can be used to manipulate and position small components of various shapes and material properties.