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Effect of electrostatics on pharmaceutical powders

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Electrostatic charging via tribocharging refers to the process of charging or electrification of two solid surfaces brought into contact and separated. In pharmaceutical manufacturing and other powder handling processes, particle charging is often a nuisance and can cause problems during manufacturing such as poor powder flow, jamming, segregation, dose inhomogeneity and even dust explosion. In this project, systematic experiments and multi-scale (quantum, particle, device scale) numerical models are performed to develop a unified theory of the relation of particle size, work

function difference, and surface water adsorption to the electrostatic charging and flow behavior in granular materials. Bipolar charging is also investigated, which is a special class of tribocharging where granular materials procure two opposite polarities on different sized particles of the same material. This is vital to better understand the fundamentals of granular tribocharging and apply the derived rules to better design and optimize the powder handling equipment used in pharmaceutical industry.

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