



# Electrostatic charge transfer observations from individual particle-particle collisions

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A novel charge measurement apparatus was designed and built to observe the electrostatic charging due to individual particle-particle collisions. The apparatus uses four electrometers to individually measure the initial and final charge of the colliding particles. The collisions are achieved using gas-injection ports to push the free-falling particles towards each other. A high frame-rate camera is used, coupled with a particle-tracking program, to monitor and confirm the elastic collisions. In this talk, we will present and discuss the charge transfer behaviours observed in same-sized PTFE-PTFE, Nylon-Nylon, PTFE-Nylon and PTFE-Aluminum particle collisions, as well as different-sized Nylon-Nylon collisions. The presented cases range between 3 and 5 mm in particle size. The different material collision cases consistently transferred charge in accordance with the triboelectric series, thereby confirming the viability of this apparatus. The direction of charge transfer in identical particle collision cases was not dictated by the net initial charges of the particles, but more likely the localized charge difference at the particles' contacting surfaces. The particle-particle collisions of varying sizes confirmed that bipolar charging behaviour occurs based on particle-size, i.e. the charge was consistently transferred in one direction. Continued testing with different particle types and sizes can help establish an empirical particle-particle charging model that can be utilized in simulations of electrostatic charging in gas-solid flows.