

Particle size dependent charge segregation in triboelectrically charged granular materials

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Abstract:

We report our experimental approach that examines the triboelectric charging of insulator particles with a known particle size distribution. The particles are charged in a flow apparatus that allows only particle-particle interactions. Particles are extracted by their charge polarity and the size distribution of each polarity is determined. We find smaller particles tend to charge negatively, while larger particles tend to charge positively, in agreement with previous ideas. For bimodal systems, a model for the frequency of collisions of particles with different sizes predicts the concentration for which the observed charge segregation is maximized. These studies are carried out for single component systems composed of soda lime glass, polyethylene and Mars regolith simulant. □