

Impact Charging of Single Particles

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Abstract— We have been working to look at electrostatic charging of particulate materials with both experimental and theoretical approaches. Our experimental methodology is, mainly with 'impact charging experiment', in which single particles are made impact onto a metal target one by one, and the net charge transfer onto the particle and the charge held by the particle in prior to the impact were measured for each impact event. We started with 3 mm particle in its diameter, and have been extending the experimental technique to the smaller particle size, and now 100 μm sample is applicable. The charge generation due to contact/impact consists of a process of contact, charge transfer, separation and charge fixation. In the separation process, the charge double layer is separated with fixed charge on each surface. Then, as the separation gap increases the capacitance of the charge double layer decreases, which lead an increase of the potential difference between two surfaces. Once the potential difference reaches to a gas break down limit of air, charge relaxation may occur, if so, the observed charge as the final form is a residual of the charge relaxation process. We discuss that the charge relaxation process dominates the amount of the net charge generation in impact charging of particulate materials.