

# Charge accumulation process of a single ceramic particle due to successive impacts

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Electrostatic charge accumulation process of a single particle due to successive impacts against stainless steel wall was measured with ceramic spherical particles, made of alumina, zirconia, and glass, of 100 micro-meter in diameter.

The experimental apparatus consists of two metal target plates, connected to charge-amplifiers independently, which configure a single Faraday cage. A chamber was vacuumed from atmosphere to 100 or 430 mmHg. A single particle was given certain amount of charge by contacts with plastic or glass vessel, and then introduced to the apparatus with air jet via an orifice. The particle collided with both upper and lower metal target alternatively, and the amount of charge held by the particle was recorded continuously by an oscilloscope during the flying process between the two electrodes.

The results showed that, in general, the ceramic particles tended to lose its initial charge gradually by successive impacts with a metal target. In general, the impact charge (net charge transfer onto the particle at each impact) is a function of impact velocity and the charge before impact held by the particle. Because in the experiment the particle loses its velocity at each impact, the relationship between the charge before impact and impact charge was examined by classifying impact velocities. In each impact velocity classes, the impact charge and charge before impact showed a liner relationship in the case of PS particles in our previous works. Glass beads showed a similar liner relationship, and the intercept on horizontal axis (charge before impact) was very close to null. This means that glass beads tend to lose its charge in impacting on metal surface. On the other hand, the cases of alumina and zirconia showed an interesting contrast with PS or glass. Although each case showed nice liner relationships between impact charge and charge before impact, but it was not consistent when the charge before impact was negative or positive. The result was very interesting but the detailed reason of this is not understood so far.