

Emission characteristics of spherical dust grains

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The space plasma environment usually contains charged dust grains. The grain charge is important parameter determining its migration through the space, coagulation, formation of dust clouds and so on. The knowledge of its charge is thus one of the basic information we want to know. There are several emission processes leading to both positive and negative charges, among others photoemission, all kinds of secondary emissions, field emissions etc.

The present study is focused on a laboratory simulation of emissions caused by energetic electron and/or ion impacts. Our experiment is based on the Paul trap which gives us an opportunity to catch a single dust grain for several days inside the vacuum vessel and exposed it by the electron/ion beams. This experimental approach allows us to separate individual charging process. We have chosen spherically shaped dust grains of various materials (metals and dielectrics) and compared the differences in secondary electron emission and field emissions from particular materials.