



Anomaly in Spontaneous Discharging of Glass Dust

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Small bodies (dust) coexist with plasma of various parameters in space as well as in laboratories and industrial facilities. The mutual interaction of plasma particles with dust grains leads to their charging. Especially, small or irregularly shaped grains can achieve a high surface electric field even under a moderate charge. When the positive electric field is strong, the accumulated charge becomes spontaneously released. This process is known as field ion emission and can limit a maximum charge of the grain exposed to the plasma environment. We study this process experimentally in laboratory conditions using single spherical glass grains trapped in the electrodynamic quadrupole and compare obtained results with previous measurements on carbon and gold grains. Although the field emission current would be controlled by the surface electric field and thus it would decrease in time as the grain total charge does, we observed an unexpected increase of the discharging current at the beginning of discharging after electron charging of non-conducting glass grains. This increase was observed only for electron charging of non-conducting grains and can be probably attributed to the way of the charge transport toward the grain surface.