



Measurements of the Work Function of Nonconducting Dust Grains

Ivana Richterova, Martin Beranek, Jiri Pavlu, Zdenek Nemecek, and Jana Safrankova

Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic (ivana.richterova@mff.cuni.cz)

In the absence of high UV radiation fluxes, dust grains immersed into a space plasma are charged dominantly by the electron attachment. In this case, the average total secondary electron yield is less than unity, dust grains can be charged to high negative potentials. For small-sized dust grains, the corresponding surface electron field intensity (being inversely proportional) is high and the grain potential is limited by the field emission.

Single dust grains have been trapped in a Paul trap and their spontaneous discharging after the electron bombardment have been studied. Our previous laboratory experiments with electron beams have shown that, probably due to extra electrons occupying surface states, the work function of negatively charged silica dust grains can be as low as 2 eV. However, these measurements have been performed with rather rough silica grains. In this paper, we repeat the study with smooth micron silica dust grains. The present results are verified by illuminating dust grains of both polarities by light of an energy exceeding the estimated work function.