

# ULTRAHIGH CHARGING OF PARTICLES AND COULOMB EXPLOSION IN DUSTY PLASMA INDUCED BY ELECTRON BEAM

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The studying of the dusty plasma properties under electron beam action are of great interest because it gives the unique opportunities for experimental investigation of strongly coupled systems as well as for developing the new dusty plasma technologies of creating the new composite materials. Highly charged dust particle generates electrostatic field that can accelerate positive ions to high power. It gives the unique possibilities of using these macroparticles (for deeply ions implantation, as catalysts for increasing rate of reactions with the high energy barrier, in the new ionic engines etc.).

Presented work deals with the experimental investigation of dust particles charging under direct influence of electron beam. The experiments were carried out with particles of different materials, forms and sizes (10-200 mkm) in the atmosphere of different gases (air, helium) at pressures  $\sim 10^{-4}$ , 0,2, 0,6 Torr and above. The current of electron beam was varied from 1 to 10 mA; energy of electrons was about 25 keV and electron beam diameter was about 3 mm. Under action of electron beam dust particles became charged. Due to Coulomb interaction these macro particles gained the velocity and spread in the different directions. On the basis of experimental data the average velocities of dust particles were obtained and the charge of macroparticle was estimated. For instance, the charge of aluminum oxide particle was about  $10^7 \sim 10^8$  elementary charges. It is  $\sim 2-3$  order more than the charge of macroparticle in the high-frequency discharge.