Charging of dust particles under action of UV radiation and in ECR discharge

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The photoemission charging of dust particles at elevated pressures are studied within hydrodynamic approach. It is found out that dust particle charge depends on the conditions at Wigner-Seitzr cell boundary. At some boundary electron density the electrical field changes the sign in the Wigner-Seitzr cell. At higher densities the dust particle charge changes the sign from positive to negative. This is in accordance with experimental results.

Charging of dust particles in the plasma of ECR discharge with two-temperature energy distribution function of electrons was studied. It was found out that in plasma with cold ions the reduced (to the electron temperature) potential of a dust particle decreased with the growth of the electron temperature. This led to the fact that the potential of the dust surface grew slower with the growth of the electron temperature than according to the linear law and, when $T_e > 5.5$ eV in hydrogen or when $T_e > 240$ eV in argon, this potential became smaller than the electron temperature (divided by the elementary charge). The fraction of hot group electrons was determined which, when greater, results in the contribution of these electrons to the charge of dust particles. It was shown that the charge of micron-sized particles could be up to 10^6 electron charges. The influence of field emission upon the charge of dust particles was studied.