TRANSFORMATIONS OF DUST CLOUD SHAPE IN NEON DC DISCHARGE

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The transformation of the dust cloud shape on discharge current and pressure in neon DC discharge at room temperature (295 K) has been observed. A discharge with microspheres with a diameter of 2.55 microns was formed in long glass discharge tube of 20 cm length and 16.5 mm i.d. at a pressure of 0.35 to 1.08 Torr and at a discharge current more than 0.4 mA. Dependencies of shape, axial and radial sizes of dust clouds, and longitudinal electric field on discharge current and neon pressure have been studied. Previous experiments were done in a DC discharge in neon at a cryogenic temperature (77 K) [1–5].

It was found that at room temperature the dust clouds were formed by individual microparticles, while at temperature of 77 K they consisted of a mixture of the different types clusters formed from microparticles. At the intersection points of dependencies of radial and axial sizes of dust clouds on discharge current, the dust clouds with shapes similar to spherical ones were observed. This result was in qualitative agreement for the data obtained at room and at cryogenic temperatures. At room temperature, the transition to dust clouds with a void with an increase in the discharge current was observed, while at 77 K the formation of the hollow dust clouds was not observed even at maximum discharge current. The current to void transition decreased with increasing neon pressure was found.

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