Dusty plasma structures at temperatures 77 K < *T* < 5 K: results of experimental investigation.

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Structure and dynamics of dusty plasma structures at cryogenic temperatures in the range of 77 K< *T* < 5 K were experimentally investigated. The experiments were carried out in a cylindrical symmetric discharge generated in vertically oriented glass tube placed inside cryostat (double glass Dewar system) at neutral gas densities 0.6-1.5×10^{17} cm^{-3} (or pressures 2-5 Torr at room temperature) and discharge currents 0.2-1 mA. In the setup developed one can control the temperature of cooling by means of liquid helium evaporations. Monodisperse polystyrene spheres of ~5.4 μm in diameter were used in order to form dust structures in cryogenic discharge. As a result, temperature dependencies of structural and dynamic characteristics of dusty plasma clouds in the discharge at the range of 77 K< *T* < 5 K were obtained. On the basis of experimental data obtained analysis of gas temperature effect on the dust particle charge screening and dust density variation was made. Besides, conditions for excitation of dusty plasma instabilities (oscillations, vortices etc.) at cryogenic temperatures were experimentally investigated. Observations of instability development owing to variations both temperature regime and discharge parameters were carried out.