Electrodynamic linear trap with electrodes of micron diameters

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The aim of this work is to study the possibility of capturing and retaining particles in a linear electrodynamic trap with electrodes of micron diameters. The length of the electrodes was equal to 120 mm, the distance between the electrodes was equal to 10 mm. The studies were carried out at atmospheric air pressure using electrodes whose diameters were 63 microns; 120 microns; 200 microns. The frequency of the alternating voltage was equal to 50 Hz. At voltages above 3.5 kV, a corona discharge of alternating current was formed on the electrodes. The trajectories of the particles were recorded by the HiSpec camera. Particle illumination was provided by a laser with a wavelength of 532 nm. Polydisperse Al2O3 particles with sizes from 10 to 120 micrometers were used in the experiments. Uncharged particles were introduced into the trap from the upper side. The particles were charged in the electric field of the corona discharge during the downward movement and trapped, forming ordered structures. It was found that the size of the trapped particles depends on the diameter of the electrodes used. With an electrode diameter of 63 micrometers, the size of the captured particles ranged from 4 to 8 micrometers, and with an electrode diameter of 200 micrometers, the size of the captured particles ranged from 40 to 60 micrometers.