Anisotropic linear structures of active Brownian particles depending on external parameters in DC discharge.

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Active Brownian particles are extremely widespread and can be met in systems of diverse complexity and scale. Active colloidal particles exhibit collective behavior and may self-organize in various types of structures in different environments: liquid, gas and plasma [1]. Dynamic and morphological characteristics of such systems are dependent on external parameters [2].

Presented experimental results of investigation of an anisotropic linear structure of active Brownian particles in dependency on external parameters in DC discharge. The structure formed by 10 polydisperse CeO_2 particles. During the experiment the discharge current was varied from $0.75mA$ to $2.5mA$, the pressure of buffer gas was varied from $30mTorr$ to $45mTorr$.

According to obtained data were reconstructed the particles' trajectories and calculated its average mean square displacements, kinetic energies, interparticle distance and deviation from axis of a structure. The dependencies on pressure and discharge current were investigated.

[1] Bechinger C, Di Leonardo R, Löwen H, Reichhardt C, Volpe G and Volpe G 2016 *Rev. Mod. Phys.* **88**(4) 045006

[2] Fedoseev A, Litvinenko V, Vasilieva E, Vasiliev M and Petrov O 2024 *Scientific Reports* **14** 13252