OBTAINING HETEROGENEOUS CHARGED STRUCTURES BY CORONARY DISCHARGES

Abakumov V.I., Bychkov V.L., Bikmukhametova A.R., Vaulin D.N., Safronenkov D.A., Chernikov V.A.

M.V. Lomonosov Moscow State University., bychvl@gmail.com

Heterogeneous charged structures were obtained experimentally in our works [1] when creating a corona discharge over the surface of various liquids. This was most clearly manifested when using alcohol and glycerin. In this case, columns and disintegrating jets appeared above the surface of the liquid. The purpose of this paper is to elucidate the nature of the onset and destruction of these structures. The scheme of the experimental device consists of a cuvette filled with liquid and an electrical circuit. The upper electrode, or several electrodes with a diameter of 0.9 mm (with a tip tip of 0.2 mm) or 2 mm (with a tip radius of -0.4 mm) was placed at a height of 5-15 mm above the surface of the liquid. The distance between the electrodes in the case of the multi-electrode system was 11 mm. The electrodes were under a positive or negative potential. The cuvettes were made of metal or dielectric. Metal cuvettes were as follows: cylindrical of diam. 130 mm, height 18 mm, and rectangular 37x70x122 mm; The dielectric plastic cuvette was rectangular 45x95x130 mm. Ampere and Volt characteristics of the discharge were measured and the results in coordinates A-V2 convenient for corona discharge analysis are presented.

In experiments with a positive corona over alcohol, the formation of large charged structures such as jets and fountains with a size of up to 10 -15 mm were observed, which occur under the electrodes and periodically change their position near the funnel formed by the ion wind. Previously, such structures were formed only in the negative corona.

References

1. Aleksandrov A.F., Bychkov V.L., Bychkov D.V., Volkov S.A., Kostyuk A.A., and Chernikov V.A. Electrohydrodynamic Peculiarities of Corona Discharge Interaction with a Liquid Surface. Moscow University Physics Bulletin, 2011, Vol. 66, No. 4, pp. 390–397.