

## MODELING THE COLOR OF HIGH-ALTITUDE ATMOSPHERIC DISCHARGES USING A REPETITIVELY PULSED DISCHARGE IN AIR, NITROGEN AND ARGON\*

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High-altitude electrical discharges in the Earth's atmosphere are studied by a large number of scientific groups [1, 2]. In scientific laboratories, these phenomena are modeled both experimentally and theoretically [1, 2, 3, 4]. However, the scientific community cannot find answers to some questions, such as the mechanism of the initiation of different TLEs and their influence on each other, as well as the nature of the color of the observed high-altitude electrical discharges.

In this work, the influence of the electrode material (aluminum and stainless steel) during the formation of mini jets on the color of a repetitively pulsed diffuse discharge in air, nitrogen, and argon is studied. The discharge was formed under the conditions of generation of runaway electrons in a nonuniform electric field with a cone-shaped and wire cathode and a plane anode.

As a result of the experiments, it was found that the similarity of the color of the mini jets, which are formed at the electrodes of aluminum and stainless steel, is closer to the emission of red sprites and blue jets, respectively, than the emission during a diffuse discharge without mini jets. At the same time, it was found that the color of the plasma changes due to the evaporation of the electrode material. There are photographs of discharges with aluminum and stainless steel electrodes in the figure 1.

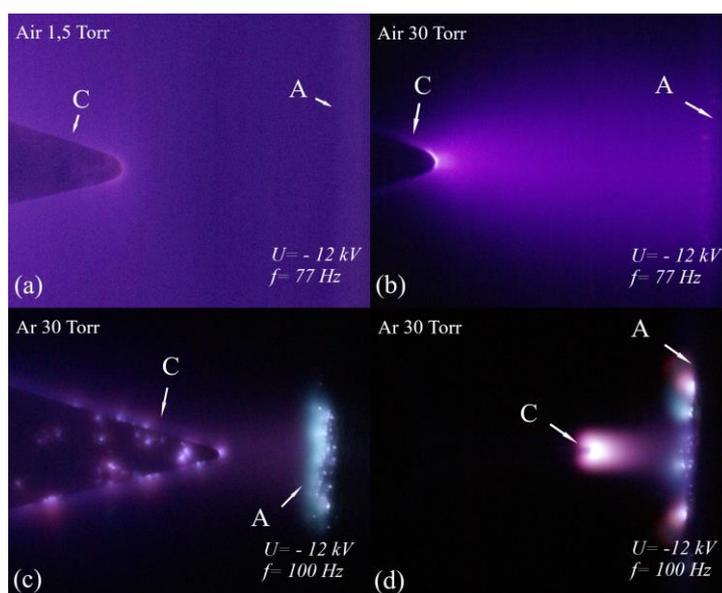


Fig.1. Photos of the discharge in air and argon. The gap length is  $d = 6$  mm (a), 12 mm (b), 2 mm (c,d). Cathode – aluminum (a,b,c,d), anode – aluminum (a,b), anode – stainless steel (c,d).

According to obtained data, it can be assumed that metal vapors in the Earth's atmosphere, for example, due to small meteorites [5], affect the color of the TLEs.

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