Current pulses and the development of microdischarges in SDBD in the presence of oxide on the electrodes

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Surface dielectric barrier discharge (SDBD) is used in numerous technological processes in the field of plasma chemistry, treatment of biological objects and aerodynamics. In most applications, DBD is initiated in the air at atmospheric pressure. In an oxygen-containing atmosphere, metal electrodes are always coated with an oxide layer. In a number of works, it was shown that the oxidation of the electrode leads to a change in the integral characteristics of the DBD [1], as well as to a change in the characteristics of individual microdischarges (MDs) and their statistics [2]. Presumably, the oxide covering the electrode edge has a significant effect on the mechanisms of MD development. This is indirectly confirmed by existing studies on corona discharge, where it was shown that coating the cathode with layers that change the properties of its surface leads to significant distortion of the shape of the current pulse front, which indicates a change in the ratio of various mechanisms of electron emission [3]. This work aims to study the shape of current pulses in SDBD in air and nitrogen at atmospheric pressure on electrodes in different states: untreated, purified from oxide, and also exposed in SDBD in atmospheric pressure air. It was shown that when the oxide is removed from the edges, a pronounced sloping pre-pulse arises at the pulse front, and in the case of untreated and trained electrodes, the pulse shapes are similar.

[1] Selivonin I, Lazukin A, Moralev I and Krivov S 2018 *Plasma Sources Sci. Technol.* **27** 085003

[2] Selivonin I and Moralev I 2021 *Plasma Sources Sci. Technol.* **30** 035005

[3] Černák M, Hosokawa T, Kobayashi S and Kaneda T 1998 *J. Appl. Phys.* **83** 5678–5690