

ATMOSPHERIC PRESSURE MICRODISCHARGES AND JETS FOR AN INACTIVATION OF MICROBIOTA

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Abstract. Among a variety of plasma sources, particular attention is focused on the development and application of plasma jets due to their ability of surface treatment outside of a closed discharge volume (see K.H. Schoenbach). The dc microdischarge is only one type of discharges used for plasma jet generation. This discharge is the main studied object in given report. The discharge parameters are following: the gas temperature is 1600–2000 K, the typical electron density is $\sim 10^{12}$ – 10^{13} cm⁻³, and the average electron energy is 1 eV (see V.I. Arkhipenko). It is shown, that the basic results obtained for this discharge are applicable to microdischarges with ripple and pulsing voltages.

Investigations of plasma jets are under consideration as well. It has been shown that ozone is the main bioactive component of jets in mixtures of helium with oxygen and argon with oxygen, and nitrogen-containing molecules (NO, NO₂, N₂O, HNO₂) for air and nitrogen plasma jets. The plasma chemistry in both the discharge and jet is discussed. Concentrations of long-living bioactive molecules are determined. It is shown the ways to control the jets compositions using different current modes of discharge.

An attention to the application of the obtained plasma structures for biomedical applications is paid. The effect of various bactericidal factors on samples contaminated with microbiological cells is under consideration. This observation allows to choose the most effective mode of microdischarge generation for applications. The inactivation of microbiota of various levels of organization is demonstrated.

References

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Arkhipenko, V. I. et al.: 2018, *High Temp. Mater. Process.*, **22**, 273–278.