

MASS SPECTROMETRY OF PLASMA JET AND APPLICATION OF ELECTRICAL DISCHARGES OPERATING AT ATMOSPHERIC PRESSURE IN BIOMEDICINE

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Abstract. In the last few decades, the study of plasma jets has been the focus of interest for a large number of scientists especially because of its potential application in biomedicine. The physical phenomenon that characterizes plasma jets is the appearance of a "pulsed atmospheric pressure streamer" (PAPS), a fast ionization front that cannot be detected by a human eye, but its observation is enabled by the use of high-speed ICCD cameras. In order to integrate this type of plasma into biomedical applications it is necessary to perform analysis of the electrical discharge's behavior and its composition. In this work, we present mass spectrometry of three different atmospheric pressure plasma sources (plasma jet, multijet plasma device and dielectric coplanar surface barrier discharge). The results show different mass spectra of neutral, positive and negative ions whose composition and concentration significantly depend on the geometry of the source and the applied parameters: the power delivered to the plasma, the type of working gas and flow rate, humidity, etc. This diagnostic method gave us an insight into the dominant reactive species of oxygen and nitrogen, the so-called RONS, which play a crucial role in biomedical applications. In addition, we have used plasma needle, the atmospheric pressure plasma source, in treatments of bacteria, plant stem cells and cancer cells. and discussed numerous effects obtained by treatment.

References

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