

COMPACT PIEZOTRANSFORMER SOURCE OF THE COLD ATMOSPHERIC PLASMA WITH THREE TYPES OF DISCHARGES

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Abstract. In recent years, low-temperature atmospheric pressure plasma (cold atmospheric plasma, CAP) has received increasing attention from the scientific and engineering community, see Adamovich I, et al. 2017. This is due to the wide possibilities of creating and using such plasma for processing various solid and liquid materials, especially in biology and medicine. In studies on the use of low-temperature nonequilibrium atmospheric pressure plasma in medicine and biology, dielectric barrier discharges (DBDs), plasma jets, and corona discharges with various types of sources and electrode configurations are most often chosen. In recent years, there has been increasing interest in the creation of small-sized mobile CAP sources using piezoelectric transformers as a compact high-voltage element, see Itoh H., et al. 2006. It is important to consider that a piezotransformer is a resonant element with a strong dependence of the resonant frequency on the electrical parameters of the load. The report presents the developed compact CAP source for biomedical applications based on a piezotransformer with an E-class driver. The developed piezotransformer power supply has an output voltage of $V_{pp} = 5$ kV, $V_{RMS} = 2.3$ kV. The source allows you to create CAP with different types of discharge depending on the tip used: direct piezoelectric discharge, dielectric barrier discharge, discharge in a plasma jet with a flow of intertwined gases. The developed source with E-class driver can be programmed to automatically adjust the frequency of the voltage at the transformer input, which allows it to work with different loads. The research was financially supported by the Russian Science Foundation, project No. 24-29-00842.

References

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