OPTICAL PROPERTIES OF A COLD PLASMA JET GENERATED BY ATMOSPHERIC PRESSURE ELECTRODE MICROWAVE DISCHARGE IN ARGON FLOW

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In recent years, much attention has been paid to studies of plasma jets (i.e. streaming afterglow plasma) based on low-current forms of high-voltage atmospheric pressure discharges. This is due to new possibilities of using the "cold" plasma of such jets in a number of innovative applications based on the modification of the functional surface properties of a wide variety of materials (ceramics, glass, polymer and organic materials). In this regard, the development of diagnostic techniques and the study of properties of nonequilibrium atmospheric pressure plasma in treatment processes are of great importance. The aim of this work was to study the optical properties of a cold plasma jet based on an atmospheric pressure electrode microwave discharge in an argon flow. The experiments were conducted on a experimental setup consisted of microwave plasmatron (2.45 GHz) and external portable electrode plasma torch developed, with an outlet of 2.5 cm in diameter and a power of up to several hundred watts [1]. Argon (99.993%) was used as a plasma-forming gas, the flow rate of which was several liters per minute. The emission spectra of microwave discharge in the plasma torch are measured and analyzed. The possibility of using of absorption spectral analysis for diagnostics of a cold plasma jet was studied, including with the use of a broadband optical source. Information on the spatial structure and dynamics of a cold plasma jet can be obtained by visualizing the jet using a laser or a white light source (shadowgraph technique). The results of shadow photography of cold plasma jet forming under various electrode microwave discharge conditions are presented.

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1. Chepelev V. M., Chistolinov A. V., Khromov M. A., Antipov S. N., Gadzhiev M. Kh. // J. Phys.: Conf. Ser. 2020. V. 1556. No. 1. P. 012091.