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COLD AIR PLASMA GENERATOR

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Recently plasma generators producing plasma with average mass temperature of 40-60 °C are intensively developing all over the world. Since cold plasma is considered to be a promising agent for biological and medical technologies, development of such generators is of great interest [1, 2]. One of the most important directions in this field is designing of cold plasma generators which use atmospheric air as a plasma forming gas instead of expensive inert gases. Cold air plasma can be a source of exogenous nitrogen oxide (NO) which is applied for treatment of various diseases [3]. Such devices like "Plazon" and "Gemoplaz-VP" [3] are able to create nitrogen monoxide using high-current arc.

The goal of the research is to design a cold air plasma generator basing on low-power discharge and to research the plasma generated. The distinction of the present device is that nitrogen monoxide is generated in a low-current discharge of peculiar geometry. The generator is a modification of the generator of cold plasma at atmospheric pressure (GCPAP) which description is given in details in [2]. In contrast to GCPAP this device is able to generate a powerful air-plasma flow which can be controlled by supplying compressed air at pressure up to 3 atm to the discharge gap.

Characteristics of the generator and parameters of the air-plasma flow generated as well have been studied at various pressure values in the discharge gap. The discharge exists at voltage of 1600-1800 V on the gap, the average current lies in the range 10 – 30 mA. The discharge current decreases with pressure increasing from 1 to 3 atm, at the same time the discharge voltage increases.

The investigation of temperature distribution along the air-plasma jet has been carried out. The average mass temperature of the flow has been shown to be of 41 °C in its center and of 32 °C on the edge (see fig. 1).

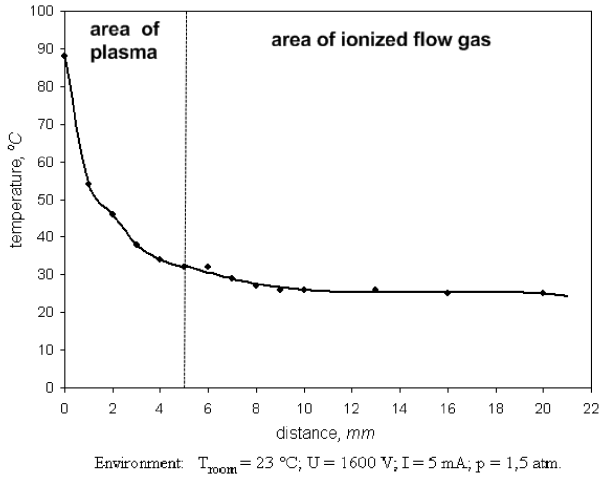

Fig. 1: Longitudial air-plasma flow temperature distribution.

Emission spectra of the plasma jet have been studied as well (see fig. 2). The spectra contain both lines of atomic and bands of molecular oxygen, as well as intensive bands of nitrogen oxide (NO) in the ultraviolet range.

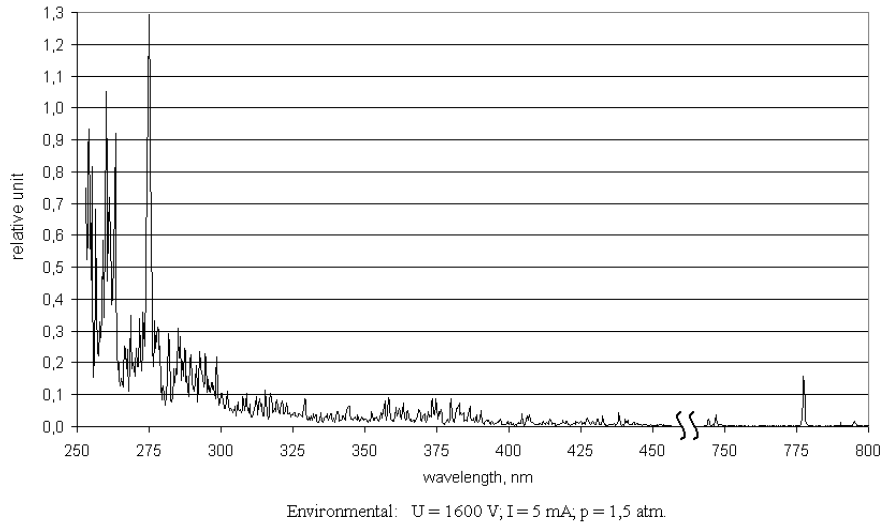

Fig. 2: Emission spectrum of the flow

Exogenous nitrogen oxide (NO) in the cold air plasma flow raises possibility to use the plasma in medical and biological technologies.

Reference

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