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APOKAMP DISCHARGE AS A SOURCE OF NITROGEN OXCIDES[1]

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Two years ago, we found that an extended diffuse jet is formed at a pulse-periodic discharge approximately perpendicular to the point of bend of the bright current channel. We call this phenomenon apokamp discharge (using the Greek words από (from) and καμπη (bend, turning)) [1, 2].

The aim of this work is to determine the composition of the plasma decay products of atmospheric pressure apokamp discharge and to clarify the phenomenon conditions. For this purpose, we measured the temperature and spectral characteristics, NO_2 concentration in various modes of pulse periodic discharge between two tip-shaped electrodes.

It is found that pulse-periodic potential discharge, in relation to dissipation power can be responsible for mainly nitrogen oxides or ozone formation. There is a critical value of dissipation power for transformation of diffuse discharge to apokamp discharge. Simultaneously, due to the thermochemical reactions plasma discharge starts to produce nitrogen oxides (Fig. 1). Thus, the gas heating in pulsed-periodic discharge is one of the key factors to explain the apokamp mode formation. The obtained data about nitrogen oxides and ozone formation are in good agreement with theoretical and our experimental works [3, 4].

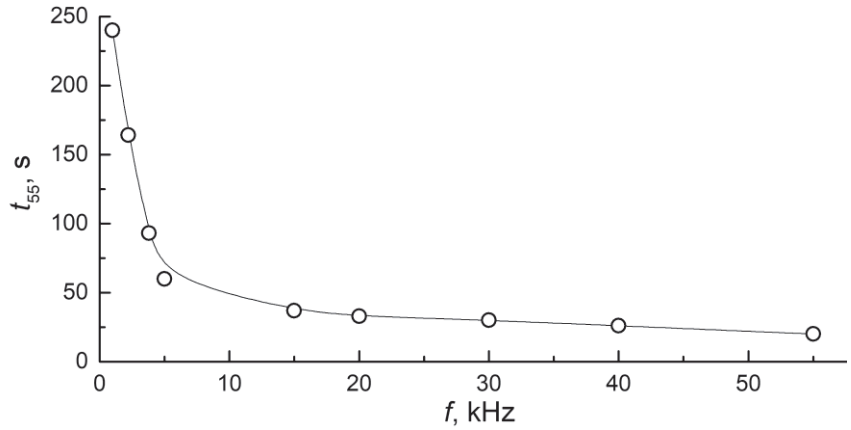

Fig. 1. Formation of NO_2 via voltage pulse frequency values at C = 5.5 pF, U_p ~ 11.3 kV, d = 7 mm. The t_{55} is period of time for achievement of set value of NO_2-analyzer (55 mg/m^3).

Decay products of atmospheric pressure plasma in air were applied to treating of wheat and rye seeds. In case of treatment period of time of 2 min and passive treatment of 1 min by plasma decay products the fungicidal activity has been revealed. It has been shown that the same treatment decrease fungi concentration on seeds surface at least two times. The main active substance of revealed effect is nitrogen dioxide.

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