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CONTENTS

Plenary Sessions	5
20th International Symposium on High-Current Electronics	15
Intense electron and ion beams	17
Pinches, plasma focus and capillary discharge	53
High power microwaves	79
Pulsed power technology	99
Pulsed power applications	133
Discharges with runaway electrons	182
14th International Conference on Modification of Materials with Particle Beams and Plasma Flows	235
Beam and plasma sources	237
Fundamentals of modification processes	287
Modification of material properties	305
Coatings deposition	388
Nanoscience and nanotechnology	425
18th International Conference on Radiation Physics and Chemistry of Condensed Matter	443
Luminescence: processes, luminescence centers, scintillators and luminophores, application	445
Non-linear physicochemical processes under severe energetic impact: breakdown, fracture, explosion, etc.	478
Physical principles of radiation and photonic technologies	499
Radiation defects: structure, formation, properties	516
Methods, instruments and equipment for physicochemical studies	547
3rd International Conference on New Materials and High Technologies	559
Non isothermal methods for materials synthesis	561
Combustion waves: theory and experiment	586
Functional materials and coatings	607
Author Index	667

20th International Symposium on High-Current Electronics



APOKAMP DISCHARGE AS A SOURCE OF NITROGEN OXIDES¹

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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 κάμψη (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, NO₂ 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].

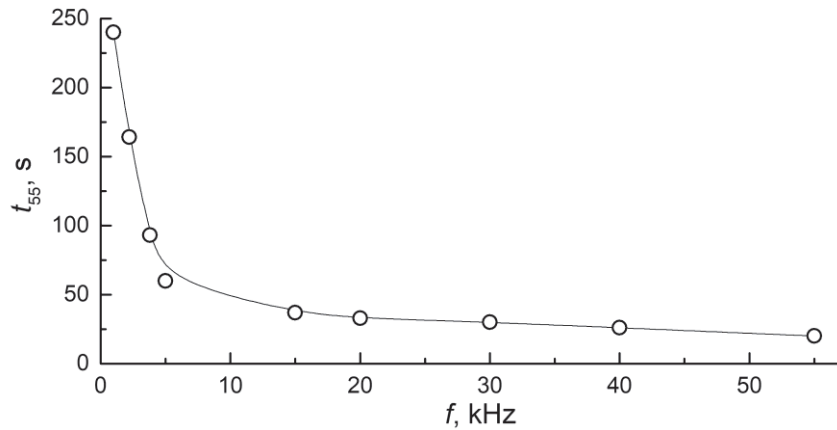


Fig. 1. Formation of NO₂ via voltage pulse frequency values at $C = 5.5$ pF, $U_p \sim 11.3$ kV, $d = 7$ mm. The t_{55} is period of time for achievement of set value of NO₂-analyzer (55 mg/m³).

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.

REFERENCES

- [1] Skakun V.S., Panarin V.A., Pechenitsyn D.S. Sosnin E.A., Tarasenko V.F. // *Russ. Phys. J.* – 2016. – Vol.59. – P. 707-711.
- [2] Sosnin E.A., Skakun V.S., Panarin V.A., Pechenitsyn D.S., Tarasenko V.F., and Baksht E.Kh. // *JETF Letters.* – 2016. – Vol.103. – P. 761–764.
- [3] Sosnin E.A., Baksht E.Kh., Panarin V.A., Skakun V.S., Tarasenko V.F. // *JETF Letters.* – 2017. – Vol.105. – P. 641-645.
- [4] Sosnin E.A., Naidis G.V., Tarasenko V.F., Skakun V.S., Panarin V.A., Babaeva N.Yu. // *JETP.* – 2017. – Vol.125. – P. 920-925.

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