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Tomsk Scientific Center SB RAS
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Abstracts

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Conferences

20th International Symposium on High-Current Electronics

14th International Conference on Modification of Materials with Particle Beams and Plasma Flows

18th International Conference on Radiation Physics and Chemistry of Condensed Matter

3rd International Conference on New Materials and High Technologies

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This book comprises the abstracts of the reports (presentations) for the oral and poster sessions of VI International Congress on Energy Fluxes and Radiation Effects (EFRE 2018). The Congress will combine four International Conferences regularly hosted in Tomsk: International Symposium on High-Current Electronics, International Conference on Modification of Materials with Particle Beams and Plasma Flows, International Conference on Radiation Physics and Chemistry of Condensed Matter, International Conference on New Materials and High Technologies. It will be a good platform for researchers to discuss a wide range of scientific, engineering, and technical problems in the fields of pulsed power technologies; ion and electron beams; high power microwaves; plasma and particle beam sources; modification of material properties; pulsed power applications in chemistry, biology, and medicine; physical and chemical nonlinear processes excited in inorganic dielectrics by particle and photon beams; physical principles of radiation-related and additive technologies; self-propagating high-temperature synthesis; and combustion waves in heterogeneous systems.

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FORMATION OF A NEGATIVE STREAMER IN NITROGEN AND AIR IN A NON-UNIFORM ELECTRIC FIELD AT SUBMICROSECOND FRONT OF VOLTAGE PULSE[1]

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Currently, much attention is paid to the investigation of high-voltage nanosecond breakdown at conditions of runaway electrons generation [1 - 4]. However, the mechanism of generation of runaway electrons, realized in the phase of breakdown, at atmospheric pressure of various gases and durations of the voltage pulse front of tens of hundreds of nanoseconds, remains poorly studied. In this paper, the results of the experimental study of the breakdown in nitrogen in a sharply inhomogeneous field are given for a duration of the voltage pulse front ≈ 200 ns.

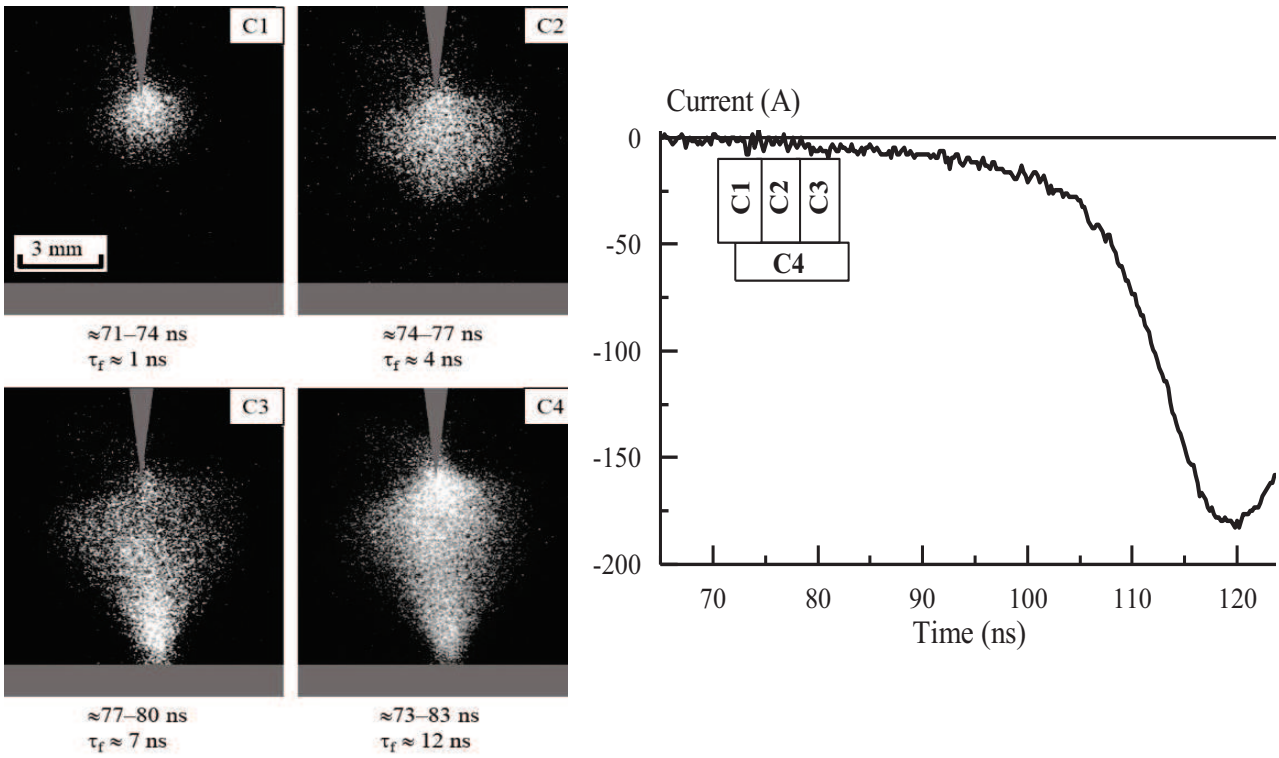

Fig. 1. Images of the streamer luminescence in atmospheric pressure nitrogen (left). The waveform of discharge current (right). C1, C2, C3, C4 - channel numbers of the ICCD camera. τ_f is the time interval during which a light emission profile was formed.

The experimental study is based on recordings by high-speed four-channel ICCD camera time-resolved light emission profiles and their complete correlation to voltage and current waveforms. It was found that at conditions under study a diffuse discharge is realized due to formation of a spherical streamer. Its diameter is comparable with an interelectrode distance. The mean propagation speed was registered to be of 0,12÷0,28 cm/ns. Amplitude of a runaway electron beam current registered behind a mesh anode was found to be of ones-tens mA.

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