

Institute of High Current Electronics SB RAS  
Tomsk Scientific Center SB RAS  
National Research Tomsk Polytechnic University

**6th International Congress  
on Energy Fluxes and Radiation Effects  
(EFRE 2018)**

*Abstracts*

September 16–22, 2018

Tomsk, Russia

Tomsk

Publishing House of IAO SB RAS

2018

## General Chairman of the Congress

Gennady Mesyats Russian Academy of Sciences

## Co-Chairmen of the Congress

Nikolay Ratakhin Institute of High Current Electronics SB RAS

Petr Chubik National Research Tomsk Polytechnic University

## Local Organizing Committee

<b>Chairman</b>	Dr. Maxim Vorobyov	Institute of High Current Electronics SB RAS, Tomsk, Russia
<b>Co-Chairman</b>	Valery Shklyayev	Institute of High Current Electronics SB RAS, Tomsk, Russia
	E. Petrikova	Institute of High Current Electronics SB RAS, Tomsk, Russia
	D. Genin	Institute of High Current Electronics SB RAS, Tomsk, Russia
	N. Labetskaya	Institute of High Current Electronics SB RAS, Tomsk, Russia
	O. Krysina	Institute of High Current Electronics SB RAS, Tomsk, Russia
	L. Avdeeva	Institute of High Current Electronics SB RAS, Tomsk, Russia
	A. Batrakov	Institute of High Current Electronics SB RAS, Tomsk, Russia
	Yu. Akhmadeev	Institute of High Current Electronics SB RAS, Tomsk, Russia
	I. Pegel	Institute of High Current Electronics SB RAS, Tomsk, Russia
	N. Landl	Institute of High Current Electronics SB RAS, Tomsk, Russia
	D. Sorokin	Institute of High Current Electronics SB RAS, Tomsk, Russia
	E. Chudinova	Institute of High Current Electronics SB RAS, Tomsk, Russia
	A. Shipilova	Institute of High Current Electronics SB RAS, Tomsk, Russia
	A. Schneider	Institute of High Current Electronics SB RAS, Tomsk, Russia
	S. Onischenko	Institute of High Current Electronics SB RAS, Tomsk, Russia
	G. Bleikher	Tomsk Polytechnic University, Tomsk, Russia
	O. Nozdrina	Tomsk Polytechnic University, Tomsk, Russia
	I. Egorov	Tomsk Polytechnic University, Tomsk, Russia
	K. Kostikov	Tomsk Polytechnic University, Tomsk, Russia
	E. Kulinich	Tomsk Polytechnic University, Tomsk, Russia
	N. Ketova	Tomsk Scientific Center SB RAS, Tomsk, Russia
	O. Ivanova	Tomsk Scientific Center SB RAS, Tomsk, Russia

## Conferences

20<sup>th</sup> International Symposium on High-Current Electronics

14<sup>th</sup> International Conference on Modification of Materials with Particle Beams and Plasma Flows

18<sup>th</sup> International Conference on Radiation Physics and Chemistry of Condensed Matter

3<sup>rd</sup> International Conference on New Materials and High Technologies

---

**6<sup>th</sup> International Congress on Energy Fluxes and Radiation Effects (EFRE 2018): Abstracts.** — Tomsk: Publishing House of IAO SB RAS, 2018. — 675 pp.

**Edited by:** Nikolay Ratakhin, Nikolai Koval, Alexey Yakovlev, Alexey Markov.

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.

The Congress was financially supported by FASO Russia and RFBR grants: 18-02-20100 (SHCE), 18-08-20066 (CMM), 18-03-20069 (NMHT), 18-38-10031 (School).

---

## DYNAMICS OF A POSITIVE STREAMER IN ATMOSPHERIC PRESSURE AIR IN A SHARPLY INHOMOGENEOUS FIELD UNDER THRESHOLD CONDITIONS FOR BREAKDOWN OF A GAP<sup>1</sup>

*M.I. LOMAEV\*\*\*, D.V. BELOPLOTOV\*, V.F. TARASENKO\*\*\*, D.A. SOROKIN\**

*\*Institute of High Current Electronics, Siberian Branch, Russian Academy of Sciences, 2/3 Akademicheskoy Ave., Tomsk, 634055, Russia, Lomaev@loi.hcei.tsc.ru, (3822) 492-392*

*\*\*National Research Tomsk State University, 36 Lenin Ave., Tomsk, 634050, Russia*

At present, much attention is paid to the study of a streamer forming at high overvoltage, whose transverse dimensions are comparable to the interelectrode distance [1 - 3]. The purpose of this work is to investigate by the method of high-speed four channel ICCD camera the formation of a streamer in a highly non-uniform electric field at threshold conditions for breakdown with simultaneous recording of the voltage at the gap and the dynamic displacement current caused by the redistribution of the electric field strength in the gap.

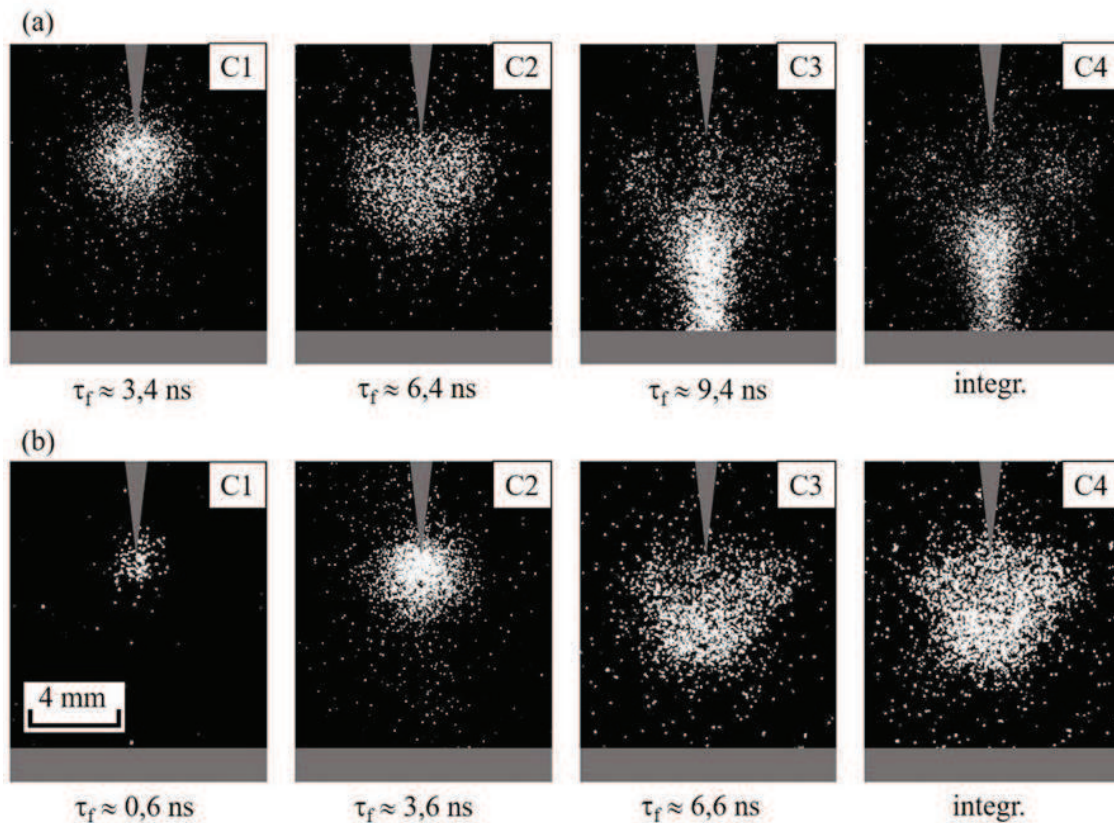


Fig. 1. Images of the streamer luminescence in atmospheric pressure air. (a) The case when the streamer crossed the gap during the voltage applying to the gap. (b) The case when the streamer did not cross the gap. C1, C2, C3, C4 - channel numbers of the ICCD camera.  $\tau_f$  is the time interval for which the glow was formed.

It is found that under these conditions a spherical streamer forms (Fig. 1). In the case of gap overlap the streamer transformed into a cylindrical one (Fig. 1a). The oscillograms of the dynamic displacement current, caused by the redistribution of the electric field intensity during the formation of the streamer, are registered. From the data obtained, the time variation of the electric field strength near the grounded cathode is determined.

### REFERENCES

- [1] *P. Tardiveau, L. Magne, E. Marode, K. Ouaras, P. Jeanney and B. Bournonville // Plasma Sources Sci. Technol. – 2016. – 25. 054005.*
- [2] *N.Yu. Babaeva, G.V. Naidis // IEEE Transactions on Plasma Science. – 2016. – 44. – 6. 899-902.*
- [3] *D.V. Beloplotov, V.F. Tarasenko, D.A. Sorokin, and M.I. Lomaev // JETP Letters. – 2017. – 106. – 10. 653–658.*

<sup>1</sup> This work was supported by the Russian Science Foundation (Project No. 17-72-20072).