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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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DIFFUSE DISCHARGE IN SF_6 AND ITS MIXTURES WITH H_2, D_2 AND C_2H_6 FORMED BY NANOSECOND VOLTAGE PULSES IN NON-UNIFORM ELECTRIC FIELD [1]

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Electronegative SF_6 gas is widely used in electrical installations as gas insulation [1]. s is due to its high electrical strength, which significantly exceeds the electrical strength of nitrogen and air. Volume self-sustained discharge in SF_6 with small additions (less than 10%) of different gases is used for various technological applications, in particular, in microelectronics for etching semiconductor materials [2]. Also a volume discharge in mixtures with SF_6 is used for excitation of non-chain chemical lasers on HF (DF) molecules.

Diffuse discharges formed in electrode systems with an inhomogeneous electric field (between blades, pins, etc.) when high-voltage pulses with short rise-time were applied was proposed to call Run-away Electron Preionized Diffuse Discharge (REP DD).

The aim of this work is to study parameters of REP DD in SF_6 and SF_6 with additives of other gases between two extended electrodes with a small radius of curvature.

It was shown that diffuse discharge can be formed in SF_6 at elevated pressure between blade electrodes with length of 30 cm (see Fig. 1). It was also confirmed that in a sharply non-uniform electric field a beam of run-away electrons is generated and that the gap breakdown occurs due to ionization waves which begin on electrodes with small radius of curvature.

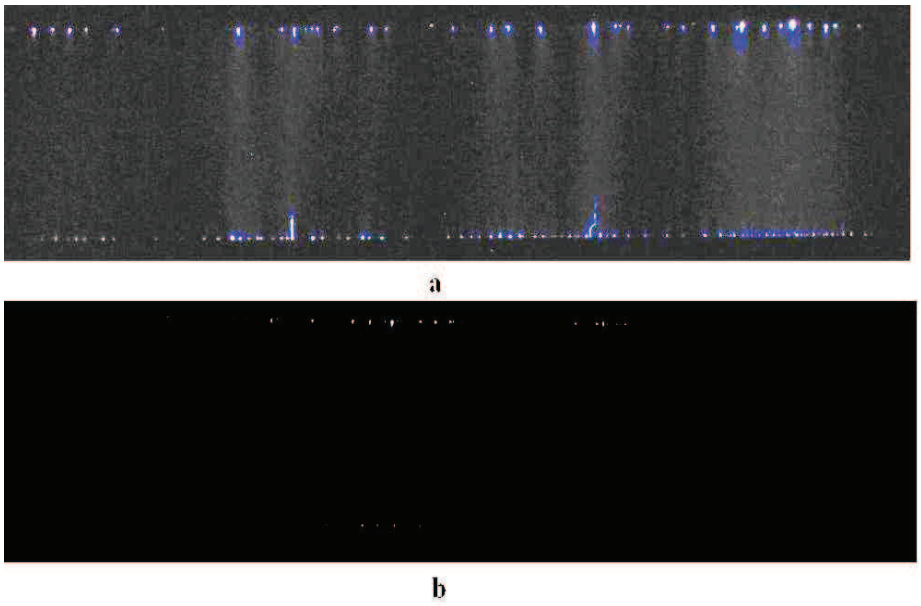

Fig. 1. Images of diffuse discharge in SF_6 obtained at pressure of 0.04 (a) и 0.05 МПа (b).

Laser action in the IR spectral region was obtained in SF_6 -$H_2(D_2)$ mixtures. The laser output up to 110 mJ was easily achieved which corresponds to ultimate intrinsic efficiency (with respect to deposited energy) of 10%.

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[1] The work is performed in the framework of the State task for HCEI SB RAS, project #13.1.4.