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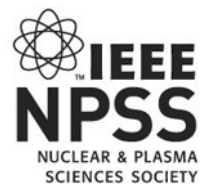
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This book comprises the abstracts of the reports (presentations) for the oral and poster sessions of VII International Congress on Energy Fluxes and Radiation Effects (EFRE-2020 online). Due to the unfavorable epidemiological situation associated with the COVID-19 pandemic, the Congress was held in a remote format using modern information technologies. The Congress incorporated together four international meetings: 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, and 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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THRESHOLD AND SPECTRAL CHARACTERISTICS OF THE ELECTRON-HOLE LIQUID CONDENSATION IN DIAMOND UNDER QUASISTATIONARY PHOTOEXCITATION¹

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Electron-hole liquid (EHL) is a condensed state of non-equilibrium charge carriers in semiconductors. EHL droplets condensation occurs when the temperature is lower and the charge carriers concentration is higher than some critical value, which is individual for every semiconductor material.

The development of high-power solid-state diamond switches would seem to have stopped due to a fundamental limitation – free excitons (FE) do not take part in electric field drift. However, the condensation of free excitons to the droplets of electron-hole liquid, which was detected in diamond at sufficiently high temperatures (up to 200 K) [1, 2] gives a chance for the use of diamond in high current electronics. EHL droplets have a surface charge and are involved in the drift. The speed of sound in diamond is high $\sim 2 \cdot 10^6$ cm/s. This value is an order of magnitude less than the saturated velocity of the carriers in the diamond.

In our experiments we used UV laser pulses with ns-range pulsewidth for creation of high charge carriers concentration, and liquid nitrogen cooling of the samples. The conditions of EHL droplets formation in diamond samples were determined for that case. Earlier, such like data was obtained mostly for femtosecond laser pulses.

Also we managed to demonstrate the effect of EHL droplets on the sample conductivity: in the presence of EHL the current through the sample was up to 2.5 times higher.

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- [2] Shimano R., Nagai M., Horiuchi K., Kuwata-Gonokami M. // Physical review letters. 2002. V. 88. No5. 057404.

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