

Abstract Submitted  
for the DPP09 Meeting of  
The American Physical Society

**Particle-in-cell simulations of electron transport in complex shape dc discharges**<sup>1</sup> ALEXANDER V. KHRABROV, IGOR D. KAGANOVICH, YEVGENY RAITSES, VLADIMIR I. DEMIDOV, DMYTRO SYDORENKO, PPPL — A region of dc discharge near cathode, or negative glow, exists in very nonequilibrium state. Three distinct groups of electrons play different roles in discharge self-organization [1]: 1) fast electrons from cathode produce ionization; 2) very cold trapped electrons make up the plasma density; and 3) intermediate electrons conduct the current. These non-equilibrium conditions provide considerable freedom to choose optimal plasma parameters for many applications by controlling electron energy distribution function (EEDF). The EEDF modification is achieved by making use of additional biased electrodes or cathode voltage forms in afterglow [2]. We have performed particle-in-cell simulations in 1 and 2D geometry to demonstrate possible control of EEDF. This work was supported by AFOSR through STTR contract.

[1] V. I. Kolobov and L. D. Tsendin, Phys. Rev. A **46**, 7837 (1992).

[2] V.I. Demidov, C.A. DeJoseph, and V. Ya. Simonov, Appl. Phys. Lett. **91**, 201503 (2007).

<sup>1</sup>This work was supported by AFOSR through STTR contract.

Igor Kaganovich  
PPPL

Date submitted: 15 Jul 2009

Electronic form version 1.4