Abstract Submitted for the GEC07 Meeting of The American Physical Society

Backscattering of secondary electrons to the cathode in the oblique electric field in dielectric barrier discharge systems. VLADIMIR KHUDIK, University of Toledo, JOEL PENDERY, Ohio State University, ALEXANDER SHVYDKY, University of Rochester, CONSTANTINE THEO-DOSIOU, University of Toledo — In contrast to electric field lines in gas discharge systems with bare electrodes, electric field lines in dielectric barrier discharge systems, where the cathode is covered with the dielectric layer, may cross the dielectric surface at an oblique angle. The secondary electrons emitted from this surface either return to the cathode due to collisions with background gas atoms or eventually escape from the region near the cathode. Using the diffusion P1-approximation to the kinetic equation for electrons, we have found analytically the electron escape factor k for different limiting cases. Monte-Carlo simulations of backscattering of electrons have been performed for noble gases and the dependence of the escape factor on the angle between the electric filed lines and the dielectric surface have been found. The analytical theory has been used to explain unexpected peculiarities in results of Monte-Carlo simulations.

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Date submitted: 15 Jun 2007

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