Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Simulation of High-Voltage DC Breakdown for Angled Dielectric Insulators including Space-Charge and Gas-Collision Effects[1] MANUEL ALDAN, University of California, Berkeley, JOHN VERBONCOEUR, Michigan State University — We report on 2D Particle-In-Cell (PIC) simulations of a semi-infinite, angled-dielectric Bergeron geometry with steady-state fields in background gas. The goal of this work is to develop the tools to predict and control breakdown under a wide range of parameters. We extend results in [1] with an improved PIC model [2], which includes the effects of space charge and particle distributions, enhanced secondary-emission modeling from metals and dielectrics [3], multiple electrodes, triple-point emission [4], and dielectric-surface outgassing. Breakdown voltage as a function of dielectric angle will be presented taking care to distinguish dominant effects in specific pressure regimes. Very low pressures (vacuum thru $\sim$100 mTorr) are dominated by multipactor avalanche while ionization and surface-charging at increased pressure (>1 Torr) drive space-charge-coupled oscillations.

[1] Jordan, N.M., et al., J. Appl. Phys., 102, 2007.
[2] Taverniers, S., et al., ICOPS 2009 Proceedings, 2009.
[3] Vaughan, J.R.M., IEEE Trans. Electron Dev., Vol. 36, No. 9, 1989, pp. 1963-1967.
[4] L. Schächter, Appl. Phys. Lett., Vol. 72, No. 4, pp. 421-423, 1998.

[1]This work is supported by an AFOSR grant on the Basic Physics of Distributed Plasma Discharges.

Manuel Aldan
University of California, Berkeley

Date submitted: 20 Jul 2012 Electronic form version 1.4