Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

The electron energy distribution of microscale field emission-driven Townsend discharges[1] YINGJIE LI, DAVID GO, University of Notre Dame — Attracted by the wide application potential of plasma-surface interactions, this work attempts to better understand the electron energy distribution (EED) of the free electrons in the discharge, which is critical in deciding the most favored type of electron-driven reaction. Particle-in-cell/Monte Carlo collision simulations are applied to study microscale Townsend discharges that can be formed in electrode gaps below 10 μm. Results show that the EED becomes non-continuous in this regime, generating several discrete peaks corresponding to specific inelastic collisions. The existence of these discrete peaks indicates that it is possible to enhance or eliminate certain types of reactions by manipulating the EED. The relative magnitude of these peaks and shape of the energy distribution can be controlled by both *pd* and the applied potential. *pd* dictates the number of inelastic collisions experienced by the emitted electrons, and the applied potential dictates the absolute maximum energy of the distribution. As shown in this work, at microscale dimensions, it is possible to control the energy distribution of free electrons to target specific, energy dependent gas-phase or surface reactions.

[1]Acknowledgement on AFOSR Award No. FA9550-11-1-0020

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Date submitted: 12 Jun 2013 Electronic form version 1.4