Abstract Submitted
for the GEC09 Meeting of
The American Physical Society

Characterization of Electrical Discharges inside the Electron Sheath YEONG-SHIN PARK, DA-HAE CHOI, Seoul National University, KYUNG-JAE CHUNG, Samsung Electronics Co., YONG-SEOK HWANG, Seoul National University — Electron sheath which occurs in front of a small positively biased electrode immersed in pre-existing plasma has been investigated by focusing on the onset voltages of the breakdown in the electron sheath. A model for electron sheath is established and thickness of the sheath is provided. The calculated electron sheath thickness is verified by Langmuir probe diagnostics and particle-in-cell simulation. Outbreak voltages of the breakdown in the electron sheath are gauged at various pressures and powers. Regarding the plasma as a cathode, biased electrode as an anode and electron sheath thickness as a discharge gap respectively, one-dimensional breakdown model is suggested. Applying Townsend's criteria of DC discharge to this breakdown model, a nonlinear equation for breakdown voltages is derived. Comparison of model-based numerical calculations to experimental results shows a good agreement between them.

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Date submitted: 19 Jun 2009 Electronic form version 1.4