Abstract Submitted
for the GEC09 Meeting of
The American Physical Society

Electrical characterization of Direct Current atmospheric pressure micro discharges using Radio frequency signal in Argon MONALI MANDRA, LAWRENCE OVERZET, MATTHEW GOECKNER, The University of Texas at Dallas, THIERRY DUFOUR, REMI DUSSART, PHILIPPE LEFAUCHEUX, GREMI Polytech d'Orleans — Parallel Micro Hollow Cathode discharges (MHCD) are fabricated in a sandwich structure as Nickel-Alumina-Nickel. 500 um thick, 3.5 inch alumina wafers are used as the dielectric between the 8 um thick Nickel films. A single micro cavity of 180 um diameter is laser drilled. An L-C tank circuit along with a matching network is used to super impose a small RF signal on the DC ignited micro discharge as a diagnostic tool. A simple equivalent circuit is used for analyzing the various key plasma parameters such as electron density, cathode sheath thickness, cathode sheath area and ion current density in the sheath by measuring the RF-impedance and capacitance of the micro-plasma. Reasonable results were obtained for argon DC micro-plasmas over a wide pressure range from 300 Torr to 1000 Torr and varying DC current. The sheath widths are found to vary slowly with pressure and are constant with DC current, while the electron density and sheath area both increase with current. These along with the IV characteristic of single hole MHCD are all consistent with what is expected for normal glow discharge regime. The technique and analysis results for argon micro-plasmas will be presented.

Monali Mandra
The University of Texas at Dallas

Date submitted: 15 Jun 2009 Electronic form version 1.4