Abstract Submitted
for the GEC07 Meeting of
The American Physical Society

Electrical and Optical Measurements in an RF-Driven Micro-Discharge Source C.M.O. MAHONY, University of Ulster, T. GANS, W.G. GRAHAM, Queen's University Belfast, P.D. MAGUIRE, University of Ulster, Z.LJ. PETROVIC, Institute of Physics Belgrade — Microdischarge properties are distinctly different to those of larger sources, leading to potential applications such as: high density tailored plasmas, local heating, fast material processing and scale up to large area sources. Hollow cathode operation is unlikely in micro-hollow cathode devices of diameter ≤ 100 μm[1] because short mean free paths inhibit pendular electron motion. Thus diameters as small as 10 μm may be required for HC operation, a critical stability challenge. We report radio frequency operation in micro-hollow cathode structures for diameters as small as 25μm. The sources are operated in argon and helium at pressures of 20 to 600 Torr and ignite readily at $\sim$20 W, operating stably at powers <10W. Measurements of breakdown characteristics, rf current and voltage and optical emission were recorded. A number of operating modes have been observed in these sub-100μm dimensions and OES of argon and helium discharges indicates there is less sputtering with helium. Positive dc bias has been observed in the cathode potential under rf operation, similar to that reported by Guo & Hong[2] at a diameter of 300 μm. [1] Kushner, J. Phys. D: Appl. Phys. 38 (2005) 1633 [2]Guo & Hong, Jpn. J. Appl. Phys. 42 (2003) 6598

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Date submitted: 15 Jun 2007 Electronic form version 1.4