

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Laser-Ablation Deposited Hafnium-Oxide Films for Triple Point Cathodes¹ RONALD GILGENBACH, NICHOLAS JORDAN, Y.Y. LAU, DAVID FRENCH, P. PENGVANICH, BRAD HOFF, MICHAEL ATZMON, University of Michigan — The triple-point is defined as the interface between metal, dielectric and vacuum; it provides a copious source of electrons for cold-cathodes. Pulsed-laser-deposition has been utilized to fabricate triple-point cathodes consisting of hafnium-oxide film-islands deposited over metal substrates. A 600 mJ, 20 ns KrF laser ablates a solid target of hafnium metal in a background gas of 20 percent O₂ and 80 percent Ar at 100 mTorr at 10-15 pps. Contact lithography is employed to fabricate arrays of Hf-oxide islands on substrates to maximize the area of triple points for electron emission. For materials analysis, the films are deposited on a Si substrate. Plasma plume diagnostics include gated optical emission spectroscopy; neutral and singly-ionized hafnium have been measured. Hafnium-oxide film diagnostics include XEDS, SEM, TEM, profilometry, ellipsometry and x-ray diffraction (XRD). Hafnium-oxide deposition rates are about 0.06 nm/pulse. Cathode experimental current results will be presented at -300 kV.

¹Research supported by AFOSR MURI on Cathodes & Windows for HPM and Applied Materials Corp.

Ronald Gilgenbach
University of Michigan

Date submitted: 03 Dec 2007

Electronic form version 1.4