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Metal-Oxide-Junction, Triple-Point Cathodes for High Current Vacuum Electron Devices[1] NICHOLAS JORDAN, RON GILGENBACH, Y.Y. LAU, BRAD HOFF, DAVID FRENCH, PHONGPHAETH PENGVANICH, University of Michigan, Nuclear Engineering and Radiological Science — Recent experiments at the University of Michigan have fabricated metal-oxide junction cathodes consisting of hafnium oxide coatings over stainless steel substrates. High dielectric constant HfO_X coatings are deposited by ablation-plasma-ion lithography using a KrF laser at 248 nm and 3-40 J/cm2 fluence. Experiments were performed on a relativistic magnetron driven by the Michigan Electron Long-Beam Accelerator at voltages of -300 kV, currents of 1-15 kA, and pulse-lengths of 0.3-0.5 ms. Experiments tested four patterned arrays of HfO2 islands on stainless steel cathodes. Three baseline comparison cases were run: fully dielectric coated, bare metal, and metal-only islands. Experimental data show initial peak currents for cathodes patterned with HfO_X islands, reached an average of 6 kA, 60% larger than uncoated cathodes. Current turn-on and rise time are also significantly faster for the patterned arrays of HfO_X.

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