Abstract Submitted
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Experimental measurements of electron emission uniformity from cold cathodes[1] XIN HE, VASILIOS VALAHOS, JOHN SCHARER, JOHN BOOSKE, SEAN SENGELE, University of Wisconsin, Madison, NICK JORDAN, RON GILGENBACH, University of Michigan, Ann Arbor — We report measurements of electron emission, including spatial uniformity, from cold field emission cathodes. The measurements are taken on a system designed to examine the nanophysics of field emission from advanced Al, W and CsI cathodes that operate in the 1-1000 A/cm^2 regime. Operation is for UHV vacuum (10^{-10} Torr) with bake-out up to temperatures of 450 C to eliminate residual water vapor or other contaminants. The current-voltage characteristics, field emission, work function, space charge effects and the Fowler-Nordheim coefficients are examined. Negative pulses of 0-20 kV and 1-5000 μs duration are applied between the cathode and anode to obtain the current-voltage characteristics. A linear translation stage is used to adjust the cathode-anode gap from 0-1.25 cm with a resolution of 0.025 mm. A small $\sim$4 mm^2 second "local anode" maps the spatial uniformity of the emission current density across the cathode surface. Measurements have been carried out on ALF (Ablation Line Focus) and knife edge Si-Ni cathodes. Additional tests will be accomplished on both single and multi-tip sharp tip/knife-edge cathodes to determine the interaction between local neighboring tips during electron emission.

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