Abstract Submitted
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A study of the physics of Miram curves[1] DONGZHENG CHEN, RYAN JACOBS, DANE MORGAN, JOHN BOOSKE, University of Wisconsin, Madison, YUE YING LAU, ABHIJIT JASSEM, University of Michigan, Ann Arbor — A Miram curve [1] is a plot of emitted current versus temperature for thermionically emitting cathodes. It has a knee where the current transitions from temperature- to space-charge-limited emission. A physics-based model to predict the Miram curve could help elucidate cathode surface physics during emission as well as assist microwave vacuum electronic device design and testing. This work shows that nonuniform emission from the edges of low(est) work function grains on the surface of a polycrystalline inhomogeneous cathode is likely responsible for the details of the smooth temperature-to-space-charge-limited emission transition. This insight is derived from a collaborative combination of experimental, theoretical, and computational modeling of the surfaces of tungsten dispenser cathodes [2,3]. [1] M. Cattelino, et al, 1982 International Electron Devices Meeting (IEEE, 1982) pp. 36-39. [2] D. Chen, et al, 2019 IEEE Int'l Vacuum Elec Conf (IEEE, 2019). [3] J. Petillo, et al, paper 8B3, IEEE Pulsed Power Plasma Sci Conf, Orlando, FL June 23-28, 2019.

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