

Abstract Submitted
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Experimental Study of the Influence of Surface Conditions on Explosive Electron Emission From a Pin Cathode¹ S.A. PIKUZ, T.A. SHELKOVENKO, D.A. HAMMER, Cornell University, E.V. PARKEVICH, I.N. TILIKIN, A.R. MINGALEEV, A.V. AGAFONOV, Lebedev Physical Institute — Most theories of Explosive Electron Emission are based on the idea of cathode flares developing after explosion of metal whiskers on the cathode surface. The spatial structure of the flare, its origin and the process of flare development are still a matter of conjecture. In this work we used picosecond duration high resolution laser probing and X-pinch point-projection X-ray radiography to directly observe whisker explosion in a high-current diode. Pin cathodes made from thin 5-25 μ m W, Cu or Mo wires were used as the load in return current circuits of hybrid X-pinch on the XP and BIN pulsers. Pin length, pin-anode gap and wire surface conditions were varied over a wide range. The diode current and voltage were measured. In experiments with small wire-anode gap (0.1–1 mm) development of the expanded dense core of the wire was observed except with lengths of 100-200 microns. Strong mitigation of the electron emission was observed in experiments with heated pins.

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