

FIELD EMISSION FROM LOW-WORK FUNCTION CATHODE COATINGS*

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We report experiments and analysis of field emission from copper knife-edge (CKE) cathodes, both bare and coated with low work function (2.6 eV) Lanthanum hexaboride (LaB₆) thin films. The bare CKE cathode exhibits evidence of space charge limited emission currents at high field strengths. The LaB₆ coated cathodes exhibit a nonlinear Fowler-Nordheim (FN) type emission. An intermediate saturation region is observed from field emission data, which is more prominent at elevated (185 C) temperature. Surprisingly, the LaB₆ coated cathodes are observed to emit less current than the higher work function (> 4 eV) bare CKE cathode. A hypothesis and corresponding model including both field emission and solid state electron transport from the Cu substrate, through the LaB₆ thin film, is proposed to explain the experimental observations.

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