Abstract Submitted
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Optical Studies of Sputtering in Magnetically Enhanced Helium Discharges[1] JAMES E. LAWLER, THOMAS J. FEIGENSON, Univ of Wisconsin, Madison, TIMOTHY J. SOMMERER, DAVID J. SMITH, JASON TROTTER, STEVEN C. ACETO, General Electric Research, Niskayuna, NY — A cold-cathode gas-discharge switch for the electric power grid must operate at the highest possible current density to be competitive. Magnetic enhancement, similar to that of a magnetron sputtering discharge, achieves current densities far above the classic "normal" cold-cathode fall current density. One of two physical mechanisms, power dissipation or sputtering, is likely to limit the ultimate current density of a magnetically enhanced device. Using forced cooling a power dissipation density of about 1 kW/cm^2 should be achievable. This corresponds to a current density of 5 A/cm^2 assuming a 200 V cathode fall. Sputtering can be much reduced using a light buffer gas such as hydrogen or helium. We are studying the transition to 'metal mode' operation in such discharges. Metal mode is often described as a current density at which lines of sputtered metal dominate buffer gas lines in the emission spectrum. Preliminary results in a magnetically enhanced discharge operating in the A/cm^2 range with helium buffer gas over some cathode materials are presented.

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