Abstract Submitted
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Optical diagnostics of sputtering in magnetically enhanced high-current discharges[1] DAVID SMITH, STEVEN ACETO, JASON TROTTER, TIMOTHY SOMMERER, GE Research, Niskayuna, NY, JAMES LAWLER, University of Wisconsin-Madison, Madison, WI — We have investigated a gallium-based liquid cathode for use in a high-voltage, high-power gas switch for grid-scale electric power conversion. The cathode requirements include conduction of high current density (1-10 A cm^{-2}), preferably at low voltage, along with minimal loss by evaporation and/or sputtering. The approach to satisfy these criteria has been to operate with a modified commercial magnetron system at high pressure where the choice of working comprises the light elements, such as hydrogen or helium. A separate anode is used to form a plane-parallel geometry. We have demonstrated pulsed operation with current densities exceeding 2 A cm^{-2} and voltages below 200 V, over a pressure range of 50-800 mTorr. The sputtering rate on gallium and other cathode materials has been estimated for various plasma conditions using a line ratio emission spectroscopy diagnostic based on analysis of the radiation trapping.

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