

Abstract Submitted
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Comparison of Fabrication Techniques for Micro-Scale Spark Gap Plasma Switches¹ MATTHEW BURNETTE, DAVID STAACK, None — Microplasma spark gaps with 2D geometries were fabricated by two techniques on alumina, first using photolithography and metal sputtering with thicknesses of hundreds of nanometers, and second using thermal-spray several microns thick, but with lower feature resolution. Several high temperature metals were tested as electrode material for the microplasma device, including tungsten and chromium; however the chromium samples were not robust enough, eroding away too quickly for extensive testing. Scanning electron microscope (SEM) images were taken before and after testing to determine the wear on the samples. The sputtered tungsten thin films and thermal-spray deposited nickel films on alumina were compared after testing in 1 atm of helium running for one hour at a current of 1 mA. Slight wear and discoloration were noted on the anodes, yet significant erosion occurred on the cathodes; no wear was noted on the alumina. The thermally-sprayed nickel sample had the least wear, while the thin tungsten sample had the most wear. Discoloration was also seen on the nearby floating-voltage electrodes despite not being a part of the circuit, most likely due to heating. As the electrodes eroded, the plasma attachment point moved unpredictably.

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