Abstract Submitted for the 4CF12 Meeting of The American Physical Society

Electrostatic Discharge Properties of Fused Silica Coatings<sup>1</sup> ALLEN ANDERSEN, CHARLES SIM, J.R. DENNISON, USU Materials Physics Group — The electric field value at which electrostatic discharge (ESD) occurs was studied for thin coatings of fused silica (highly disordered SiO2/SiOx) on conductive substrates, such as those encountered as optical coatings and in Si microfabrication. The electrostatic breakdown field was determined using an increasing voltage, while monitoring the leakage current. A simple parallel-plate capacitor geometry was used, under medium vacuum and at temperatures down to  $\sim 150$  K using a liquid N2 reservoir. The breakdown field, pre-breakdown arcing and I-V curves for fused silica samples are compared for  $\sim 60$  nm and  $\sim 80 \ \mu m$  thick, room and low temperature, and untreated and irradiated samples. Unlike typical I-V results for polymeric insulators, the thin film silica samples did not exhibit pre-breakdown arcing, displayed transitional resistivity after initial breakdown, and in many cases showed evidence of a second discontinuity in the I-V curves. This diversity of observed discharge phenomena is discussed in terms of breakdown modes and defect generation on a microscopic scale.

<sup>1</sup>This work was supported through funding from NASA Goddard Space Flight Center.

Allen Andersen USU Materials Physics Group

Date submitted: 20 Sep 2012

Electronic form version 1.4