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Recommended Citation

Sam Hansen, JR Dennison, and Allen Andersen, "Electrostatic Discharge Breakdown Analyses," Utah State University Student Showcase, Logan, UT, April 11, 2014.

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Spring 2014
Utah State University
Student Showcase



*Utah State University
Logan, UT
April 11, 2014*

Electrostatic Discharge Breakdown Analyses

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Abstract

Electrostatic discharge (ESD) and the associated material breakdown is the primary cause for spacecraft damage due to space environment interactions. This phenomenon occurs when the space plasma fluxes charge a craft to high voltages where insulating materials then break down and conduct current. This can damage or destroy onboard electrical systems. This project deals with how suspect materials break down under high voltage exposure. The USU Material Physics Group has acquired hundreds of samples that underwent ESD. The ESD damage sites of these samples have been analyzed for parameters including breakdown size, shape, coloring, and location and material characteristics such as thickness and polymer type. The results have been recorded in an *ESD Quality Summary Table*. Initial trends within this data set are being identified and sorted within the matrix based on experimental parameters and material type in order to locate trends. Information that we have already found; as well as correlations which we hope to find, will aid in predicting which materials are best suited for use in high voltage scenarios.