

Abstract Submitted
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Temperature and Endurance Time of Electrostatic Field Strengths of Polymeric Spacecraft Insulators CHARLES SIM, ALEC SIM, J.R. DENNISON, Utah State University, Department of Physics — The electrostatic breakdown of polymeric materials is important in the design and lifetimes of power line, spacecraft, computational systems, and electronic military components. The key parameters in determining material lifetime include the applied temperature and electric field and the material parameters (Gibbs free energy and density of states). This study measures the endurance time to breakdown under an applied static electric field for low density polyethylene (LDPE) as a function of field strength and temperature. Using a custom high vacuum chamber, well characterized ramping procedures and temperature control, the time to breakdown is accurately determined for endurance times ranging from 10^0 s to 10^5 s. The measured endurance time data for LDPE has been fit with a new theoretical formalism that describes a transition between two established theories based on recoverable and irrecoverable defect formation.

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