Abstract Submitted
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**Temperature-Dependent Radiation Induced Conductivity of Diverse Highly Disordered Insulating Materials**[1] J.R. DENNISON, GREGORY WILSON, Utah State University — Incident high energy electron radiation deposits energy in highly disordered insulating materials, exciting electrons from localized trap states into the conduction band, thereby enhancing the radiation induced conductivity (RIC) of these extremely poor conductors. RIC depends on the power deposited in the material and sample temperature, through the details of the energy density of disordered states within the band gap. We compare RIC measurements from 30 K to 300 K for two materials—polymeric polyimide (Kapton) and glassy fused silica ($SiO_2/SiO_x$)—that exhibit different temperature dependence and response as the electron beam is turned on and off. A simple theory for RIC, based on thermally-assisted hopping conductivity, is presented to explain the observed differences in terms of constant, exponential and Gaussian densities of disordered states. We also discuss the differences seen which result from the use of very high energy (10's MeV) penetrating radiation (which deposits primarily energy in the thin samples) and high energy (100's keV) nearly-penetrating radiation (which deposits both energy and some charge in the materials).

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