

Abstract Submitted
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Temperature Dependence of SiO₂ Electron-Induced Luminescence AMBERLY EVANS, GREGORY WILSON, J.R. DENNISON, Utah State University — SiO₂ (fused quartz) is commonly used for optical instrumentation in space telescopes, including low temperature IR telescopes, where it can be exposed to electron fluxes from the space plasma environment. During recent charging tests of this dielectric material, a discernable glow was detected emanating from the surface of the SiO₂, indicating that the incident electron beam induced a luminescent effect. As the sample cooled from 300 K to 120 K, a change in the energy spectrum and intensity of the glow was observed between 250 nm to 1700 nm, implying that the luminescent property is temperature dependent. Luminescence results from transitions between extended conduction states and localized states below the mobility edge resulting from structural defects. Temperature dependent luminescence, including changes in relative peak intensities, results from changes in trap state population, accessible trap states, and transition states. Our observations are discussed in context with previous results of similar phenomenon and with simple models of disordered band theory. This work was supported by funds from NASA Goddard Space Flight Center.

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