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Density of State Models of Steady-State Temperature Dependent Radiation Induced Conductivity[1] JODIE GILLESPIE, JR DENNISON, Utah State Univ, ALEC SIM, Irvine Valley College — Radiation induced conductivity (RIC) occurs when incident radiation deposits energy and excites electrons into the conduction band of insulators. The magnitude of the enhanced conductivity is dependent on a number of factors including temperature and the spatial- and energy-dependence and occupation of the materials distribution of localized trap states within the band gapor density of states (DOS). Expressions are developed for steady-state RIC over an extended temperature range, based on DOS models for highly disordered insulating materials. A general discussion of the DOS of disordered materials can be given using two simple distributions: one that monotonically decreases below the band edge and one that shows a peak in the distribution within the band gap. Three monotonically decreasing models (exponential, power law, and linear), and two peaked models (Gaussian and delta function) are developed, plus limiting cases with a uniform DOS for each type. Variations using the peaked models are considered, with an effective Fermi level between the conduction mobility edge and the trap DOS, within the peaked trap DOS, and between the trap DOS and the valence band. Explicit solutions, limiting cases, and applications of the models to RIC measurements are presented.

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