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Electron Energy Dependent Charging Effects of Multilayered Dielectric Materials GREGORY WILSON, AMBERLY EVANS, J.R. DENNISON, Utah State University — Measurements of the charge distribution in electron-bombarded, thin-film, multilayer dielectric samples showed that charging of multilayered materials evolves with time and is highly dependent on incident energy; this is driven by electron penetration depth, secondary electron emission and material resistivity. A thin film SiO_2 structure with a conductive middle layer was charged by bombardment using a 200 eV to 5 keV electron beam with regular 15 s pulses at 1 nA/cm^2 to 500 nA/cm^2. Measurements of the surface potential, displacement current and the beam energy allow the charge distribution to be inferred based on the net surface potential's dependence on electron range, beam current and secondary electron emission. Results are shown to be consistent with simple models, using previous results of electron range, yields and resistivity. Large negative net surface potentials led to electrostatic breakdown and large visible arcs which have been observed to lead to detrimental spacecraft charging effects. The project was funded by a grant from NASA Goddard Space Flight Center.

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