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Low energy electron irradiation induced charging of dielectric materials: measurements and analyses.

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Charging of dielectric materials under electron irradiation is a commonly encountered problem in many space applications. Spacecraft charging due to solar and cosmic radiations may lead to critical discharge phenomenon. Indeed, under irradiation (especially electron irradiation), insulators as well as floating conductors may charge negatively or positively depending on the incident electron properties (energy, incidence angle , flux) and on the specific material properties (composition, surface roughness, contamination, temperature, etc.) The knowledge of the electrical properties electron emission yield, conductivity and radiation induced conductivity) under electron irradiation for each material of the spacecraft is needed for spacecraft plasma interaction software. The aim of our contribution is to present the results of charging proprieties (magnitude and kinetic) under low incident electrons energy (from few eV to keV) for Teflon and alumina. The energy distribution of the emitted secondary and backscattered electrons was measured dynamically with the help of high speed hemispherical electron energy analyzer. The evolution of the surface potential of the irradiated sample was derived from the energy shift of the secondary electron pic.

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