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Quantifying Materials Surface Conditions Through Secondary Electron Yield Measurements[1] PHIL LUNDGREEN, JR DENNISON, Utah State University — Secondary electron yields (SEY) are heavily influenced by surface conditions, including roughness, oxidation, and contamination. For common elemental conducting materials such as Cu, numerous yield measurements found in the literature are found to vary significantly. In an effort to categorize and characterize variations in these studies parameters for an empirically-based model of SEY curves written in a reduced format for yield, $\delta(E)/\ \delta_{max}$, versus incident energy, E/E_{max} have been employed. The four SEY fitting parameters of interest include the maximum yield, δ_{max} at energy, E_{max} and the exponents for power-law behavior at low and high energy limits. Evaluation of numerous yield measurements from prior studies gathered in the form of a user-friendly SEY database show discernible correlations between the parameters and these surface conditions. Establishing such trends allow for semi-quantitative predictions of Cu under varying surface conditions. Knowledge of how SEY will vary for different technical materials used in spacecraft construction, plasma devices, or other applications and how these materials' surface conditions evolve with prolonged exposure to extreme environments can increase modeling accuracy of electron emission and system charging. Specifically, applications for the survivability of spacecraft in the space environment over mission lifetimes are discussed.

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