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Approximation of Range in Materials as a Function of Incident Electron Energy GREGORY WILSON, J.R. DENNISON, Utah State University — The range, or maximum distance an electron of a given incident energy can penetrate through a material before all kinetic energy is lost and the electron comes to rest, is a common way to parameterize electron interactions with materials. We have developed a simple composite analytic expression to approximate the range, R using standard materials properties (e.g., density, atomic number, atomic weight, stochiometry). This is accomplished by fitting tabulated values from the NIST ESTAR database with well established relativistic semi-empirical models for the high energy range (greater than 30 keV) and relating this to the NIST IMFP (inelastic mean free path) database for lower energy ranges (less than 10 meV) by using the continuous slow down approximation (CSDA). The resulting function is valid for most conducting, semiconducting and insulating materials using a single fitting parameter and represents a large increase in estimated range extending over more than seven orders of magnitude in energy (approximately 3 eV to 10 MeV) and range (1 nm to 1 cm), with uncertainty of less than approximately 20 percent.

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