# Stimulated Electron Desorption Studies from Microwave Vacuum Electronics / High Power Microwave Materials

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Abstract

The materials and the environment contained in high power microwave devices play an important role in design efficiency and optimization. Gas desorption, secondary electron emission, high material vapor pressures, poor material quality, electron and photon induced outgassing, and material breakdown challenges the state of the art in developing higher energy, higher frequency devices. Ultra high vacuum environments and good vacuum techniques reduce some of these challenges. Materials with surface and bulk composites can be a limiting factor. Electron stimulated electron desoption yielding secondary electron emission, combination of true secondary electrons and backscattered electrons, is to be examined both experimentally and computationally. The UNLV secondary electron emission test stand measures the evolution of the spatial distribution of secondary electrons driven by a very low current, moderate energy, pulsed primary electron beam. The affects of contaminants, coatings and composites, and thermal gradients coupled to secondary electron emission will be investigated. Basic science issues on energy deposition in the medium and its affect on the surface properties are to be examined. With the aid of a secondary electron emission Monte Carlo code, experimental studies are to be modeled and compared. Projected code enhancements will allow for the modeling of complex material composites and geometries encountered in experimental studies. Results are to be compared with research efforts at the University of New Mexico, the Naval Research Laboratory, and the Air Force Research Laboratory where unique complementary experiments are being conducted.