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Experimental Measurements and First Principles Modeling of Secondary Electron Yield of Materials of Interest to High Power Vacuum Electron Devices[1] TALAL AHMED MALIK, MARK GILMORE, SALVADOR PORTILLO, RAUL ENRIQUE GUTIERREZ, University of New Mexico, MACIEJ POLAK, University of Wisconsin, RYAN JOHNSON, IVANA MATANOVIC, University of New Mexico, DANE MORGAN, University of Wisconsin, EDL SCHAMILOGLU, University of New Mexico — Multipactor breakdown (MPB) is a RF breakdown phenomenon that decreases the overall efficiency of high power RF systems operating in vacuum. In worst case scenario, MPB might also lead to complete failure of the device. Among other factors, secondary electron emission (SEE) from device electrodes in synchronism with E-field oscillations forms the important basis for triggering MPB. Therefore, minimizing SEE is important in improving RF vacuum device performance. This presentation will show the results of secondary electron yield (SEY) measurements in the low energy regime (10 eV to 1000 eV) for the materials of interest to space electronic system, including copper, aluminum 6061 and silver. In addition, different surface treatment methods adopted in this study to suppress SEY will be shown. Furthermore, simulations of copper SEY will be presented. Electronic structure properties of copper were first calculated using Exciting code after which the SEY curve was obtained from Monte Carlo simulations using MAST-SEY code. This approach is unique as it uses momentum dependent energy loss functions from density functional theory, and the prediction of SEY is made entirely from the first principles.

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