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Electron Emission from Nano and Microstructured Materials for Fusion and Plasma Discharge Applications[1] MARLENE PATINO, University of California, Los Angeles, YEVGENY RAITSES, Princeton Plasma Physics Laboratory, RICHARD WIRZ, University of California, Los Angeles — Secondary electron emission (SEE) from plasma-facing walls can lead to adverse effects (e.g. increased plasma heat flux to the wall) in plasma devices, including plasma processing, confinement fusion, and plasma thrusters. Experimental and computational efforts of engineered materials with nm to mm-sized structures (grooves, pores, fibers) have previously shown a decrease in SEE for primary electrons incident normal and oblique to the material. Here we present SEE measurements from one such engineered material, carbon velvet with μm fibers, and from a plasma-structured material, tungsten fuzz with nm fibers. Results show two trends: (a) significant reduction in SEE at normal incidence for carbon velvet (75% reduction) and tungsten fuzz (40-50% reduction) over smooth graphite and tungsten, respectively, and (b) SEE from tungsten fuzz is nearly independent of incident angle (i.e. not a cosine dependence on incident angle observed for smooth materials). Hence, the reduction in SEE from tungsten fuzz over smooth tungsten is more pronounced (up to 63%) at grazing angles. This is important for many plasma devices since in a negative-going sheath the potential structure leads to relatively high incident angles.

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