Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

Electron Emission from Nano and MicroStructured Materials for Plasma 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-confining 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. Reduction in SEE from engineered materials with nm to mm-sized structures (grooves, pores, fibers), has been previously observed for primary electrons incident normal to the material. Here we present SEE measurements from one such engineered material, carbon velvet with microfibers (5 μm diameter, 1-2 mm length), and from a plasma-structured material, tungsten fuzz with nm fibers (35-50 nm diameter, 100-200 nm length). Additionally, dependence of SEE on incident angle was explored for tungsten fuzz. Results for carbon velvet and tungsten fuzz at normal incidence show 75% and 50% decrease in total yield from smooth graphite and tungsten, respectively. More notable is the independence of SEE on the incident angle for tungsten fuzz, as opposed to inverse cosine dependence for smooth materials. Hence, the reduction in SEE from tungsten fuzz is more pronounced at grazing angles. This is important for plasma-facing materials where a retarding plasma sheath leads to increased likelihood of plasma electrons impacting at grazing angles.

[1]This work was supported by DOE contract DE-AC02-09CH11466; AFOSR grants FA9550-14-1-0053, FA9550-11-1-0282, AF9550-09-1-0695, and FA9550-14-10317; and DOE Office of Science Graduate Student Research Program.

Marlene Patino
University of California, Los Angeles

Date submitted: 10 Jun 2016 Electronic form version 1.4