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Surface Micro- and Nano-Architectured Materials for Plasma Micropropulsion

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Micro- and nano-engineered materials with surface architecture were proposed for the reduction of secondary electron emission, which is unwanted phenomenon for various plasma and non-plasma applications, including but not limited to Hall thrusters, multipactor discharges, particle accelerators etc. In this talk, I will review effects of secondary electron emission on plasma-wall interaction and performance of plasma devices. We will also discuss results of recent measurements and models of the secondary electron emission from surface architectured materials featuring low and high aspect ratio fibers and protrusions such as carbon velvet (**Figure 1**, upper panel) and tungsten fuzz (**Figure 2**, lower panel). The main physical mechanism by which the effective secondary electron emission from these materials is reduced as compared to the same bulk materials with planar surfaces is by trapping secondary electrons within their structured surfaces. Possible applications of these engineered materials for microplasma propulsion will be also discussed.

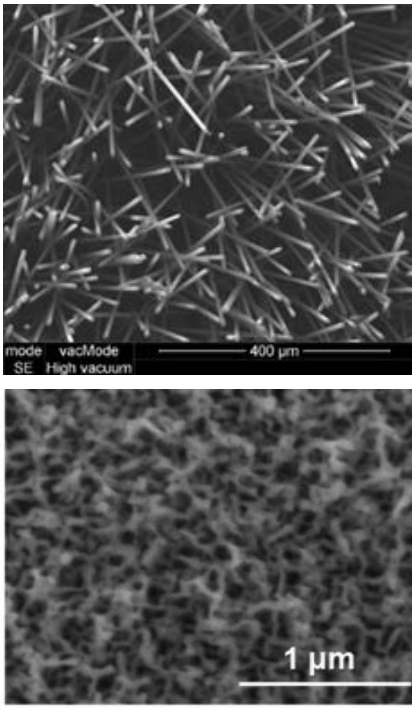

Figure 1. SEM micrographs of micro-structured carbon velvet (top) and nano-structured tungsten-fuzz (bottom)

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