Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

The role of lithium thin-film coatings on W surface morphology evolution under high-fluence and high temperature He irradiation[1] A.L. NEFF, University of Illinois, Urbana IL, J.P. ALLAIN, University of Illinois; Micro and Nanotechnology Center, University of Illinois, K. BYSTROV, T.W. MORGAN, FOM Institute DIFFER, Partner in the Trilateral Euregio Cluster, The Netherlands — Tungsten is the candidate plasma-facing component material for the ITER divertor due to its high sputter threshold, high melting temperature, and excellent thermal conductivity. However, when exposed to He ions with E = 0.01-1.0 keV and high fluences $>10^{26}$ m^{-2} [1], as those expected in a burning plasma fusion tokamak divertor, the damage to the surface can include the creation of bubbles, holes and tendril-like fuzz morphology. Recent studies show that adding low-Z impurities (C and Be) to a He plasma can inhibit the growth of fuzz. In other applications, lithium (Li) as a PFC coating in multiple tokamaks has improved plasma performance, yet its interaction with high-Z materials (i.e. W) and its role inhibiting fuzz formation is not well understood. We investigated the effect of a thin ∼1000 nm Li coating on formation of W surface defect morphology under high fluence and temperature conditions. Samples were exposed with fluxes of $\sim 10^{24}$ $m^{-2}s^{-1}$ and T_{surf} ∼1100 °C. After irradiation, the surfaces of the samples were characterized with SEM. These results are presented along with XPS and SIMS results elucidating the persistence of Li coatings under these conditions. [1]O. El-Atwani, et al., Nucl. Fusion 54 (2014) 083013.

[1]Work supported by US DOE Contract Nos. DC-SC0010717 and DC-SC0010719

Anton Neff
University of Illinois, Urbana IL

Date submitted: 24 Jul 2015 Electronic form version 1.4