Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Surface morphology changes to tungsten under exposure to He ions from an electron cyclotron resonance plasma source[1] DAVID DONOVAN, ANURAG MAAN, JONAH DURAN, University of Tennessee-Knoxville, DEAN BUCHENAUER, JOSH WHALEY, Sandia National Laboratory — Exposure of tungsten to low energy (<100 eV) helium plasmas at temperatures between 900-1900 K in both laboratory experiments [1] and tokamaks [2] has been shown to cause severe nanoscale modification of the near surface resulting the growth of tungsten tendrils. We used a relatively low flux (2.5×10^{19} ions m^{-2} s^{-1}) compact ECR plasma source at Sandia-California to investigate the early stages of helium induced tungsten damage. Exposures of polished tungsten discs were performed and characterized using SEM, AFM, and FIB cross section imaging. Bubbles have been seen on the exposed tungsten surface and in sub-surface cross sections growing to up to 150 nm in diameter. Comparisons were made between exposures of warm rolled Plansee tungsten discs and ALMT ITER grade tungsten samples. A similar He plasma exposure stage has now been developed at the University of Tennessee-Knoxville with an improved compact ECR plasma source. Status of the new UTK exposure stage will be discussed as well as planned experiments and new material characterization techniques (EBSD, GIXRD).

[1] M.J. Baldwin, R.P. Doerner, J. Nucl. Mater. 404 (2010) 165.
[2] G.M. Wright, et al, Nucl. Fusion 52 (2012) 042003.

[1]Work supported by US DOE Contract DE-AC04-94AL85000 and the PSI Science Center.

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Date submitted: 22 Jul 2015 Electronic form version 1.4