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Depth profiles of Helium and Deuterium in tungsten "fuzz" using Elastic Recoil Detection KEVIN WOLLER, DENNIS WHYTE, Plasma Science and Fusion Center MIT — The structure of the surface region of tungsten plasma facing components changes when subjected to helium (He) plasmas and material temperature >1100 K. The micron-sized highly porous nano-tendril structure is termed tungsten "fuzz." These changes are potentially detrimental to the performance of tungsten in D-T fusion devices. The morphological evolution of the fuzz is not understood but experimental results indicate that the fuzz grows in depth with He fluence. Elastic Recoil Detection (ERD) has been used for the first time to measure the concentration of the plasma species (He and hydrogen/deuterium) with respect to the W density as a function of depth perpendicular to the surface. ERD was performed on tungsten samples that have been exposed to helium plasma with varying material temperatures and exposure times. The results suggest that the percent atomic concentration of helium is saturated at a very high level, ∼0.5% He/(He+W), and is constant throughout the measureable "fuzz" depth, even with exposure temperatures >1800 K. The implications of these measurements are discussed. Supported by US DoE award DE-SC00-02060.

Kevin Woller
Plasma Science and Fusion Center MIT

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