Abstract Submitted
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In-situ **synergistic D/He irradiation studies of Lithium coated commercial and multimodal Tungsten and nano-composite Li-W thin films**[1] ANTON NEFF, JEAN PAUL ALLAIN, OSMAN EL-ATWANI, CHASE TAYLOR, YOUSUNG HAN, MING GAN, VIKAS TOMAR, Purdue University, ASHISH SINGH, SANDIP HARIMKAR, Oklahoma State University — Because of their high melting temperature and resistance to sputtering, refractory metals, such as W or Mo, are an attractive wall material for burning plasma devices like fusion tokamaks. For example, the current plan for ITER is to use a pure W divertor. However the refractory metals can result in damage (i.e., hardening, blistering, embrittlement, nanostructuring, etc) due to low-energy irradiation by hydrogen and helium. These effects could potentially allow high Z particles to enter the fusion plasma and extinguish it. Three potential methods of preventing the irradiation-induced damage are investigated: increasing the density of the grain boundaries via ultra-fine multimodal grained tungsten, using lithium as a coating material, and creating W-Li nano-composite thin films. Hydrogen, helium, and synergistic D/He irradiations were performed in PRIHSM at Purdue University, up to fluences of $\sim 10^{17}$ cm^{-2}, energies between 100-1000 eV, and temperatures from room temperature up to 300 $^{\circ}$C, while monitoring in situ the sputtering rate and the surface evolution using XPS. Other surface characterizations were performed using SEM and AFM.

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