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Surface analysis of retention and lithium wetting of Molybdenum[1]

C.H. SKINNER, A.M. CAPECE, P.P.P.L., J.P. ROSZELL, B.E. KOEL, Princeton Univ. — A quantitative understanding of the adsorption and retention of deuterium by lithium-conditioned materials is needed to optimize the performance of Li-PFCs, especially for the long duration discharges anticipated in NSTX-U. For liquid Li PFCs, wetting by Li of the substrate is a key factor in the design. We report UHV surface science experiments on these topics. The effects of impurities and grain boundaries in TZM is shown by comparing single crystal Mo substrates to Mo alloy (TZM). The substrate is coated with a known monolayer-scale thickness of Li and exposed to D thermal neutrals and ions from 5 eV to 500 eV with controlled amounts of residual vacuum gases. The surface composition is measured with Auger electron spectroscopy and D uptake by thermal desorption spectroscopy. Microscale wetting of stainless steel and TZM by lithium will be measured by Auger elemental microimaging. The results will connect atomistic surface science models to plasma surface interactions expected in tokamaks.

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