Abstract Submitted
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Erosion and re-deposition of lithium coatings on graphite and TZM molybdenum in support of NSTX-U divertor operations[1] TYLER ABRAMS, M.A. JAWORSKI, R. KAITA, D.P. STOTLER, Princeton Plasma Physics Laboratory, G. DE TEMMERMAN, M.A. VAN DEN BERG, H.J. VAN DER MEIDEN, T.W. MORGAN, FOM-DIFFER — It is expected that lithium films applied to graphite and TZM molybdenum tiles in NSTX-U will persist significantly longer than calculated from gross erosion rates due to prompt re-deposition. The time evolution of Li coatings on these substrates is being studied in Magnum-PSI, a linear plasma device capable of ion fluxes up to 10^{25} $m^{-2}s^{-1}$ at electron temperatures <5 eV. A series of 2-7 s plasma exposures at normal magnetic incidence were run on bare samples of each substrate then repeated after a deposition of 100-1000 nm of Li. During discharges on Li-coated graphite, Li-I emission begins decreasing after only five seconds. This indicates that rapid diffusion of Li into the bulk graphite substrate may be occurring. In contrast, emission from Li-coated TZM Mo persists for >30 s. The total Li erosion fluence from the sample φ_{Li} was calculated and compared to the areal density of Li on the sample ρ_{Li} to estimate the re-deposition fraction $R = 1 - \rho_{\mathrm{Li}}/\varphi_{\mathrm{Li}}$. Initial calculations from experimental data indicate that R >0.85 for Li-coated TZM Mo at the center of the plasma column. An analytic/numerical model is in development to simulate the dominant mechanisms of particle loss and gain from thin Li films in the presence of plasma bombardment, the results of which will be presented.

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