Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Measurements of the Absorption of Atmospheric Gases in Bulk Lithium Metal using a Mass Balance[1] CONNOR A. HART, University of Maryland, College Park, CHARLES H. SKINNER, ANGELA M. CAPECE, Princeton Plasma Physics Laboratory, BRUCE E. KOEL, Princeton University — Lithium conditioning of plasma facing components has enhanced the performance of several fusion devices. However, metallic lithium is very reactive and it is important to quantify the processes leading to the passivation of lithium upon exposure to air. Passivation, as used here, refers to the absorption of atmospheric gases by lithium to ultimately form lithium species including lithium hydroxide, carbonate, and oxide. The current work uses a mass balance with microgram sensitivity to measure the mass gain during the absorption of atmospheric gases by bulk lithium. Metallic lithium films with thicknesses of 0.3 and 1.0 mm are exposed to humid air as well as dry synthetic air at atmospheric conditions in order to reproduce the environment of a tokamak exposed to air during maintenance activities and venting. The data yield the reaction rates and interdiffusion of these lithium species as functions of thickness and time. These results provide critical insight into the chemical state of a lithiated surface after air exposure. In addition, the depth of passivation versus time is of interest in determining the length of exposure required to completely passivate a lithium layer of a given thickness, making it safe to handle.

[1]Science Undergraduate Laboratory Internship funded by Department of Energy

Connor Hart
University of Maryland, College Park

Date submitted: 11 Jul 2014 Electronic form version 1.4