

Abstract Submitted  
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**Lithium vapor trapping at a high-temperature lithium PFC diver-  
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FOM-DIFFER — Liquid lithium has been proposed as a novel plasma-facing mate-  
rial for NSTX-U and next-step fusion devices but questions remain on the ultimate  
temperature limits of such a PFC during plasma bombardment. Lithium targets  
were exposed to high-flux plasma bombardment in the Magnum-PSI experimental  
device resulting in a temperature ramp from room-temperature to above 1200°C. A  
stable lithium vapor cloud was found to form directly in front of the target and per-  
sist to temperature above 1000°C. Consideration of mass and momentum balance in  
the pre-sheath region of an attached plasma indicates an increase in the magnitude  
of the pre-sheath potential drop with the inclusion of ionization sources as well as  
the inclusion of momentum loss terms. The low energy of lithium emission from a  
surface measured in previous experiments ( $< 1\text{eV}$ ) is conducive to trapping within  
this modest potential well. The scale length derived from the ionizing pre-sheath  
model of 3mm is consistent with the observed neutral lithium emission found in the  
experiment. The strong trapping inferred from the lifetime of the coating indicates  
previously calculated temperature limits for lithium PFCs need to be re-evaluated.

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