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Characterization of Liquid Lithium Wetting and Thermoelectric Properties for Nuclear Fusion Applications PETER FIFLIS, WENYU XU, MICHAEL CHRISTENSON, DANIEL ANDRUCZYK[1], DAVIDE CURRELI, DAVID RUZIC, University of Illinois at Urbana-Champaign — Critical to the implementation of flowing liquid lithium plasma facing components is understanding the interactions of liquid lithium with various surfaces. Presented here are experiments investigating the material compatibility, wetting characteristics, and relative thermopower of liquid lithium with a variety of potential substrate candidates for the LiMIT concept [D.N. Ruzic et al 2011 Nucl. Fusion 51 102002]. Wetting experiments with lithium used the contact angle as a metric. Among those materials investigated are 316 SS, Mo, Ta, and W. The contact angle, as well as its dependence on temperature was measured. For example, at 200 C, tungsten registers a contact angle of 130°, whereas above its wetting temperature of 350 C, the contact angle is less than 80°. Several methods were found to decrease the critical wetting temperature of various materials and are presented here. The thermopower of W, Mo, Ta, Li, Ga, Wood's metal and Sn has been measured relative to stainless steel, and the Seebeck coefficient of has then been calculated. For molybdenum the Seebeck coefficient has a linear rise with temperature from S_{Mo} =3.9μVK^{-1} at 30 °C to 7.5μVK^{-1} at 275 °C.

[1]On Assignment at PPPL

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