Abstract Submitted
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Investigation of tin-lithium eutectic as a liquid plasma facing material.[1] DAVID RUZIC, MATTHEW SZOTT, MICHAEL CHRISTENSON, IVAN SHCHELKANOV, KISHOR KUMAR KALATHIPARAMBIL, University of Illinois at Urbana-Champaign — Innovative materials and techniques need to be utilized to address the high heat and particle flux incident on plasma facing components in fusion reactors. A liquid metal diverter module developed at UIUC with self circulating lithium has been successfully demonstrated to be capable of handling the relevant heat flux in plasma gun based tests and on operational tokamaks. The proper geometry of the liquid lithium trenches to minimize droplet ejection during transient plasma events have also been identified. Although lithium has proven to be effective in improved plasma performance and contributes to other advantageous factors like reduction in the fuel recycling, impurity gettering and, owing to the low Z, a significantly reduced impact on plasma as compared to the solid wall materials, it still poses several drawbacks related to its high reactivity and high vapor pressure at the relevant tokamak wall temperatures. The evaporation properties of a new eutectic mixture of tin and lithium (20% Sn) shows that lithium segregates to the surface at melting temperatures and hence is an effective replacement for pure lithium. Also, the vapor from the eutectic is dominated by lithium, minimizing the entry of high Z Sn into the plasma. At UIUC experiments for the synthesis and characterization of the eutectic – measurement of the critical wetting parameters and Seebeck coefficients with respect to the trench materials have been performed to ensure lithium wetting and flow in the trenches. The results will be presented.

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