Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Experimental Characterization of Thermo-electric Driven Liquid Lithium Flow in Narrow Trenches for Magnetic Confinement Fusion[1]

WENYU XU, MICHAEL CHRISTENSON, PETER FIFLIS, DAVIDE CURRELI, DANIEL ANDRUCZYK[2], DAVID RUZIC, CPMI, Department of Nuclear, Plasma and Radiological Engineering, University of Illinois — The application of liquid metal, especially liquid lithium has become an important topic for plasma facing component (PFC) design. A liquid PFC can effectively eliminate the erosion and thermal stress problems compared to the solid PFC while transferring heat and prolong the lifetime limit of the PFCs. A liquid lithium surface can also suppress the hydrogen isotopes recycling and getter the impurities in fusion reactors. The Lithium/metal infused trench (LiMIT) concept successfully proved that the thermo-electric effect can be utilized to drive liquid lithium flow within horizontally placed metallic open trenches in transverse magnetic field. A limiter based on this concept was tested in HT-7 and gave out positive results. However a broader application of this concept may require the trench be tilted or even placed vertically, for which strong capillary force caused by narrow trenches may be the solution. A new LiMIT design with very narrow trenches have been manufactured and tested in University of Illinois and related results will be presented. Based on this idea new limiters are designed for EAST and LTX and scheduled experiments on both devices will be discussed.

[1]This project is supported by DOE/ALPS contract: DEFG02- 99ER54515
[2]In residence at Princeton Plasma Physics Laboratory

Wenyu Xu
CPMI, Dept of Nuclear, Plasma and Radiological Engineering,
University of Illinois

Date submitted: 12 Jul 2013 Electronic form version 1.4