

Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Advanced Flowing Liquid Lithium Divertor Plate Design¹

STEVEN STEMMLEY, CODY MOYNIHAN, MATT SZOTT, ALFONSO DE CASTRO, University of Illinois at Urbana-Champaign, PATRICK BUNTING, PETER F. BUXTON, DANIEL IGLESIAS, Tokamak Energy Ltd, DAVID RUZIC, University of Illinois at Urbana-Champaign — Liquid lithium has shown promise as a plasma facing material because of its ability to handle high heat loads and particle fluxes as well as improve plasma performance. In the past, the Liquid Metal Infused Trench (LiMIT) concept, working solely via thermoelectric magnetohydrodynamics (TEMHD), has been shown to work well under fusion relevant conditions. However, under intense, local heat flux, lithium can be accelerated quickly and expose the underlying substructure, called dryout. Recently, alternative geometries such as posts and large pore foam geometries have been shown to mitigate liquid lithium dryout at high heat fluxes. For the large pore foam, no depression in the lithium surface was observed for an electron beam heat flux of 6.8 MW/m^2 . These new structures are being incorporated into a divertor plate design with a fully flowing liquid lithium loop for the ST40 tokamak. This design involves the modification of an existing divertor tile to include these advanced geometries as well as the associated liquid metal pumps, piping, and reservoir system. Results and discussion of the advanced geometry testing and the preliminary design for the liquid lithium loop will be presented.

¹This work was supported through Tokamak Energy Ltd and DOE contract DEFG02-99ER54515

Steven Stemmley
University of Illinois at Urbana-Champaign

Date submitted: 29 Jun 2020

Electronic form version 1.4