

Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Hybrid Illinois Device for Research and Applications Material Analysis Test-stand (HIDRA-MAT)¹ ANDREW SHONE, ALFONSO DE CASTRO, University of Illinois at Urbana-Champaign, ZACHARIAH KOYN, Energy Driven Technologies LLC, AVEEK KAPAT, RABEL RIZKALLAH, DANIEL O'DEA, University of Illinois at Urbana-Champaign, JEAN-PAUL ALLAIN, Pennsylvania State University, DANIEL ANDRUCZYK, University of Illinois at Urbana-Champaign — HIDRA is a toroidal plasma fusion device located at UIUC. Steady state plasmas and high particle fluxes on the order of $10^{22} \text{ m}^{-2}\text{s}^{-1}$ provide a unique test-bed for materials research. HIDRA-MAT is an extension of HIDRA that acts as a material test-stand capable of performing plasma exposure and surface characterization *in-vacuo*. Removing the material surface degradation that occurs from oxidation when exposed to atmosphere produces data that more accurately depicts the PMI mechanisms taking place. HIDRA-MAT's material preparation systems include a rotatable UHV sample heater and liquid metal (LM) droplet injector. Sample surface characterization in-between and after plasma exposures is achieved by dual-pulsed LIBS and TDS. In addition to the surface characterization diagnostics, HIDRA-MAT's dual RGA system allows for deuterium and helium differentiation. Preliminary testing of each of HIDRA-MAT's sample preparation systems and diagnostics have been conducted. LM droplet size and sample temperature can be controlled during application. Results will be shown that highlight HIDRA-MAT's ability to investigate PMI mechanisms associated with LM PFCs retention of deuterium and helium.

¹Department of Energy DESC0017719

Andrew Shone
University of Illinois at Urbana-Champaign

Date submitted: 29 Jun 2020

Electronic form version 1.4