Abstract Submitted
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Analysis and model validation of tungsten prompt redeposition in tokamak divertor[1] JEROME GUTERL, Oak Ridge Associated Universities, TN, USA, TYLER ABRAMS, General Atomics, CA, USA, DAVID ENNIS, CURT JOHNSON, STUART LOCH, Auburn University, AL, USA, DMITRY RUDAKOV, University of California San Diego, CA, USA, WILLIAM WAMPLER, Sandia National Laboratories, Albuquerque, NM, USA, PHILIP SNYDER, General Atomics, CA, USA — Mechanisms governing W prompt redeposition in divertor are analyzed. At the divertor targets, the width of the Chodura sheath is comparable to the sputtered W ionization mean-free path. As a result, W prompt redeposition and net erosion are strongly related to the sheath properties. When 90% or more of sputtered W are ionized within the sheath, the fraction of promptly redeposited tungsten impurity is determined by the multiple ionizations of W impurities outside of the sheath, and weakly depends on other sheath features. Furthermore, we show that the SXB coefficient used to spectroscopically estimate W gross erosion is significantly reduced due to the ionization of W within the sheath when the plasma density is large. The validity of the model describing W prompt redeposition is examined using W net erosion measurements in DIII-D. A reduced model is presented to quantify redeposition and net erosion on W samples exposed to uniform attached divertor plasma conditions. The ratio of W net erosion rates measured experimentally from W samples of different sizes exposed to the same attached plasma conditions [1] are well reproduced with this reduced model. [1] D. L. Rudakov, et al. Physica Scripta T159 (2014)

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