Abstract Submitted
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Global modeling of wall material migration following boronization in NSTX-U[1] J.H. NICHOLS, M.A. JAWORSKI, C.H. SKINNER, PPPL, F. BEDOYA, UIUC, F. SCOTTI, V.A. SOUKHANOVSKII, LLNL, K. SCHMID, IPP Garching — NSTX-U operated in 2016 with graphite plasma facing components, periodically conditioned with boron to improve plasma performance. Following each boronization, spectroscopic diagnostics generally observed a decrease in oxygen influx from the walls, and an in-vacuo material probe (MAPP) observed a corresponding decrease in surface oxygen concentration at the lower divertor. However, oxygen levels tended to return to a pre-boronization state following repeated plasma exposure. This behavior is interpretively modeled using the WallDYN mixed-material migration code, which couples local erosion and deposition processes with plasma impurity transport in a non-iterative, self-consistent manner that maintains overall material balance. A spatially inhomogenous model of the thin films produced by the boronization process is presented. Plasma backgrounds representative of NSTX-U conditions are reconstructed from a combination of NSTX-U and NSTX datasets. Low-power NSTX-U fiducial discharges, which led to less apparent surface degradation than normal operations, are also modeled with WallDYN. Likely mechanisms driving the observed evolution of surface oxygen are examined, as well as remaining discrepancies between model and experiment and potential improvements to the model.

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