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Deuterium uptake in boronized ATJ graphite walls of NSTX-U¹ JAVIER DOMINGUEZ, State Univ of NY- Stony Brook, FELIPE BEDOYA, University of Illinois Urbana Champaign, PREDRAG KRSTIC, State Univ of NY-Stony Brook, JEAN PAUL ALLAIN, University of Illinois Urbana Champaign, STEPHAN IRLE, Nagoya University, CHARLES SKINNER, ROBERT KAITA, Princeton Plasma Physics Laboratory, BRUCE KOEL, Princeton University — We present a study of the role of boron and oxygen in the chemistry of deuterium retention in boronized ATJ graphite irradiated by a deuterium plasma. The experimental results were obtained by the first in vacuo X-ray Photoelectron Spectroscopy (XPS) measurements at the National Spherical Torus Experiment Upgrade (NSTX-U). The subtle interplay of boron, carbon, oxygen and deuterium chemistry is explained by reactive molecular dynamics simulation, verified by quantum-classical molecular dynamics and successfully compared to the measured data. The calculations deciphered the roles of oxygen and boron for the deuterium retention and predict deuterium uptake by a boronized carbon surface of 90% close in value to that previously predicted for a lithiated and oxidized carbon surface.

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