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Simulations of Diffusive Lithium Evaporation onto the NSTX Vessel Walls[1] D.P. STOTLER, C.H. SKINNER, W.R. BLANCHARD, PPPL, P.S. KRSTIC, ORNL, H.W. KUGEL, H. SCHNEIDER, L.E. ZAKHAROV, PPPL — The evaporation of lithium (Li) onto the NSTX divertor plates has reduced D recycling, improved confinement, and suppressed ELMs. However, in plasmas with suppressed ELMs, the core carbon and medium-Z metallic impurity concentrations increase in the latter part of a discharge. To the extent that these impurities are the result of sputtering from the graphite tiles and other surfaces, increased coverage of the plasma facing surfaces with Li should reduce the impurity sources. This increased coverage can be achieved by evaporating the Li into a helium (He) filled vessel and exploiting the fact that the mean free path of the Li atoms scales inversely with the He pressure. Thus, higher (lower) pressures preferentially coat the top (bottom) of the vessel. A model for predicting and optimizing this process has been developed and validated against an initial set of deposition experiments. The model is found to agree with the data to within the estimated errors over a range of He pressures. The most significant uncertainties in the model have been identified and more discriminating validation tests are planned.

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Daren Stotler
Princeton Plasma Physics Lab

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