

Abstract Submitted
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Multi-scale modeling to relate Be surface temperatures, concentrations and molecular sputtering yields¹ ANE LASA, ORNL, ELNAZ SAFI, KAI NORDLUND, Univ. Helsinki — Recent experiments [1,2] and Molecular Dynamics (MD) simulations [3] show erosion rates of Be exposed to deuterium (D) plasma varying with surface temperature and the correlated D concentration. Little is understood how these three parameters relate for Be surfaces, despite being essential for reliable prediction of impurity transport and plasma facing material lifetime in current (JET) and future (ITER) devices. A multi-scale exercise is presented here to relate Be surface temperatures, concentrations and sputtering yields. Kinetic Monte Carlo (MC) code MMonCa is used to estimate equilibrium D concentrations in Be at different temperatures. Then, mixed Be-D surfaces – that correspond to the KMC profiles – are generated in MD, to calculate Be-D molecular erosion yields due to D irradiation. With this new database implemented in the 3D MC impurity transport code ERO, modeling scenarios studying wall erosion, such as RF-induced enhanced limiter erosion or main wall surface temperature scans run at JET, can be revisited with higher confidence.

[1] D. Nishijima et al., Plasma Phys Contr F 50 (2008) 125007

[2] S. Brezinsek et al., NF 55 (2015) 063021

[3] E. Safi et al., JNM 463 (2015) 805-809

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