GEC18-2018-020073

Abstract for an Invited Paper
for the GEC18 Meeting of
the American Physical Society

Machine learning plasma-surface interface for coupling sputtering and transport simulations

JAN TRIESCHMANN, Brandenburg University of Technology Cottbus-Senftenberg

For consistent sputtering and transport simulations, the coupling of the model components has to be established bridging the intrinsic time and length scales of both plasma and surface. Their direct coupling is infeasible as the scales of the systems span several orders of magnitudes. As a means of mitigation, a plasma-surface interface based on artificial neural networks is suggested. A multilayer perceptron network has been trained on data of Ar sputtering an Al-Ti composite target. The set of input data has been obtained using TRIDYN developed by Moeller and Eckstein [1]. It is demonstrated that the trained network can be successfully exploited to predict the energy distributions and angular distributions of sputtered and reflected particles for arbitrary energy distributions of impinging particles. It is finally argued that such machine learning model interfaces may be generally applied to various coupling problems, e.g., for the direct linkage between the discharge of an atmospheric plasma jet and an exposed liquid or solid surface.

[1] W. Moeller, W. Eckstein, Nucl. Instr. and Meth. B2, 814 (1984)

Contributions by Florian Krüger, Tobias Gergs, and Thomas Mussenbrock as well as funding by the DFG in the frame of SFB-TR 87 are kindly acknowledged.