Brandenburgische Technische Universität Cottbus - Senftenberg

Forschungscluster Kognitive Systeme

EINLADUNG

zum Vortrag von

Herrn Dr. Jan Trieschmann

BTU Cottbus-Senftenberg, LS Theoretische Elektrotechnik

zum Thema

“Coupling sputtering and transport simulations through a machine learning plasma-surface interface”

Abstract:

Thin film processing by means of plasma sputter deposition inherently depends on the interaction of energetic particles with a target surface and the subsequent transport of film forming species through the plasma. The inherent time and length scales of the dynamics at the solid surface and in the gas-phase span orders of magnitude. While methods to kinetically describe the surface processes and the gas-phase transport take advantage of solving the respective sub-problem independently, their consistent coupling is a prerequisite. A viable plasma-surface model bridges these sub-models, allowing also for complex surface and gas compositions encountered in reactive sputtering. For this objective, a machine learning plasma-surface interface is proposed based on a multilayer perceptron network. The latter has been trained and verified with a set of incoming/outgoing particle energy and angular distributions obtained from TRIDYN simulations for Ar sputtering an Al-Ti composite target. An error analysis is carried out for the obtained training results and their quality is compared and discussed for different sets of hyperparameters. Specifically, the influence of network depth and width, activation functions, as well as regularization and early stopping is evaluated. It is demonstrated that the trained network is able to predict the sputtered particle distributions for unknown, arbitrarily shaped incident ion energy distributions. For application as a plasma-surface model, the prediction time and the possibility for run-time evaluation in the frame of a Monte Carlo transport simulations are finally investigated.

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Freitag, 24.05.2019, 13:30 – 15:00 Uhr
BTU Cottbus – Senftenberg, LG 3A, R. 338

Alle Interessenten sind herzlich eingeladen!