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Plasma-Surface Interactions in 2D and 3D Simulations for Materials Processing PAUL MOROZ, Tokyo Electron US Holdings, Inc. — A computational model of plasma-surface interactions implemented in the FPS-3D feature profile code [1] is discussed. The code uses cellular model for solid materials and is capable of treating etching, deposition, and ion implantation, both in 2D and 3D. It allows modeling of materials processing at very different scales, ranging from a few nanometers to a few micrometers. As input parameters, FPS-3D requires that the fluxes of all reactive species to the surface be provided. Incoming fluxes are represented by particles, each characterized by the kind of species as well as by the energy and direction of flight. The Monte Carlo launcher generates those species in correspondence with specified fluxes. A size of a Monte Carlo particle is typically significantly smaller than the size of a material cell, so numerical statistical artifacts could be reduced. The Monte Carlo treatment of gas and ion reactions might depend on particle energy and angle of incidence to the cell's normal, as well as on the surface temperature. The finite penetration depth of ions into solid materials is included in FPS-3D, which allows treatment of more complex situations such, for example, as etching through the deposited polymer layers.

[1] P. Moroz, APS-DPP, NP8, Atlanta, GA, 2009.

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