

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Modeling of grain surface modification in low pressure plasma via PIC algorithm BENIAMINO ROVAGNATI, University of Illinois at Chicago, GIOVANNI LAPENTA, Los Alamos National Laboratory, FARZAD MASHAYEK, University of Illinois at Chicago — In recent years, material processing technologies have been remarkably improved by the ever-growing research interest and efforts in nano-science along with plasma processing techniques. In particular, low-pressure plasma has been widely employed in the coating industry due to its capability of efficiently generating active species, responsible for layer deposition, in a low temperature environment. Here, we focus our attention on the deposition process on a submicron particle submerged in a CH_4/H_2 plasma. A pre-existing PIC code, which performs the particle charging calculations, is extended to account for plasma species scattering and charge-exchange processes via a Monte Carlo Collision (MCC) method, for soft-sphere interactions between non-charged species governed by the Lennard-Jones law, and for plasma/surface and gas/surface interactions via a Monte Carlo method. The last takes advantage of the immerse boundary method which allows a localized surface reaction process and layer growth as a function of super-particle densities and sticking probability coefficients.

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Date submitted: 22 Aug 2006

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