



Development of Ion Beam Sputtering Model of Surface Nanostructure Morphology with Semi-Empirical Yield

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ABSTRACT

A new Monte Carlo model for studying morphology of nanostructures on solid surfaces, as a result of ion beam surface sputtering (IBSS), is presented. This model is based on a semi-empirical sputter yield parameter in ion-solid collision. It circumvents the complexity of existing statistical, classical, and continuum models, most of which are difficult to relate to real experimental parameters, by its semiempirical nature of direct reliance on the experimental values of the sputter yield. In addition to this constraint to a crucial experimental factor, the model simulates the multidimensional nature of other accompanying physical processes stochastically; thus, reducing the complexity of their computation. Preliminary results presented here indicate that the model captured common experimentally observed features of evolution of solid surfaces subjected to continuous particle irradiation and allows for a way to study the effect of the different mechanisms of surface morphology and the nature of their interplay in the dynamics of surface evolution. Another preliminary result is for simulations using this model is that roughening process is not significantly affected by redeposition of eroded surface atoms.

Keywords: Monte Carlo surface sputtering model; ion-solid collisions; Surface evolution; Empirical yield; Surface nanostructures.

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