MECHANISMS OF SURFACE NANOSTRUCTURING IN AMORPHOUS SI

A. Ilinov[1], A. Lopez-Cazalilla[1], L. Bukonte[1], F. Djurabekova[1], K. Nordlund[1], S. Norris[2]

1 Department of Physics, University of Helsinki, PL 43, FIN-00014
2 Department of Mathematics, Southern Methodist University, Dallas, Texas 75205, USA
email: andrey.ilinov@helsinki.fi

Modification of material properties by accelerated ion beams becomes more and more widespread technique. Under high ion fluences, various periodic nano-sized structures as ripples or clusters may be formed on irradiated surfaces. It is important to understand mechanisms of the pattern formation, as it would give an opportunity to produce sub-10 nm surface features in a predictable and controllable way.

The conventional theory of ripple formation [1] is based on the erosive (sputtering) effect. However, in the recent work [2] it has been demonstrated that atomic redistribution following ion impacts may become the governing mechanism under certain conditions.

The analytical model for prediction of the ripple wavelength has been recently developed in our group [2]. However, there are still unresolved questions regarding this theory. The aim of this work is to analyze how the surface curvature affects redistributive and erosive properties. To do that, we simulate irradiation of concave and convex curved Si surfaces (corresponding to ion impacts on already formed ripples) under 1 keV Ar ions irradiation using the molecular dynamics (MD) method at various angles.

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