

Abstract Submitted  
for the MAR05 Meeting of  
The American Physical Society

**Stochastic Evolution of Nano-Structures in the Continuum Step**

**Model** MASASHI DEGAWA, University of Maryland, FRENCE SZALMA, ELLEN WILLIAMS, MRESEC TEAM — Stochastic Evolution of Nano-Structures in the Continuum Step Model \* M. Degawa, F. Szalma and E.D. Williams, Department of Physics and MRSEC University of Maryland College Park MD, 20742 Technological demands of the fabrication of nano-structures and quantum dots provides renewed motivation for understanding the atomistic properties that control crystal shapes. With decreasing structure size, the issues of finite size and shape effects become non-negligible and also the increasing sensitivity to external perturbations, such as the substrate interface. We have previously shown that the effects of curvature, which cannot be neglected in nanoscale structures, yield a family of crystal shapes with constant surface chemical potentials. The member of this family that represents an absolute minimum in the total free energy follows the Pokrovsky-Talapov ECS (PT-ECS), which is also the result obtained in the limit of zero curvature. The remaining members of the family represent metastable states. Here, we extend the continuum results to include the discreteness of steps using the continuum step model. The metastable states now represent the structures, which are formed due to a barrier for the peeling (and also nucleation) of layers necessary for the evolution of the crystal shape. We relate the barrier height to the crystallite parameters, including volume and interface interactions, and discuss its consequences for the kinetics of shape evolution. \*This work has been supported by the DOE-NNI and NSF-MRSEC.

Masashi Degawa  
University of Maryland

Date submitted: 08 Dec 2004

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