Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Mass Transport in Nano-scale Step Fluctuations[1] FERENC SZALMA, T.L. EINSTEIN, M. DEGAWA, E.D. WILLIAMS, U. of Maryland, D.B. DOUGHERTY, U. of Pittsburgh — Extending earlier work,[2] we investigate the linear response of a 2D nano-scale system to small perturbations and determine its transport properties. We use a 2-parameter-based energy landscape to simulate a supersaturated lattice gas by a BKL kinetic MC algorithm. The 2D gas atoms condense into a small island surrounded by a dilute gas. Island-edge fluctuations are due to both the diffusion of island atoms along its edge and atom exchange with the surrounding rare gas. Their relative importance depends on the ratio of the two energy parameters. We focus on adatom diffusion on Pb(111) surfaces below the roughening temperature, with energy parameters taken from EAM calculations. We find that edge fluctuations are mainly due to diffusion along the island edge, and determine the temperature dependence of the associated hopping rate. The Arrhenius behavior of the rates yields an effective energy barrier which fits well in the series of similar barriers for Pt, Au, and Ag. After comparing with experiments involving spirals as well as islands on Pb, we assess our simple model.

[1]Work at UM supported by NSF MRSEC DMR 0520471 and partially by DOE-CMSN DEFG0205ER46227
[2]F. Szalma et al., Phys. Rev. B 71, 035422 (2005)

Ferenc Szalma
Dept. of Physics, Univ. of Maryland

Date submitted: 30 Nov 2005 Electronic form version 1.4