Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Directing Self Assembly of Nanostructures Kinetically: Patterning and the Ehrlich Schwoebel Barrier[1] CHUAN-FU LIN, AJMI BH HAMMOUDA, University of Maryland, HUNG-CHIH KAN, National Chung-Cheng University, Taiwan, RAY PHANEUF, University of Maryland — We present the results of Kinetic Monte Carlo simulation, which show that an extra diffusion barrier (Ehrlich Schwoebel Barrier) to an atom crossing a step can lead to self assembly of a variety of ordered arrangements of nanometer-sized "mounds" during epitaxial growth on a patterned substrate. Interestingly, in different temperature windows of epitaxial growth, the pattern-mound interaction acts as an important factor to assemble specific periodic nanostructures, with mound unit cells of 1/3 x 1/3 , $1/\sqrt{2}$ x $1/\sqrt{2}$ and 1x1, with respect to the pattern period, as the temperature is increased. Our previous work on epitaxial growth of GaAs on patterned GaAs(001) substrates also showed evidence that an Ehrlich-Schwoebel barrier might play a role in a transient growth instability we observe[1-3]. We anticipate that this phenomenon could find application in the fast, controlled assemblies of nanostructures. 1. T. Tadayyon-Eslami et al., *PRL* **97**, 126101 (2006) 2. H.-C. Kan et al., *PRB* **73**, 195410 (2006) 3. H.-C. Kan et al., *PRL* **92**, 146101 (2004)

[1]Work supported by NSF #DMR0705447, LPS and the UM-MRSEC # DMR0520471.

Ray Phaneuf
University of Maryland

Date submitted: 27 Nov 2009 Electronic form version 1.4