Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Quantum Modulation of Island Nucleation on Top of a Metal Nanomesa[1] YONG HAN, Department of Material Science and Engineering, University of Utah, Salt Lake City, UT 84112, M. HUPALO, M.C. TRINGIDES, Ames Lab-USDOE, Department of Physics and Astronomy, Iowa State University, Ames, IA 50011, FENG LIU, Department of Material Science and Engineering, University of Utah, Salt Lake City, UT 84112, DEPARTMENT OF MATERIAL SCIENCE AND ENGINEERING, UNIVERSITY OF UTAH, SALT LAKE CITY, UT 84112 TEAM, AMES LAB-USDOE, DEPARTMENT OF PHYSICS AND ASTRONOMY, IOWA STATE UNIVERSITY, AMES, IA 50011 COLLABORATION — We present a theoretical analysis of selectivity of nucleation location for the two-dimensional island on top of a metal nanomesa. It has been observed experimentally that the nucleation can start either along the periphery of the mesa top or in the middle, depending on the mesa thickness. Such an intriguing nucleation behavior is shown to be originated from the thickness-dependent mesa edge barrier for an adatom to jump off the mesa, induced by the quantum size effect. Based on the experimentally observed nucleation locations, we estimate that the mesa edge barriers for the 5- and 6-layer Pb(111) mesas can differ by $\sim 23 \pm 7$ meV.

[1]This work is supported by NSF.

Yong Han
Department of Material Science and Engineering
University of Utah, Salt Lake City, UT 84112

Date submitted: 24 Nov 2006 Electronic form version 1.4