Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Novel Coarsening Behavior of Pb nanocrystals on Si(111)[1] P. F. MICELI, C. A. JEFFREY, Dept. of Physics and Astronomy, University of Missouri-Columbia, R. FENG, E. H. CONRAD, School of Physics, Georgia Institute of Technology, M. HUPALO, M. C. TRINGIDES, Ames Lab, Iowa State University, C. KIM, Dept. of Physics and Research Inst. of Basic Sciences, Kyunghee University, Korea, P. J. RYAN, MUCAT, Advanced Photon Source, Argonne National Lab — We show that Pb nanocrystals grown on Si(111)7x7 exhibit novel coarsening behavior that cannot be described by the classical Gibbs-Thomson effect. This system is known for quantum size effects (QSE) that lead to preferred island heights which depend on the coverage and temperature. Using complementary surface x-ray diffuse scattering and STM, we find an unexpected and unusual flux rate dependence, a lack of scaling of the island densities, and island decay times that are orders of magnitude faster than expected from the classical analysis. For example, a highly mono-disperse island height distribution is observed if the islands are grown at high rather than low flux rates. These results have important implications for understanding the controlled growth and self-organization of nanostructures.

[1]The MUCAT beamline is supported through the Ames Lab by the US-DOE. Research funding is supported by NSF, PRF (PFM, CAJ), Ames Lab (MCT, MH), Canim Scientific (EHC), NSERC-Canada (CAJ), Ministry of Science & Tech.-Korea (CK).

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Date submitted: 07 Dec 2005 Electronic form version 1.4