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Non-classical scaling in the Pb/Si(111) coarsening at low temperature[1] MYRON HUPALO, Iowa State University Ames Lab-USDOE , R. FENG, E.H. CONRAD, C. A. JEFFREY, P. F. MICELI, S. HAYDEN, M. GRAMLICH, P. J. RYAN, C. KIM, MUCAT, Advanced Photon Source, Argonne National Laboratory, M.C. TRINGIDES, Iowa State University Ames Lab-USDOE — Recent coarsening experiments monitoring the evolution of a mixture of stable and unstable islands in Pb/Si(111) towards a mono-disperse 7-layer height distribution have revealed novel features that extend the classical curvature driven growth. Two complementary techniques are used, X-ray scattering and STM. In particular the coverage θ , temperature T and flux F dependence are the opposite of what is expected from the classical analysis. The coarsening time τ increases with increasing temperature T, coverage θ and decreases with increasing flux rate F according to the scaling relation τF=constant. These paradoxical results can be understood from the island stability dependence on lateral size L in addition to the QSE-driven well–analyzed height dependence. The decay constant of an unstable island is an increasing function of its lateral size and for sizes larger than Lc$\sim$50nm the unstable islands do not decay but grow in the next stable height. Since the lateral size increases with T, θ and decreases with F this can account for the novel coarsening results.

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