

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Time Resolved Study of Ordering Between Quantum Well Islands by Wide-Area k-Space Mapping HAWOONG HONG, L. BASILE, P. CZOSCHKE, A. GRAY, T.-C. CHIANG, Fredrick Seitz Materials Research Laboratory, University of Illinois at Urbana-Champaign — The growth of Pb quantum well islands on Si(111) was investigated in time resolved manners. The wide-area momentum space mapped in our x-ray diffraction techniques allows simultaneous observation of the lateral ordering and height distributions of Stranski-Krastanov (S-K) islands during deposition, annealing, and cycling between deposition and annealing. These islands are formed not by strain relaxation but through quantum phase separation. The ordering of these islands exhibits unusual behaviors not well described by existing strained island theories. The population of islands always decreases monotonically during all three processes. However, the island ordering was stable without coarsening with time, at least within the experimental condition. This study suggests that quantum well effect may provide a new mechanism for uniform self-assembled nanostructures.

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Date submitted: 01 Dec 2005

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