

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Shape and Composition Map of a Prepyramid Quantum Dot

BRIAN SPENCER, SUNY Buffalo — We present a theory for the shape, size, and nonuniform composition profile of a small prepyramid island in an alloy epitaxial film when surface diffusion is much faster than deposition and bulk diffusion. The predicted composition profile has segregation of the larger misfit component to the island peak, with segregation enhanced by misfit strain and solute strain but retarded by alloy solution thermodynamics. Vertical composition gradients through the center of the island due to this mechanism are on the order of 2%/nm for $\text{Ge}_X\text{Si}_{1-X}/\text{Si}$ and 10 - 15%/nm for $\text{In}_X\text{GaAs}_{1-X}/\text{GaAs}$ [PRL 95, 206101 (2005)].

Brian Spencer
SUNY Buffalo

Date submitted: 29 Nov 2005

Electronic form version 1.4