Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Strain relaxation and crystal quality in compositionally graded GaAsSb/GaAs metamorphic buffer layers[1] BENNY PEREZ RODRIGUEZ, JOANNA MIRECKI MILLUNCHICK, University of Michigan — We have compared linearly graded, step graded, and constant composition layers of GaAs(1-x)Sb(x)/GaAs grown by Molecular Beam Epitaxy to determine which grading schemes result in the highest crystalline quality, while relaxing the lattice parameter most effectively. The incorporation rates used throughout the experiment for Ga and As were kept constant at 0.96 and 1.11 ML/s respectively. The Sb incorporation rate was varied from 0 to 0.63 ML/s to obtain a final composition of the topmost layers of x=0.5. The real-time stress evolution was obtained using an in situ multi-beam optical stress sensor. In our experiments, aggressive grading of the Sb flux results in decreased Sb incorporation at low x, a higher residual stress, and a bifurcation in the tilt of the sample. Less aggressive grading increases results in more uniform incorporation and lower residual stress, but the tilt remains. The tilt may be reduced by incorporating large steps in the grading, and completely eliminated when a constant composition layer of GaAs(0.5)Sb(0.5) is deposited directly on GaAs. The defect density of constant composition layers is somewhat higher than linearly graded layers with the same thickness and final composition. However, increasing the thickness of the layer reduces the defect density.

[1]This work is supported by the National Science Foundation DMR 0092602

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Date submitted: 03 Dec 2005 Electronic form version 1.4