Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Self-organized Evolution on Patterned GaAs(001) Surfaces during Homo-Epitaxial Growth[1] HUNG-CHIH KAN, Dept. of Physics, Univ. of MD, College Park, and Lab. for Physical Sciences, ERIN FLANAGAN, Dept. of Materials Science and Engr., Univ. of MD., College Park, TABASSOM TADAYYON-ESLAMI, Dept. of Materials Science and Engr., Univ. of MD, College Park, and Lab. for Physical Sciences , SUBRAMANIAM KANAKARAJU, CHRIS RICHARDSON, Lab. for Physical Sciences, RAYMOND PHANEUF, Dept. of Materials Science and Engr., Univ. of MD, College Park, and Lab. for Physical Sciences — We report on experimental characterization of morphological evolution of patterned GaAs(001) surfaces during homo-epitaxial growth. We lithographically patterned our GaAs(001) substrates with arrays of cylindrical pillars whose size and spacing are systematically varied. The growth of GaAs layers on the patterned substrate were performed in a MBE chamber at a substrate temperature of 580 $^\circ$C. The growth rate is ~ 2.7 Å/s. After each growth step, the surface topography is characterized with atomic force microscopy (AFM). AFM profiles along [-110] show that flat-topped pillars evolve into concave downward parabola whose curvature is nearly independent of the initial pillar diameter. We also perform both physically based and phenomenological numerical calculations to simulate the growth and compare the results with our experimental observations.

[1]This work is supported by the Laboratory for Physical Sciences and an NSF-MRSEC Grant No. DMR-0080008.

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Date submitted: 03 Dec 2005 Electronic form version 1.4