Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Growth and stability of dysprosium silicide nanostructures on Si(001) MATTHEW ZEMAN, ROBERT NEMANICH, North Carolina State University — The growth and coarsening dynamics of epitaxial dysprosium silicide nanostructures on Si(001) are observed using tunable ultra-violet free electron laser excitation for photo-electron emission microscopy (PEEM). A dense array of compact silicide nanostructures is observed to coarsen during annealing at 950-1050C. Some of the nanostructures grow into large flat-topped rectangular islands at the expense of smaller islands which disappear via Ostwald ripening. The coarsening rate of the island distribution increases with increasing temperature, and the formation of a flat top on the growing islands is related to strain relaxation. Additionally, the shape and growth rates of the islands may be influenced by the island crystal structure and/or local island distributions. A subsequent deposition of dysprosium onto the surface results in the nucleation of new island and nanowire structures. Immediately after the deposition is terminated the nanowires begin to decay from the ends while the larger island structures grow. The decay of the wires can be attributed to Ostwald ripening and is explained in terms of the Gibbs-Thompson relation, where the high adatom concentration at the nanowire ends leads to the diffusion of adatoms away from the wires towards the larger surrounding structures. In situ movies will be presented which detail the growth and coarsening processes.

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Date submitted: 20 Nov 2006 Electronic form version 1.4