

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Dislocation

filtering by buffer layer interfaces in InSb/Al_xIn_{1-x}Sb heterostructures grown on GaAs (001) substrates¹ MADHAVIE EDIRISOORIYA, TETSUYA MISHIMA, MICHAEL SANTOS, University of Oklahoma — Recent efforts have been devoted to the development of InSb-based transport devices, including mesoscopic magnetoresistors and field-effect transistors, on GaAs (001) substrates. The small effective mass of electrons in InSb leads to a high mobility at room temperature. Remotely-doped InSb quantum wells offer the additional advantage of a conducting layer that is close to the surface. One key to maximizing the performance of such devices is the reduction of dislocation and micro-twin densities induced by the large lattice mismatch between InSb/Al_xIn_{1-x}Sb and GaAs. We investigated the dislocation filtering effects of the interfaces formed between an Al_yIn_{1-y}Sb interlayer and an Al_xIn_{1-x}Sb matrix layer with $y > x$. Transmission electron microscopy analysis shows that the interlayer interfaces filter out threading dislocations. We improve this dislocation filtering by optimizing the interlayer thickness, the number of interlayers, and the growth conditions.

¹This work was supported by the NSF under Grants DMR-0510056 and DMR-0520550.

Madhavia EdirIsooriya
University of Oklahoma

Date submitted: 04 Dec 2005

Electronic form version 1.4