Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Mechanical Stability of Ultra Thin Ge/Si Film on SiO_2:the Effect of Si/SiO_2 Interface MINGHUANG HUANG, University of Utah, JOHN A. NAIRN, University of Utah, M.G. LAGALLY, University of Wisconsin-Madison, FENG LIU, University of Utah — We perform two-dimensional linear elastic finite element analysis to investigate mechanical stability of ultra-thin Ge/Si film grown on or bonded to SiO_2, using imperfect interface elements between Si and SiO_2 to model Si/SiO_2 interfacial slippage. We show that the overall composite film is stable when only the tangential slippage is allowed. But it becomes unstable when normal slippage is allowed: the coherently strained Ge island induces a large local bending of Si layer, and debonds the Si layer from the underlying SiO_2 forming a void at the Si/SiO_2 interface. Thus, the quality of Si/SiO_2 interface is expected to play an important role in controlling the stability of those device structures employing the strained Si/SiO_2 film. *This work is supported by DOE.

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Date submitted: 30 Nov 2004 Electronic form version 1.4