Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Fabrication and transport measurement of periodic wavy structures of Si/SiGe nanomembranes MINRUI YU, ROBERT BLICK, ARNOLD KIEFER, DON SAVAGE, MAX LAGALLY — We demonstrate fabrication of completely under-etched Hall-bars made from Si/SiGe nanomembranes with a highly doped SiGe layer. The sample material is epitaxially grown by chemical vapor deposition (CVD) on silicon-on-insulator (SOI) wafers. Hall-bars are defined by optical photolithography and etched by reactive ion etching (RIE). They are then completely released from the substrate through hydrogen fluoride (HF) vapor etching. The lattice mismatch between silicon (Si) and germanium (Ge) generates an initial strain inside the material, which tends to recover once the sacrificial oxide layer is removed. This combined with carefully designed geometric constraints causes the structures to buckle and generate periodic wavy patterns after releasing and rebonding to the wafer surface. We study the magneto-transport at both room and low temperatures, with and without light illumination. Our results show the effect of strain on band structure and electron mobility. This will further the understanding of mechanically modulated electron transport.

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Date submitted: 17 Dec 2008 Electronic form version 1.4