Abstract Submitted
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Elastic strain-sharing as a means of fabricating strained-Si(110) nanomembranes[1] SHELLEY SCOTT, ARRIELLE OPOTOWSKY, DONALD SAVAGE, MICHELLE ROBERTS, MAX LAGALLY, University of Wisconsin-Madison — Hole mobility is higher in Si(110) than it is in Si(001), and straining Si(110) produces further improvements, making strained-Si(110) desirable for p-MOS devices. We describe elastic strain sharing in Si:SiGe:Si(110) heterostructure membranes, which generates flexible, transferable, and dislocation-free strained-Si(110) nanomembranes. Membranes are grown by chemical vapor deposition on the Si template layer of (110) silicon-on-insulator (SOI) substrates. Selective etching of the buried oxide layer 'releases' the epitaxial tri-layer system. X-Ray diffraction measurements show that the heterostructure elastically relaxes by transferring strain from compression in the alloy layer, into tensile strain in the Si layers, and we will discuss the achieved mobility values. The XRD line scans exhibit narrow peak widths and thickness fringes, which are both signatures of high-quality (negligible dislocation density) single-crystal strained-Si.

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