Abstract Submitted
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Elastic strain sharing in silicon nanomembranes from a silicon nitride stressor layer[1] ANNA CLAUSEN, University of Wisconsin-Madison, DON E. SAVAGE, MAX G. LAGALLY — Strained-silicon (001) nanomembranes have increased electron mobility relative to their unstrained counterparts and are therefore of considerable interest for ultra-fast flexible electronics [1]. The increased mobility is caused by the strain splitting of the delta valleys in the conduction band and the concomitant reduced inter-valley scattering of charge carriers. Previous work using SiGe as the stressor layer on silicon-on-insulator (SOI) requires epitaxial growth and is restricted to tensilely straining Si. We grow polycrystalline SiN on SOI by PECVD to form tensilely as well as compressively strained Si nanomembranes. When the SiN/Si film is released from the buried oxide layer, the strain in the SiN layer is elastically shared with the Si layer. The strain-relaxed nanomembrane is then bonded onto a new substrate. XRD, Raman, and TEM are used to characterize the strain transfer and the presence or absence of dislocations in the Si nanomembrane. Our results are in good agreement with predictions from continuum elasticity theory. [1] Yuan, H-C. et al., Semicond. Sci. Tech. **22**, S72-S75 (2007).

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