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Elastically strained silicon/silicon dioxide nano-layers LEONID TSYBESKOV, ANDREI SIRENKO, NJIT, DAVID LOCKWOOD, JOHN MCCAFFREY, NRC, Canada — Traditional fabrication of strained Si nanostructures (nano-layers, nano-tubes, nano-belts and nano-membranes) involves lattice mismatched Si/SiGe heteroepitaxy. In this paper, we demonstrate that elastically-strained, high aspect ratio Si nano-layers can be fabricated using a modified procedure of a-Si/SiO2 deposition followed by thermal annealing. We find that the mismatch between Si and SiO2 thermal expansion coefficients prevents the thermal crystallization of amorphous Si near Si/SiO2 interfaces and that this phenomenon can be used to direct crystallization of nanometer-thick Si layers. These more than micron in lateral dimension Si nano-layers with thickness of $\sim$ 10 nm exhibit a very low density of structural defects and remain elastically strained with respect to the Si substrate.

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