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Enhanced Power Factor in Strained Silicon Nanomesh Thin Film BINGYUAN HUANG, XIAO GUO, DUCKHYUN LEE, ANISH TUTEJA, PETER GREEN, AKRAM BOUKAI, University of Michigan - Ann Arbor — The power factor  $S^2\sigma$  (S is the Seebeck coefficient and  $\sigma$  is the electrical conductivity) of n-type silicon thin films is increased by utilizing both tensile lattice strain and nanomesh structures. The tensile strained lattice in n-type silicon splits the six-fold degenerate conduction band, which results in reduced inter-valley scattering and consequently enhanced electron mobility. The nanomesh feature structure decreases the thermal conductivity due to increased phonon scattering. The nanomesh was patterned onto both strained and unstrained silicon on insulator (SOI) using reactive ion etching with self-assembled block copolymers as masks. The Seebeck coefficient and electrical conductivity measurements were then performed on both strained and unstrained nanomesh SOI in vacuum over a wide temperature range. Increases in S and  $\sigma$  were observed and an enhanced power factor was obtained.

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