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**Phonon Transport in one-dimensional Silicon Nanowires**[1] KEDAR HIPPALGAONKAR, Dept of Mech Engg, UC Berkeley, JINYAO TANG, Chem. Dept, UC Berkeley, RENKUN CHEN, BAOLING HUANG, KARMA SAWYER, Dept. of Mech Engg, UC Berkeley, PETER ERCIUS, NCEM, Lawrence Berkeley Labs, PEIDONG YANG, Chem. Dept, UC Berkeley, ARUN MAJUMDAR, Dept. of Mech Engg, UC Berkeley — Traditionally, heat transfer in crystalline solids has been understood to follow the diffusive equation of conduction where the thermal conductivity of the material is an intrinsic property. Silicon, being a semiconductor material, has a significant portion of its thermal conductivity arising from phonons. Decrease in dimensionality coupled with secondary scattering from rough surfaces can decrease the thermal conductivity by as much as two orders of magnitude (k = 1.6 W/mK) compared with bulk single crystal (k = 140 W/mK) making it interesting for thermoelectric applications. The additional scattering from rough surfaces introduces another length scale to scatter the phonons and we find that this might make it possible to break Fourier's Law stemming from diffusive heat transfer from the phonons. This might result in the dependence of the thermal conductivity of the Silicon Nanowires on dimensions and roughness. In this work we have characterized the roughness of different kinds of Silicon Nanowires with controlled geometry and correlate these characteristics with transport properties.

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