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Nanoscale thermoelectric properties of fs-laser induced nanotracks on Sb_2Te_3 JENNA WALRATH, YEN-HSIANG LIN, YUWEI LI, VLADIMIR STOICA, LYNN ENDICOTT, KEVIN PIPE, CTIRAD UHER, ROY CLARKE, RACHEL GOLDMAN, Univ of Michigan - Ann Arbor — Antimony telluride (Sb_2Te_3) is a canonical material for thermoelectric applications. It was recently shown that ∼20 nm diameter Sb_2Te_3 nanowires, fabricated by the vapor-liquid-solid method, exhibit ∼20% enhancement in the Seebeck coefficient, S, in comparison to that of the bulk [1]. In addition, nanotrack formation was recently induced by fs-laser irradiation of Sb_2Te_3 [2]. Here, we report on the nanoscale thermoelectric properties of such fs-laser induced nanotracks on Sb_2Te_3 using scanning tunneling spectroscopy (STS) to probe the local density of states near the surface, and scanning thermoelectric microscopy (SThEM) to probe the local Seebeck coefficient just below the surface [3]. In the pristine (nanotrack) regions of Sb_2Te_3, STS reveals a bandgap of ∼0.3 eV (>1 eV), suggesting the presence of an insulating surface layer in the irradiated regions. However, SThEM shows similar thermovoltages across both the pristine and nanotrack regions, presumably due to the buried regions of Sb_2Te_3. These data suggest that the nanotracks are buried beneath an insulating surface layer, consistent with our recent transmission electron microscopy observations.

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