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Absolute Seebeck Coefficient Measurements of Thermoelectric Thin Films SARAH MASON, AZURE AVERY, DAIN BASSET, BARRY ZINK, Univ of Denver — Significant advancements in thermoelectric device efficiencies are possible through size reduction to the nanoscale. Quantities that determine a material's efficiency, such as thermopower, or Seebeck coefficient, S, are influenced by the measurement apparatus, so that measuring a thermally generated voltage gives,$\frac{dV}{dT} = S_{sample} - S_{lead}$. If accurate values of, S_{lead}, are available, simple subtraction provides S_{sample}. This is rarely the case in measurements using micromachined devices, with leads exclusively made from thin film materials that do not have well known bulk-like thermopower values. We have developed a technique to directly measure S as a function of T using a micromachined thermal isolation platform consisting of a suspended, patterned SiN membrane. By measuring a series of thicknesses of metallic films up to the infinitely thick thin film limit, in which the thermopower is no longer increasing with thickness, but still not at bulk values, we are able to show the contribution of the leads needed to measure this property. Having a thorough understanding of the background contribution we are able to determine the absolute thermopower of a wide variety of thin films, as well as their thermal and electrical conductivities, on the same sample.

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