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Nanoscale Absolute Thermopower Measurements SARAH MASON, Univ of Denver, BARRY ZINK COLLABORATION[1] — Significant advancements in thermoelectric device efficiencies have been due to size reduction to the nanoscale. With reduced dimensions come complications in measuring thermoelectric material properties. Quantities needed to characterize thermoelectric material efficiency, such as the thermopower, or Seebeck coefficient, S, are primarily contingent upon 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 the film's absolute thermopower value. This is rarely the case in nanoscale measurement 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 infinite thin film limit, in which the thermopower is no longer increasing with thickness, but still not at bulk values, along with the effective electron mean free path, we are able to show the contribution of the leads needed to measure this property. Having a comprehensive understanding of the background contribution we are able to determine the absolute thermopower of a wide variety of thin films.

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