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Measurements of thermoelectric properties in thin films as a function of temperature using micromachined thermal isolation platforms RUBINA SULTAN, AZURE AVERY, University of Denver, DAIN BASSETT, University of Denver, BARRY ZINK, University of Denver — Thermoelectrics are emerging materials for practical applications such as local cooling in integrated circuits, remote power generation in space and particularly in the field of energy conversion. The dimensionless figure of merit ($ZT = \sigma\alpha^2 T/k$) which defines the efficiency of a thermoelectric material depends on material's intrinsic properties (thermal conductivity, electrical conductivity and thermoelectric power) so the reliability and performance depends on the material itself. One challenge is to explore materials in thin film form by precisely measuring thermal and electrical transport properties using effective measurement techniques. A better thermoelectric material with optimized ZT combines a higher electrical power factor ($\sigma\alpha^2$) and lower phonon thermal conductivity. Disordered thin films and nano structures are known to have low thermal conductivity. Further, their thermal conductivity and electronic properties can be controlled by the technique of alloying. In this talk, we present our measurement technique and recent results of in plane thermal conductivity, thermopower and electrical conductivity measurements of e-beam evaporated pure amorphous Si thin films and its metal alloys in the temperature range of 77- 325 K and discuss the figure of merit.

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