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Direct Measurements of Figure-of-Merit in Amorphous Silicon-based Thermoelectric thin films RUBINA SULTAN, University of Denver, AZURE AVERY, Uinversity of Denver, BARRY ZINK, University of Denver — Thermoelectric materials may play an important role in the solution of the urgent global need for energy. The dimensionless figure of merit ($ZT = \sigma\alpha^2 T/k$) depends on three fundamental transport properties (thermal conductivity, electrical conductivity and thermoelectric power) of the material and optimizing the efficiency relies on effective measurement techniques of these quantities. These material properties may change from bulk to thin film form. The primary challenge is to search for materials with optimized electrical transport while minimizing the thermal conductivity. Amorphous materials and their alloys are relatively new functionally important materials that demonstrate superior properties in wide range of applications such as in thermoelectricity because of their low thermal conductivity due the higher degree of disorder. Previously, we reported in plane thermal conductivity of amorphous Silicon Nitride (a-Si-N) membranes. In this talk we present our measurement technique and recent results of thermoelectric properties of thin film amorphous Si and its alloys by direct measurement of in plane thermal conductivity, thermopower and electrical conductivity on one platform and discuss the thermoelectric figure of merit.

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