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Developing P-type Nanocomposites for Optimized Thermoelectrics A.D. AVERY, K.S. MISTRY, National Renewable Energy Laboratory, B.L. ZINK, University of Denver, M.L. OLSEN, P.A. PARILLA, J.L. BLACKBURN, A.J. FERGUSON, National Renewable Energy Laboratory — Nanocomposites constructed of conducting polymers with organic inclusions such as single-walled carbon nanotubes are promising candidates for materials where the thermal and electrical transport properties can be decoupled, with the aim of realizing more efficient organic thermoelectric composites. Successful realization of high-performance organic thermoelectric devices requires a detailed fundamental understanding of the factors governing thermal and electrical transport through these materials. Additionally, in reduced geometries, many of these materials are expected to be anisotropic, necessitating the ability to measure these properties in the sample plane. In this talk, we describe our suspended membrane technique for directly measuring the in-plane thermal and electrical transport in the same sample, and present results for several different thin films. We present our approach to developing p-type materials with tunable transport behavior, through fabrication of composites consisting of single-walled carbon nanotubes (SWCNTs) dispersed in a polymer matrix. Finally, we discuss post-fabrication treatments of the SWCNT thin films and the benefits offered by nanostructuring these architectures to optimize the thermoelectric dimensionless figure-of-merit, ZT.

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