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Enhanced Thermoelectric Properties in Tailored Semiconducting SWCNT Networks A.D. AVERY, Metropolitan State University of Denver, B.H. ZHOU, National Renewable Energy Laboratory, J. LEE, E. LEE, Korea Advanced Institute of Science and Technology, E.M. MILLER, R. IHLY, National Renewable Energy Laboratory, D. WESENBERG, University of Denver, K.S. MISTRY, S.L. GUILLOT, National Renewable Energy Laboratory, B.L. ZINK, University of Denver, Y. KIM, Korea Advanced Institute of Science and Technology, J.L. BLACKBURN, A.J. FERGUSON, National Renewable Energy Laboratory — Single-walled carbon nanotubes (SWCNTs) are a versatile electronic material being explored as cost-effective, high-performance alternative in a variety of renewable energy applications. In this talk, we present a series of experiments designed to probe the thermal and electrical transport through networks of semiconducting SWCNT dispersed in matrices of polyfluorene polymers. We measured electrical transport as a function of hole density to explore the coupling between the electrical conductivity and Seebeck coefficient (thermopower) in the s-SWCNT networks. These networks exhibit large thermopowers > 1000 μV/K at very low hole densities. Thermopower values remain high at high doping levels, resulting in thermoelectric power factors greater than 340 μW/m K. Finally, we present measurements that demonstrate our doping process significantly reduces the thermal conductivity relative to undoped networks suggesting s-SWCNTs are a viable material for realizing thermally stable room temperature thermoelectric devices fashioned from inexpensive and abundant organic constituents.

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