Seebeck Coefficients and Electrical Conductivities of PEDOT:PSS/Te Nanowire Organic/Inorganic Composites

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Thermoelectric generators have drawn much attention due to their capability of harvesting waste heat to generate electricity. A new class of thermoelectrics is the organic-inorganic composite because it is cost effective, and can be manufactured by a facile solution-based process. In this work, a microcircuit was fabricated to characterize the thermoelectric properties of the PEDOT:PSS/tellurium nanowire composite from 10 to 400 K. The Seebeck coefficient and the electrical conductivity were found to increase with increasing temperature through a complex, thermally activated mechanism. It is also shown that the Seebeck coefficient doubled and the electrical conductivity slightly decreased due to an oxidation process of the Te nanowires. This suggests that encapsulations of the composite will be necessary towards practical applications.

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