

Nanoscale thermoelectric energy conversion: materials and devices

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Abstract

Energy consumption in our society is rapidly increasing, but still nearly 60 % of the generated energy is wasted in the form of heat. Recently thermoelectric energy conversion has gained great attention as a viable technology to directly convert waste heat into electricity to enhance the energy efficiency. Another emerging application for thermoelectrics is harvesting energy from human body-heat on the skin using wearable thermoelectric power generators (TEGs). It has been recently demonstrated that these wearable TEGs can generate a few hundred Watts level, which is enough to power a small wearable medical sensor. In this talk, we overview the recent advances in the development of thermoelectric materials and devices, and discuss the fundamental physics behind the recent enhancement of the thermoelectric materials performance. Various high performance thermoelectric materials based on inorganic, organic materials, and their composites are introduced. Challenges in further enhancing the thermoelectric performance of these materials and in fabricating practical devices out of them are also discussed for future research directions.

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BIO:

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