Development and characterization of biphasic thermoelectrics

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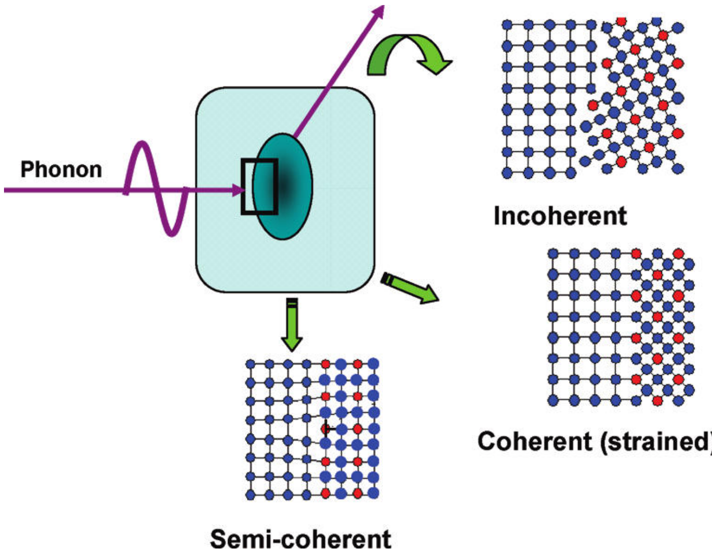
ConvEne IGERT
Supported by the National Science Foundation

Thermoelectric materials, which allow for the direct conversion between thermal and electrical energy, are promising materials for the recapture of waste heat. However, the efficiency of these devices—which are related to the dimensionless figure of merit, *zT*—must be improved to encourage wider adoption.

In our research we look to decrease the thermal conductivity, which is inversely proportional to *zT*, through the introduction of a secondary phase—currently I study Heusler inclusions in the half-Heusler thermoelectric TiNiSn, which has a large Seebeck coefficient, *S*, but a high thermal conductivity compared to commercially used thermoelectrics. The interface between the bulk matrix and inclusions acts to scatter phonons. I am looking to characterize this interaction, as well as further our understanding of how to design the microstructure for improved properties.

For this study x-ray diffraction, metallography, transport measurements and differential scanning calorimetry, among other techniques, will be used to elucidate the system.

$$zT = \frac{S^2 \cdot \sigma}{\kappa} T$$



M.G. Kanatzidis, *J. Am. Chem. Soc.* **132** (2010)

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