

Better thermoelectric properties achieved in ntype composite

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TEM micrographs for composite specimen $fBi_2Te_{2.7}Se_{0.3}$ with f =0.3vol%. Credit: Bushra Jabar



Recently, a research team from the Institute of Solid State Physics, Hefei Institutes of Physical Science showed a way to achieve high thermoelectric properties in n-type $Bi_2Te_{2.7}Se_{0.3}$ (BTS).

After incorporating nanometer-sized particles of 3-D topological insulator Bi_2Se_3 in BTS, the researchers found that this was a new alloy which could not only boost power factor remarkably, but also lower lattice <u>thermal conductivity</u> significantly.

Thermoelectric devices offer an alternative renewable energy resource to alleviate increasing global energy demands and environmental concerns. Currently, n-type BTS is used in both refrigeration and <u>power</u> generation application at/near room temperatures. But the low merit (ZT) for BTS poses a foremost barrier in elevation of energy harvesting applications.

As a result, this BTS-based composite system offered high ZT, a crucial factor in thermoelectric devices.

Thus, researchers require a strategy to improve the power factor in addition to lowering thermal conductivity, and this research offers a new approach to enhance both the power factor and phonon blocking for BTS simultaneously so as to boost its ZT significantly.

More information: Bushra Jabar et al. Enhanced power factor and thermoelectric performance for n-type $Bi_2Te_{2.7}Se_{0.3}$ based composites incorporated with 3D topological insulator nanoinclusions, *Nano Energy* (2020). <u>DOI: 10.1016/j.nanoen.2020.105512</u>

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