

Bulk and Nanocomposite Thermoelectrics: Synthesis, Properties, and Applications



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Abstract Being a possible solution to avoid many environmental, political and economic issues, thermoelectric materials have been widely investigated for their ability to convert heat into electricity in the recent past as well as their benefit in reducing the dependence on fossil fuels. In this review we tried to highlight the challenges and possible strategies to synthesize efficient thermoelectric materials. The performance of thermoelectric power harvesting systems or thermoelectric generators (TEGs) relies on the improvement of the overall figure of merit (ZT) and the output power. Nanocomposite thermoelectrics display a vibrant augmentation of ZT and the strain engineering or band manipulation in bulk thermoelectrics prospect from the overall increase in efficiency of the TEGs. In this chapter, we will discuss the processing and feasible properties of the different nanocomposite and bulk thermoelectric systems. The physical or chemical methods of nanocomposite/bulk synthesis methods will be discussed, and the theoretical background of intrinsic transport coefficients will be highlighted in this regard. The possibilities of enhancement of the efficiency can be viewed in nanocomposites with special microstructures, which in turn

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