

Alternative strategies for thermoelectric materials development

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The presently used thermoelectric materials, as Bi₂Te₃-Sb₂Te₃ and PbTe, were developed until the early 1960's. However, they show a maximum $ZT \simeq 1$, which leads to device efficiencies that are not big enough to compete with the traditional compression systems. The development of the 'Phonon Glass and Electron Crystal' (PGEC) concept, in the middle 1990's, led to the discovery of a large number of new and improved thermoelectric materials. Several strategies were used in the last years for this research. In the present contribution a review on the different strategies for new thermoelectric materials identification and development is made. This includes the study of selected semiconducting compounds, the choice and exploration of particular phase diagrams, the bulk materials grain size reduction to nano-scale dimensions, the investigation of low-dimensional systems, the research of disordered materials, etc. A special focus will be made on recent approaches used in our institutes to identify new thermoelectric materials.