Thermal Characterization of Semiconductor Bi2Te3 Alloys using Differential Scanning

Calorimetry- preliminary study

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Abstract

Thermoelectric generators are a simple, robust and attractive option for

harvesting thermal waste. Due to the increasing global demand for energy,

climate change and a need for sustainable energy solution, thermoelectric

generators are a very appealing, clean option. Despite their relatively low

efficiency, recent developments in nanotechnology prove that their response

can be improved. Therefore, a resurgence of research projects have been

dedicated to increasing their thermopower while reducing the thermal

conductivity and increasing the Seebeck coefficient and electric conductivity

of the electrical contacts. The most common thermoelectric material is

Bismuth Telluride Bi2Te3 doped with various impurities such a Selenium,

antimony, etc. Numerous fabrication and characterization methods have been

studied in order to increase the Seebeck coefficient. Two of the most

common start with a hot alloy of Bi2Te3 (most common) or a mechanical

(cold) alloy of Bi2Te3. The goal of this work is to test whether various

fabrication methods of cold alloys lead to similar heat capacity values for the

alloy, therefore offering a simpler, less expensive method of fabrication.