

Study on future prospects for feasibility of novel modifications in melt technique to improve properties of crystals for the development of Reference Materials for Thermoelectric Applications

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Abstract-

Thermoelectric materials are of importance owing to their usage in power generation and refrigeration applications. High figure of merit materials are widely employed for the said purpose. For power generation applications, Seebeck coefficient plays a vital role in this regard appropriate and precise measurement of it is required. For the said purpose proper calibration of Seebeck coefficient measurement equipment is desired which can be carried out using a reference material which is made up of wafers of high figure of merit thermoelectric materials. Bismuth Telluride (Bi_2Te_3) is one of the commonly used materials for the said purpose. In order to obtain high quality, high figure of merit single crystal for said application either advanced melt growth techniques may be utilized or modification in existing methods in a novel way may be used.

For that, the paper discusses about various novel modifications/approaches which may be designed and further developed for many thermoelectric materials to enhance their properties for the above-mentioned application. These includes use of shock waves, ampoule bulb shaped ampoule, support arrangement in ampoule which can be used in existing Vertical Bridgman (VB) Growth method in-order to reduce thermal fluctuations during growth and leading to enhancement in various properties of crystals. The details shall be presented in conference.

Keywords: Seebeck Coefficient, Reference Materials, Thermo-electrics, Vertical Bridgman Technique, Single Crystal.

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