

Preparation of n-type Bi₂Te₃ Films by Electrophoretic Deposition

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Abstract : A high quality crack-free film of Bi₂Te₃ material has been deposited for the first time using electrophoretic deposition (EPD) and microstructures of various films have been investigated. One of the most important thermoelectric (TE) applications is Bi₂Te₃ to manufacture TE generators (TEG) which can convert waste heat into electricity targeting the global warming issue. However, the high cost of the manufacturing process of TEGs keeps them expensive and out of reach for commercialization. Therefore, utilizing EPD as a simple and cost-effective method will open new opportunities for TEG's commercialization. This method has been recently used for advanced materials such as microelectronics and has attracted a lot of attention from both scientists and industry. In this study, the effect of media of suspensions has been investigated on the quality of the deposited films as well as their microstructure. In summary, finding an appropriate suspension is a critical step for a successful EPD process and has an important effect on both the film's quality and its future properties.

Keywords : Bi₂Te₃, electrical conductivity, electrophoretic deposition, thermoelectric materials, thick films

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