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Fabrication of *n*-type Bi_2Te_3 film using electrophoretic deposition for thermoelectric applications

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Abstract

Fabrication of uniform, crack-free *n*-type Bi_2Te_3 films using a fast, cost-effective, electrophoretic deposition method for thermoelectric applications has been reported in this study. The sintering process has been done at 693K to achieve compact and dense coatings. The microstructures of the surface of the green and sintered films, as well as their thicknesses, have been investigated using SEM, which showed a uniform and even film has resulted using electrophoretic deposition (EPD). Furthermore, the Seebeck coefficients of the green and sintered films have been measured and in-plane Seebeck coefficients of 189 μV/K have been recorded for the sintered film at 500 K.

Keywords—Electrophoretic deposition; Bi_2Te_3 Thick Films; Microstructure; Sintering; Seebeck coefficient; Thermoelectric materials.

Introduction

Thermoelectric (TE) materials are capable of generating potential differences when exposed to a temperature gradient [1]. The temperature difference can be provided by the enormous amount of

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