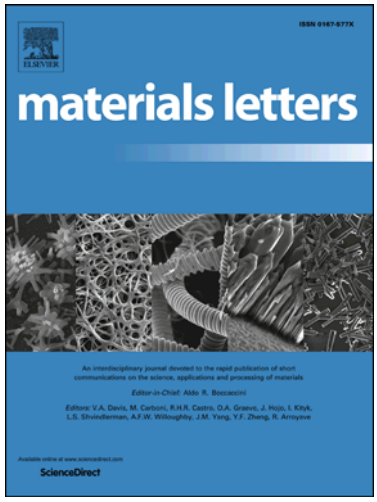

Control of oxygen content of n-type Bi_2Te_3 based compounds by sintering process and their thermoelectric properties

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Control of oxygen content of n-type Bi_2Te_3 based compounds by sintering process and their thermoelectric properties

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Abstract

Oxygen content in n-type Bi_2Te_3-based alloys plays a crucial role in determining the thermoelectric properties. We aimed to control the residual oxygen that originated from the ball milling process; for this, sintering processes such as spark plasma sintering (SPS) and plasma activated sintering (PAS) were utilized. The reduction of oxygen content was successfully achieved with PAS, leading to improved electrical properties. With the removal of residual oxygen, the carrier concentration increased, resulting in reduced electrical resistivity. The phonon thermal conductivity was reduced due to the grain size of this sample, which was smaller than that of the hot-pressed (HP) samples. An enhanced value of the dimensionless figure of merit (ZT) of 0.83 at 473 K, an increase of 25.2% compared with that of the HP samples, was achieved. The selection of the appropriate sintering process should be considered to remove oxygen content, as well as to minimize grain growth.

Keywords; thermoelectrics, Bi_2Te_3, oxygen content, plasma activated sintering

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