

Texture induced thermoelectric transport and mechanical properties of bismuth telluride thermoelectric compounds

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Bi₂Te₃-based compounds are good candidates for the low temperature thermoelectric (TE) power generation application due to their low thermal conductivity. These compounds possess rhombohedra structure, which consists of close (0001) basal plane. Our study shows that bulk Bi₂Te₃-based compounds processed through powder consolidation using hot pressed spark-plasma-sintering (SPS) or hot extrusion are anisotropic. We have found that the resultant bulk Bi₂Te₃-based compounds exhibit a strong (01-10) texture along the extrusion direction or perpendicular to hot press direction of SPS. We also have found that the processing-induced texture has a great impact on the mechanical properties and thermoelectric transport. The effect of the texture on mechanical strength and figure of merit (ZT), measure for TE transport efficiency, for these Bi₂Te₃-based compound has been quantified and correlated. In this presentation, we will present and discuss the correlation among the texture, mechanical property and TE transport property.

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