**High-Performance Bi2Te3 Thermoelectric Materials *via* Modulation of Carrier Concentration Guided by SPB Model**

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**Abstract**

Thermoelectric materials, enabling the direct conversion between thermal and electrical energies, have been considered as energy-saving alternatives for sustainable power generation. Due to the intrinsic interdependence of thermoelectric parameters, including electrical conductivity, Seebeck coefficient, and electrical thermal conductivity, modulation of carrier concentration (*n*) is of vital significance to obtain thermoelectric materials with high energy conversion efficiency, which is gauged by a dimensionless figure of merit *zT*. Here, we utilize the single parabolic band (SPB) model to predict the optimal *n* (~ 1 × 1019 cm-3) of bismuth telluride (Bi2Te3), and guide our experimental design. By reducing *n* from ~ 1 ×1020 cm-3 in the intrinsic Bi2Te3 to ~ 6 ×1019 cm-3 in the Cr introduced Bi2Te3, *zT* was effectively improved from 0.7 to 1.08 at 470 K, and high average *zT* close to 1 was achieved from 300 K to 470 K.



**Figure 1.** Calculation results of SPB model showing the effective *zT* enhancement with reduced *n*.

**References**

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