Developing *n*-type thermoelectric materials with ultrahigh power factor

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As technologies advances, the demand of electronic devices rises gradually and the sizes that required for these devices becomes more compact. Thus, the heat dissipation becomes an issue for the electronic devices. Thermoelectric (TE) materials are capable of converting thermal energy into electricity. Therefore, the TE materials has the applications of waste heat recovery and refrigeration. Among all, bismuth telluride is the most representative material for refrigeration and other near room-temperature applications. This research focus on the thermoelectric properties of Cu-doped Bi_2Te_3. In our slightly doped samples, we found out that the Cu-Bi2Te3 has the potential to reach an ultrahigh power factor of 10 mW/mK^2) and it appears n-type conducting. This may be attribute to the low electrical resistivity (ρ = 0.45 mΩcm) which is lower than other literatures. Accordingly, its zT value increased to 1.8. This value is 108% higher when comparing to the highest value (zT = 1.25) in previous literature of room temperature n-type BiSeTe+InSb. Moreover, this sample is reproducible. Owing to the high *PF*, the *n*-type Cu-Bi_2Te_3 has great potential in the field of TE refrigerating.