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**Phase diagram of thermoelectric Bi<sub>2</sub>S<sub>3</sub>-Bi<sub>2</sub>Se<sub>3</sub>-Bi<sub>2</sub>Te<sub>3</sub> system**

WEISHU LIU, QINYONG ZHANG, QIAN ZHANG, Boston College, BO YU, GANG CHEN, ZHIFENG REN, Boston College, BOSTON COLLEGE TEAM, MIT TEAM — It is well known that the highest ZT value, at an optimized carrier concentration, is mainly determined by a material parameter  $\beta = \mu(m^*/m_0)^{3/2}/\kappa_{\text{lat}}$ , where  $\mu(m^*/m_0)^{3/2}$  and  $\kappa_{\text{lat}}$  are the weighted carrier mobility and lattice thermal conductivity, respectively. In order to explore some new compositions in Bi<sub>2</sub>S<sub>3</sub>-Bi<sub>2</sub>Se<sub>3</sub>-Bi<sub>2</sub>Te<sub>3</sub> system, we propose a compositional thermoelectric phase diagram (TPD), including weighted carrier mobility, lattice thermal conductivity, and material parameter, for the 1% copper doped Bi<sub>2</sub>S<sub>3</sub>-Bi<sub>2</sub>Se<sub>3</sub>-Bi<sub>2</sub>Te<sub>3</sub> solid solution fabricated by MA-HP method. Here, the  $\mu(m^*/m_0)^{3/2}$  and  $\kappa_{\text{lat}}$  values could be deduced from the measured electrical resistivity, Seebeck coefficient, and thermal conductivity. The alloying effect on the thermoelectric phase diagram will be discussed from varying atomic size, chemical bond, lattice structure, etc.

Weishu Liu  
Boston College

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