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Ternary p-type half-Heuslers: another perspective bulk thermoelectrics XIAO YAN, WEISHU LIU, HUI WANG, DEZHI WANG, Boston College, GANG CHEN, MIT, ZHIFENG REN, Boston College, BOSTON COLLEGE TEAM, MIT COLLABORATION — By employing the nanocomposite approach, we have achieved peak ZT of 0.8 at 700 °C for p-type $Hf_{0.5}Zr_{0.5}CoSb_{0.8}Sn_{0.2}$. A larger difference in atomic mass and size of Hf and Ti than Hf and Zr in the crystal structure has produced a peak ZT of ∼1.1 at 800 °C for p-type $Hf_{0.8}Ti_{0.2}CoSb_{0.8}Sn_{0.2}$. However the ZT peak is on the high temperature side. A ternary combination of Ti, Zr, and Hf at M site (MCoSb) has given rise to higher ZT in n-type MNiSn system. Will ternary on the M site yield better ZT for p-type? In this report, we will present our recent achievement of 10-25% ZT improvement for temperature range 25-700 °C without sacrificing the peak ZT value of 1.1 at 800 °C.

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