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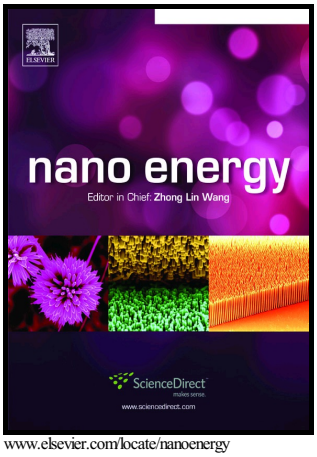

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Shuankui Li[a], Xuerui Liu[a], Yidong Liu[a], Fusheng Liu[b], Jun Luo[c], Feng Pan[a*]

[a]School of Advanced Materials, Peking University Shenzhen Graduate School, Shenzhen, 518055, China

[b]College of Materials Science and Engineering, Shenzhen University and Shenzhen Key Laboratory of Special Functional Materials, Shenzhen, 518060, China

[c]School of Materials Science and Engineering, Shanghai University, Shanghai, 200444, China

panfeng@pkusz.edu.cn

Abstract

Tuning the electron and phonon transport properties of thermoelectric materials to partially decouple electrical conductivity, Seebeck coefficient and thermal conductivity is the core issue to improve the conversion efficiency. Herein, $Bi_2Te_{2.7}Se_{0.3}/SnS_2$ nanocomposites with a unique hetero-structure that the 2D atomically thin SnS_2 nanosheets (2-15 nm) homogeneously assembled on BTS grain boundaries have been successfully synthesized to explore the size-dependent electron and phonon regulating effects. The atomically thin $Bi_2Te_{2.7}Se_{0.3}/SnS_2$