Electronic Supplementary Information

Synergistic tuning of carrier and phonon scattering for high performance of n-type $Bi_2Te_{2.5}Se_{0.5}$ thermoelectric material

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1. The lattice parameters of the samples with different content of $MnTe_2$.

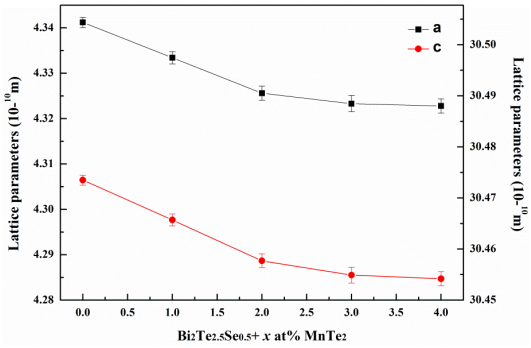

Figure S1. Lattice parameters of $Bi_2Te_{2.5}Se_{0.5}$ + *x* at.% $MnTe_2$

2. Rietveld refinements.

The XRD patterns of x=3.0 and x=4.0 samples have been refined by the GSAS with EXPGUI interface[1,2]. The refined composition for x=3.0 and x=4.0 are $Bi_{1.864(2)}Te_{2.531(1)}Se_{0.468(9)}Mn_{0.135(8)}$ and $Bi_{1.863(6)}Te_{2.530(8)}Se_{0.469(2)}Mn_{0.136(4)}$.

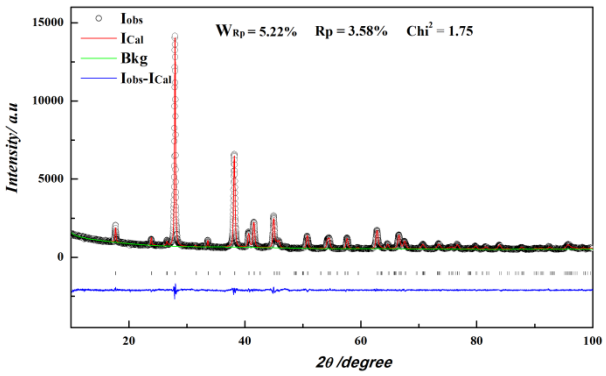

Figure S2. Rietveld refinements for *x*=3.0 sample.

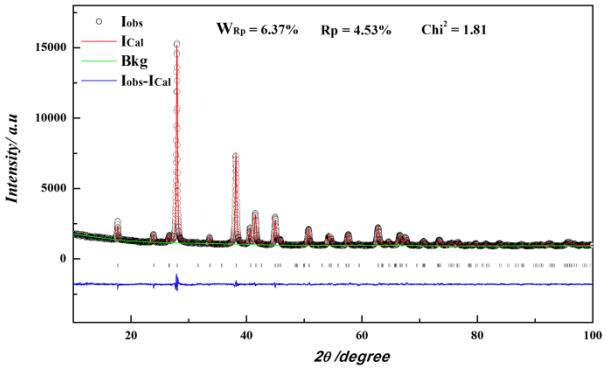

Figure S3. Rietveld refinements for *x*=4.0 sample.

3. Estimation for the band gap by Goldsmid-Sharp method[3]

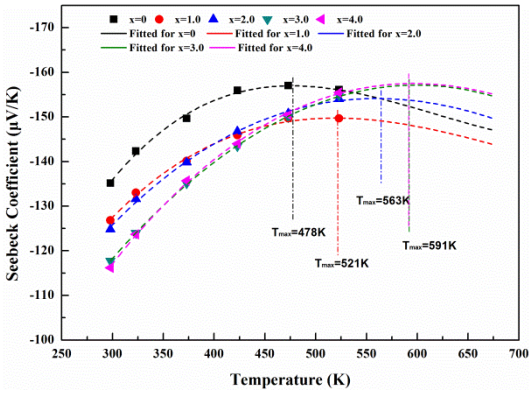

Figure S4. Estimation for the band gap by Goldsmid-Sharp method

4. Power factors of the samples with different content of $MnTe_2$.

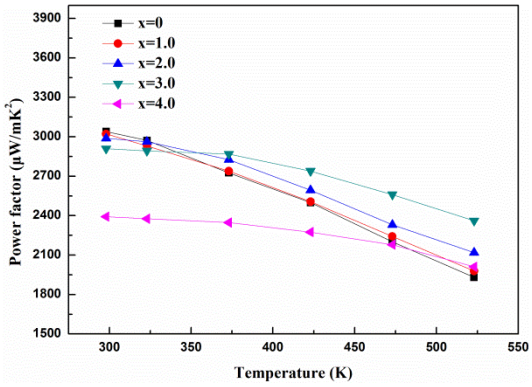

Figure S5. The power factor for $Bi_2Te_{2.5}Se_{0.5}$ + *x* at% $MnTe_2$

References

[1] A.C. Larson and R.B. Von Dreele, General Structure Analysis System (GSAS), Los Alamos National Laboratory Report LAUR 86-748, 2004.

[2] Brian H. Toby, J. Appl. Cryst. 34, 210-213, 2001.

[3] H. J. Goldsmid and J. W. Sharp, J Electron Mater., 1999,28,869.