

Supporting Information

Electrical and thermal transport properties of spark plasma sintered *n*-type

Bi₂Te_{3-x}Se_x alloys: combined effect of point defect and Se content

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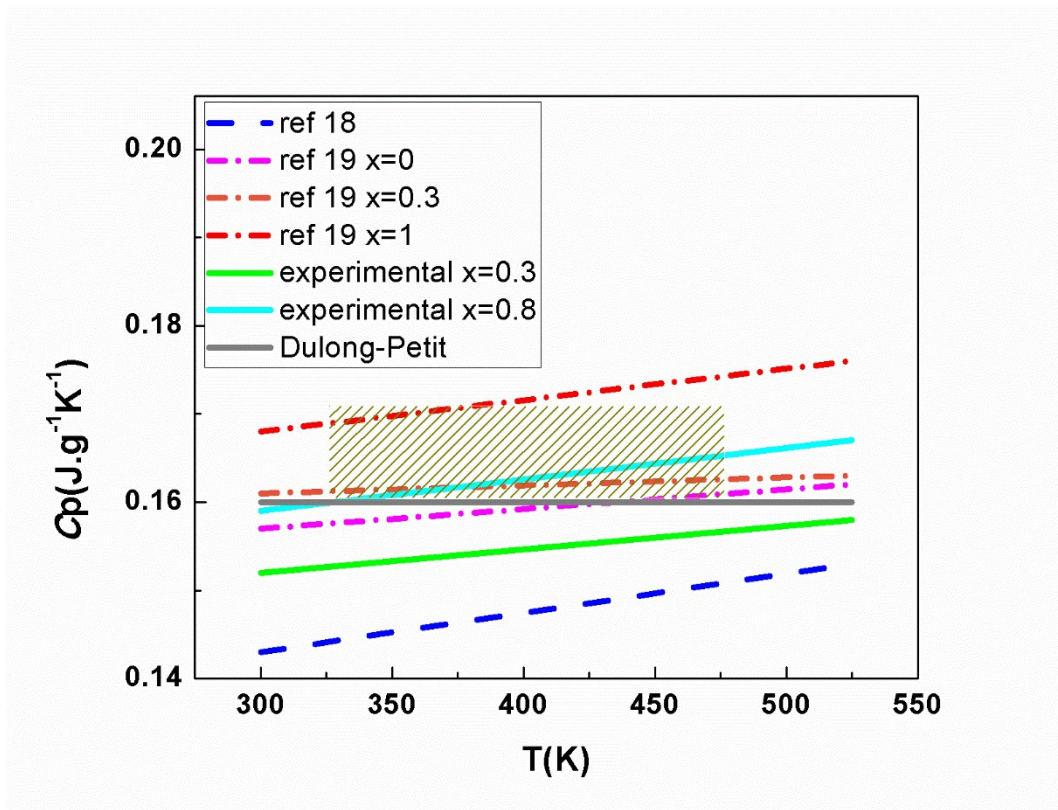


Fig. S1 Specific heat of the $\text{Bi}_2\text{Te}_{2-x}\text{Se}_x$ samples. The shadow parts are the adopted values and other lines are reference values for comparison.

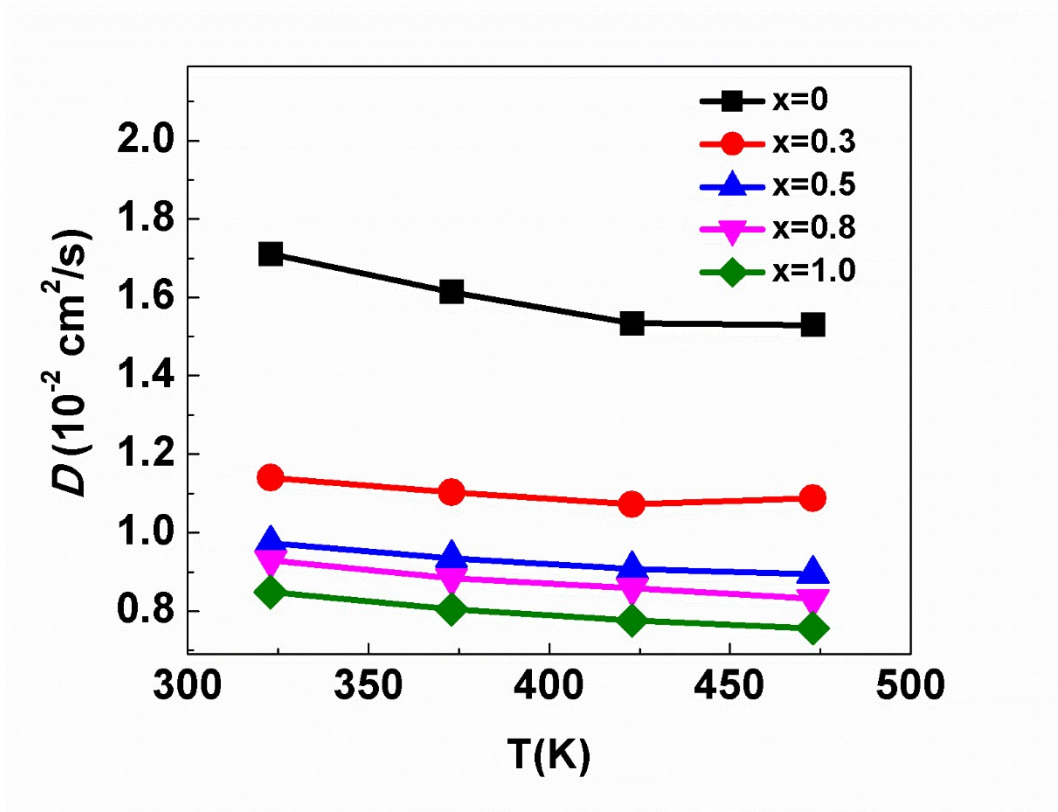


Fig. S2 Thermal diffusivity coefficient of the samples $\text{Bi}_2\text{Te}_{3-x}\text{Se}_x$ ($x=0, 0.3, 0.5, 0.8$ and 1).

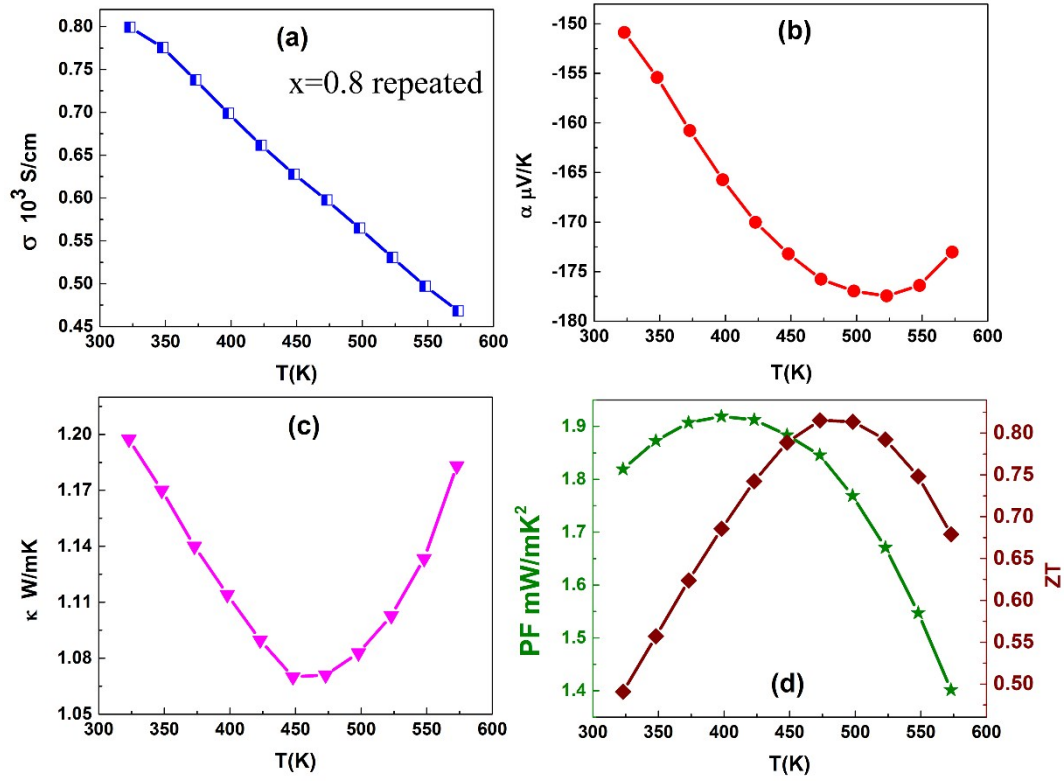


Fig. S3 Temperature dependence of electrical and thermal transport properties of the re-prepared sample $\text{Bi}_2\text{Te}_{2.2}\text{Se}_{0.8}$ (named $x=0.8$ repeated in the manuscript) from 323K to 573K. This high temperature measurement up to 573K proves that the maximum ZT value is limited at 473K. In addition, the uptrend of the thermal conductivity at $\sim 473\text{K}$ demonstrates the onset temperature of the bipolar effect.

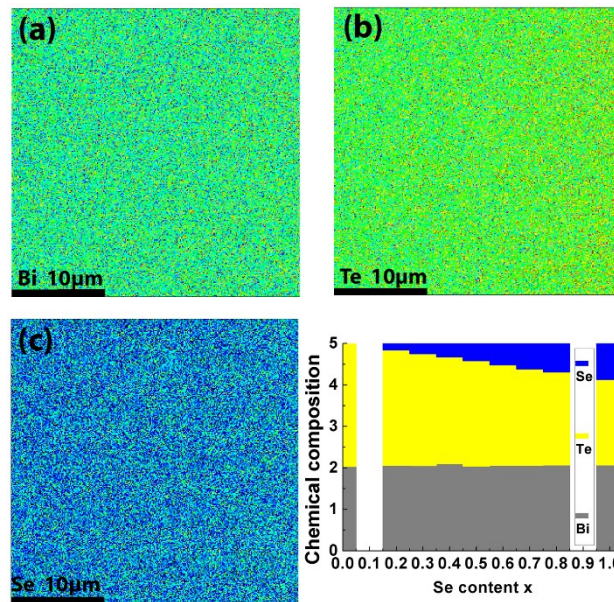


Fig. S4 EPMA mapping of main elements on polished $\text{Bi}_2\text{Te}_{2.2}\text{Se}_{0.8}$ surface (a) Bi, (b) Te, (c) Se and quantitative analysis results.

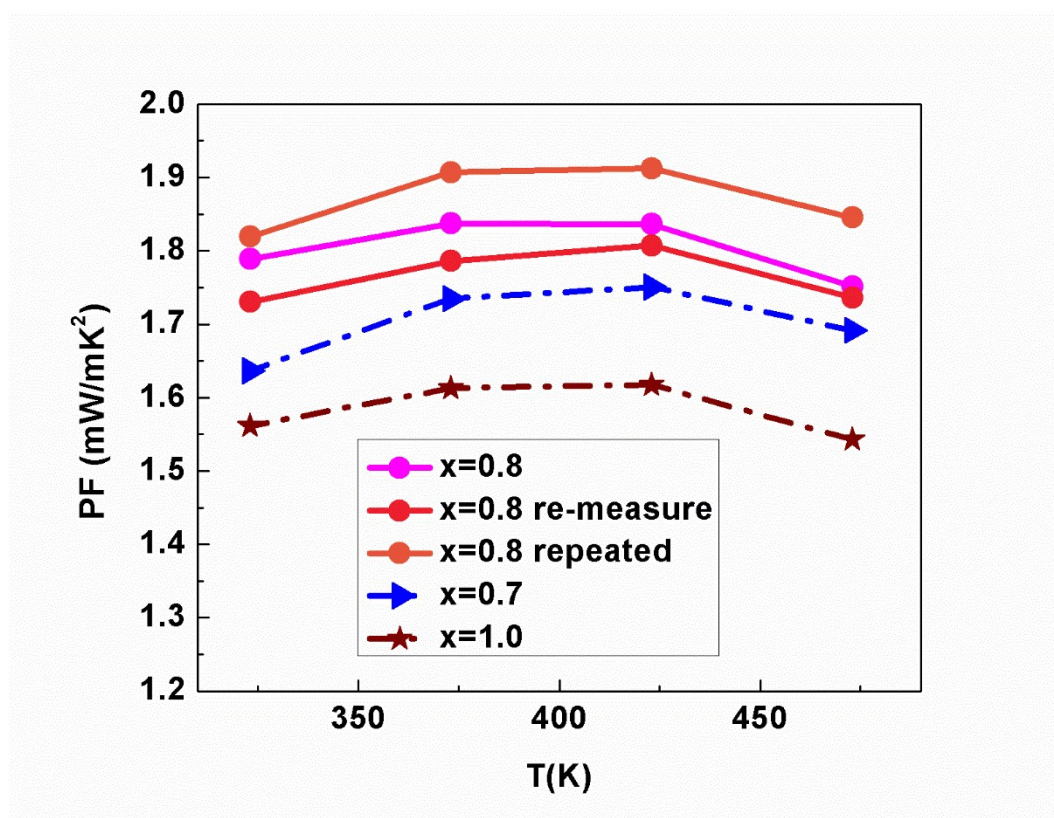


Fig. S5 Comparison of the power factors of $\text{Bi}_2\text{Te}_{2.2}\text{Se}_{0.8}$ to adjacent composition $\text{Bi}_2\text{Te}_{2.3}\text{Se}_{0.7}$ and $\text{Bi}_2\text{Te}_2\text{Se}_1$.

Se contents x	0	0.2	0.3	0.4
Lorenz number L ($10^{-8} \text{ V}^2\text{K}^{-2}$)	1.77	1.72	1.71	1.69
	0.5	0.6	0.7	0.8
	1.85	1.69	1.68	1.66
				1.63

Fig. S6 Calculated Lorenz number

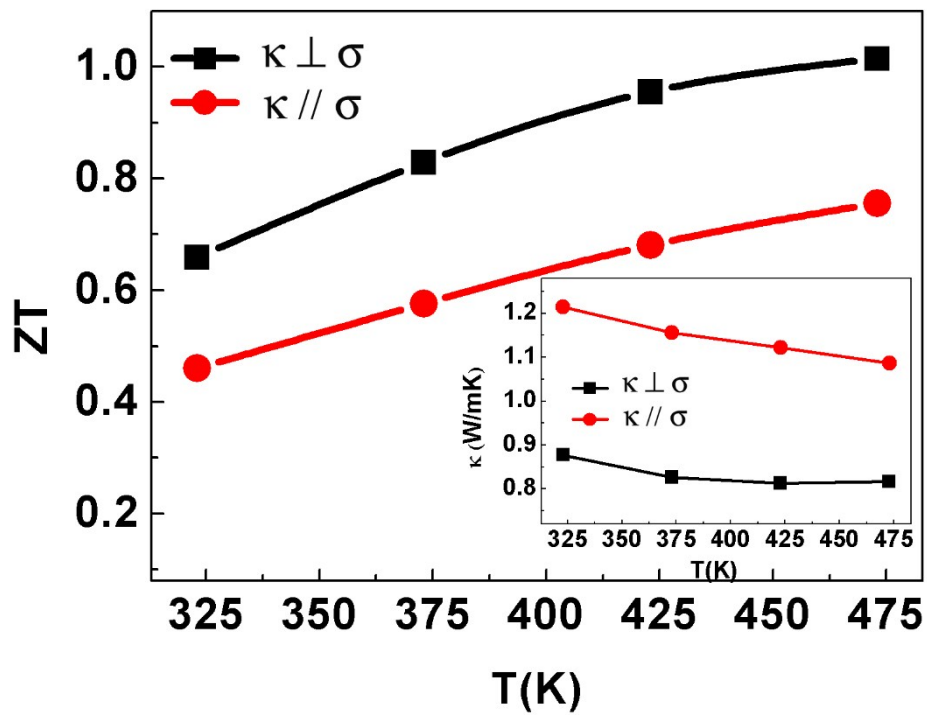


Fig. S7 Comparison of the ZT of $\text{Bi}_2\text{Te}_{2.2}\text{Se}_{0.8}$ with thermal conductivity measured perpendicular and parallel to the measuring direction of electrical conductivity.