Electronic Supplementary Information

Investigation into the optimized growth, anisotropic properties and theoretical calculations of the polar material $Cs_2TeW_3O_{12}$

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1. **Figure S1**. Experimental and calculated powder X-ray diffraction patterns of $Cs_2TeW_3O_{12}$ polycrystalline.

2. **Figure S2**. (a) and (b) Photographs of the as-grown $Cs_2TeW_3O_{12}$ crystals in a narrow and large thermostatic field, respectively.

3. **Figure S3.** Viscosity versus temperature curves in different flux systems, where the viscosity of the TeO_2-Cs_2CO_3 flux system is evidently lower than that of the TeO_2 flux system.

4. **Figure S4**. Specific heat vs. temperature for $Cs_2TeW_3O_{12}$.

5. **Figure S5**. The processing orientations of $Cs_2TeW_3O_{12}$ crystal for measuring the thermal diffusion and thermal conductivity coefficients.

6. **Table S1**. Observed Raman wavenumbers (cm^{-1}) and vibrational assignments for $Cs_2TeW_3O_{12}$ crystal.

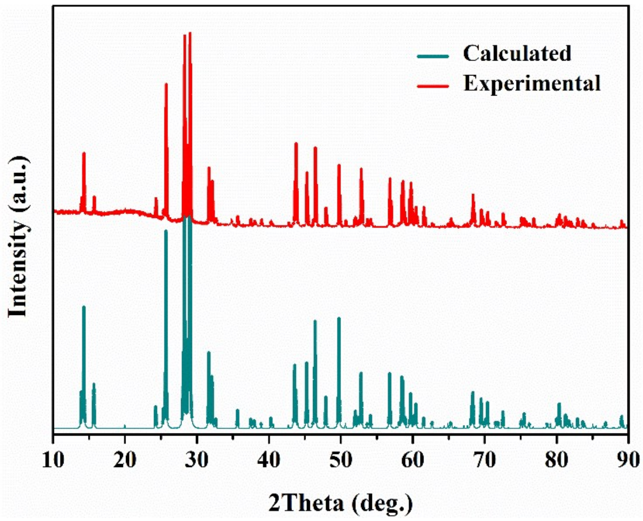

Figure S1. Experimental and calculated powder X-ray diffraction patterns of $Cs_2TeW_3O_{12}$ polycrystalline.

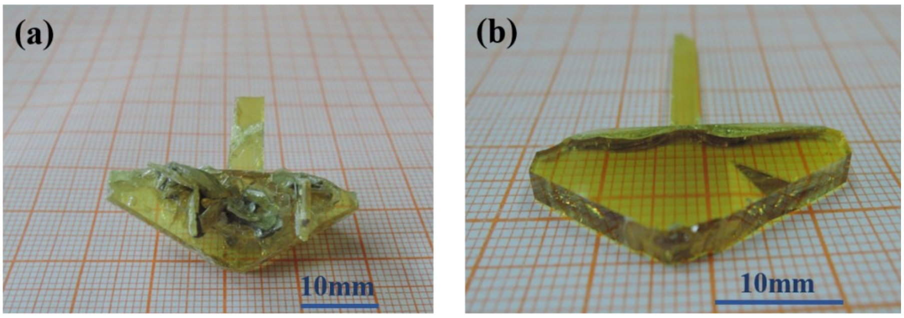

Figure S2. (a) and (b) Photographs of the as-grown $Cs_2TeW_3O_{12}$ crystals in a narrow and large thermostatic field, respectively.

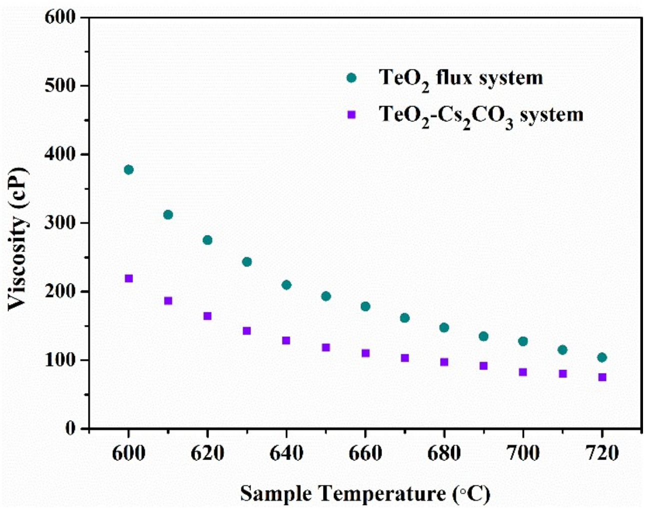

Figure S3. Viscosity versus temperature curves in different flux systems, where the viscosity of the TeO_2-Cs_2CO_3 flux system is evidently lower than that of the TeO_2 flux system.

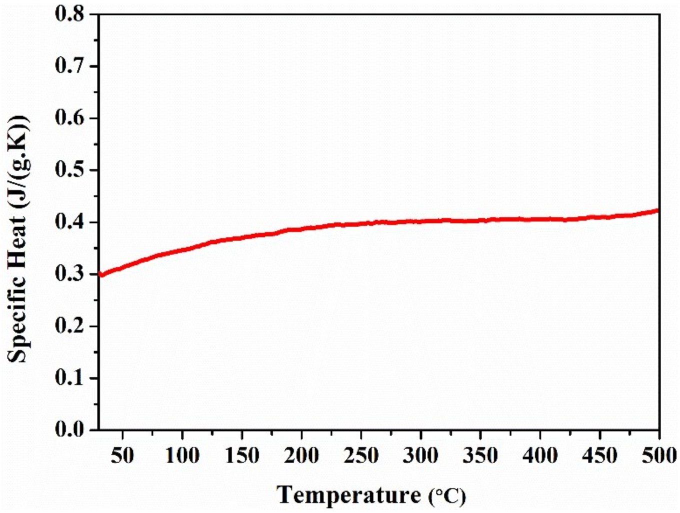

Figure 4. Specific heat vs. temperature for the $Cs_2TeW_3O_{12}$ crystal.

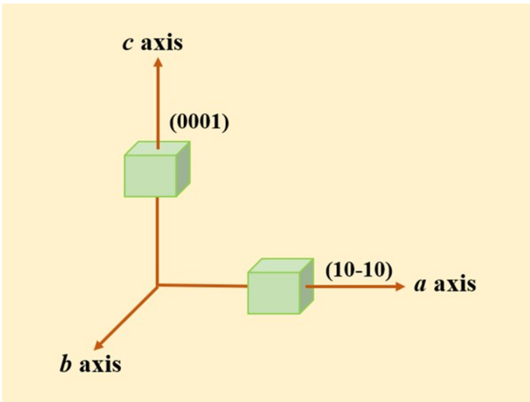

Figure S5. The processing orientations of $Cs_2TeW_3O_{12}$ crystal for measuring the thermal diffusion and thermal conductivity coefficients.

Table S1. Observed Raman wavenumbers (cm^{-1}) and vibrational assignments for the $Cs_2TeW_3O_{12}$ crystal.[1-3]

Raman spectra (cm^{-1})	Assignments
146.55 (vs)	translational motions of W^{6+}, $Te^{4+}$and Cs^{+} cations
200-600 (w)	bending modes of W-O bonds, Te-O bonds, and W-O-Te bridges
665.52 (s)	W-O bonds and W-O-Te bridges
674.14 (s)	W-O bonds and W-O-Te bridges
910.34 (vs)	stretching vibrations of the short W-O bonds
937.94 (m)	stretching vibrations of the short W-O bonds

In the table, vs: very strong; s: strong; m: medium; w: weak;

References

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