Supporting Information

Synthesis, structure and nonlinear optical properties of solution-processed Bi_2TeO_5 nanocrystals

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Table S1. Boiling temperature of the water and ethylene glycol mixed solvent at different composition, as well as the corresponding effect on the final products of the reaction.

Ethylene glycol (ml)	Water (ml)	Boling temperature (°C)	Final products
40	0	~196	Bi_2Te_3
40	1	~180	-
40	2	~164	-
40	3	~154	Bi_2Te_3
40	4	~148	-
40	5	~141	Bi_2TeO_5
40	6	~136	Bi_2TeO_5
40	7	~131	Bi_2TeO_5
40	8	~128	Bi_2TeO_5

Note: The precursors $Bi(OOCCH_3)_3$, $K_2TeO_3{\cdot}H_2O$ and KOH were set to 1.0, 1.5 and 10 mmol respectively, and the reaction time was set to 3 hours.

Table S2. The reaction yield of 4 Bi_2TeO_5 nanocrystals with different growth conditions. The reaction yield is calculated by the ratio of the experimental weight and theoretical weight.

Sample	H_2O (ml)	KOH (mmol)	Temperature (^oC)	Theoretical weight (g)	Experimental weight (g)	Yield
1	8	1	~128	0.3128	0.2645	84.56%
2	7	1	~131	0.3128	0.2647	84.62%
3	6	1	~136	0.3128	0.2623	83.86%
4	6	5	~136	0.3128	0.2540	81.20%

Note: Other same parameters: $Bi(OOCCH_3)_3$ 1 mmol; $K_2TeO_3{\cdot}H_2O$ 0.5 mmol; PVP 0.4 g; EG 40 ml.

Table S3. The comparison of solution growth strategies for different NLO nanocrystals.

Solution-growth	Growth time	Reaction temperature	Preparation process	Morphology control	Reference
$LiNbO_3$	30-96 h	220 °C	Without post-treatment	Size control	Ref. 15
$BaTiO_3$	66 h	220 °C	Need protecting gas and pre-treatment	Size control	Ref. 14
$KTiOPO_4$	~56 h	100°C then 700 °C	Multiple heat treatment	Sizes control	Ref. 13
Bi_2TeO_5	3 h	128-141 °C	Without further heat treatment or the use of protecting gas	Sizes and Shapes control	This work

Note: The reference number corresponds to the citation number in the manuscript.

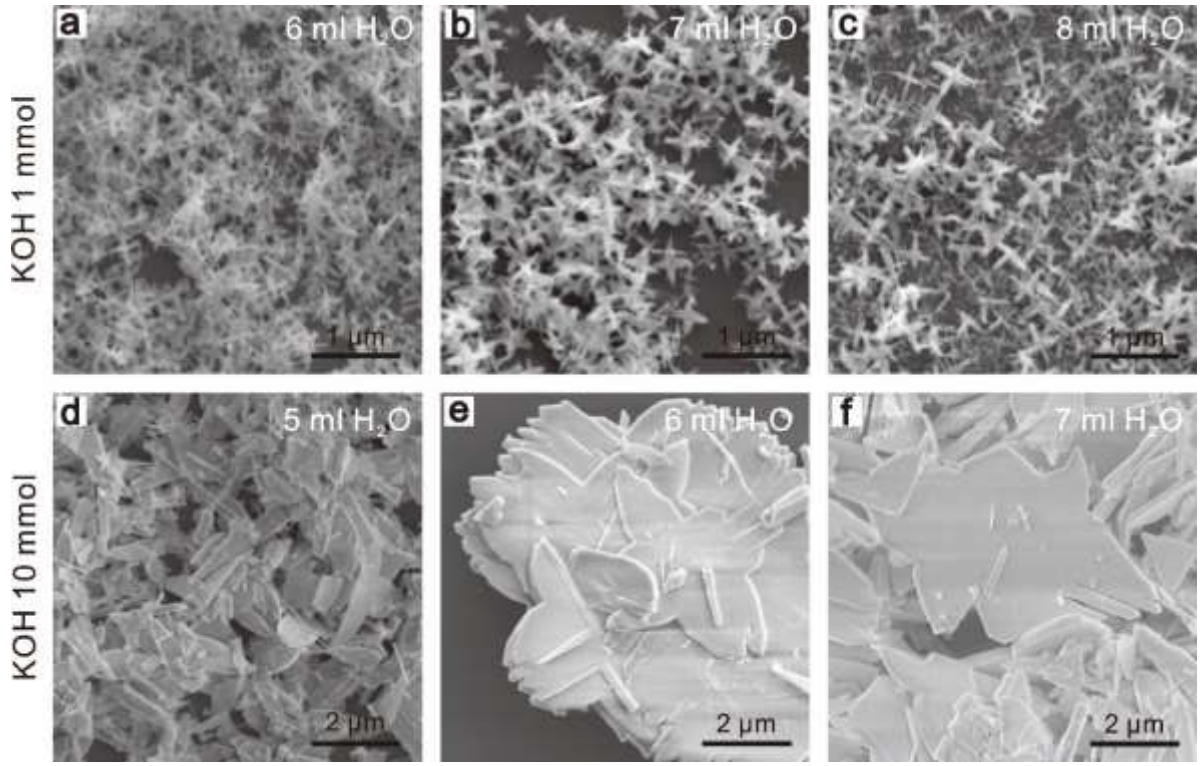

Figure S1. Morphology control of the Bi_2TeO_5 nanocrystals by tuning the mixed solvent. The added H_2O is set to **(a)** 6, **(b)** 7 and **(c)** 8 ml with 1mmol KOH, and **(d)** 5, **(e)** 6 and **(f)** 8 ml with 10 mmol KOH. The other same growth parameters are set as: 40 ml EG; 1 mmol $Bi(OOCCH_3)_3$ and 0.5 mmol $K_2TeO_3 \cdot H_2O$.

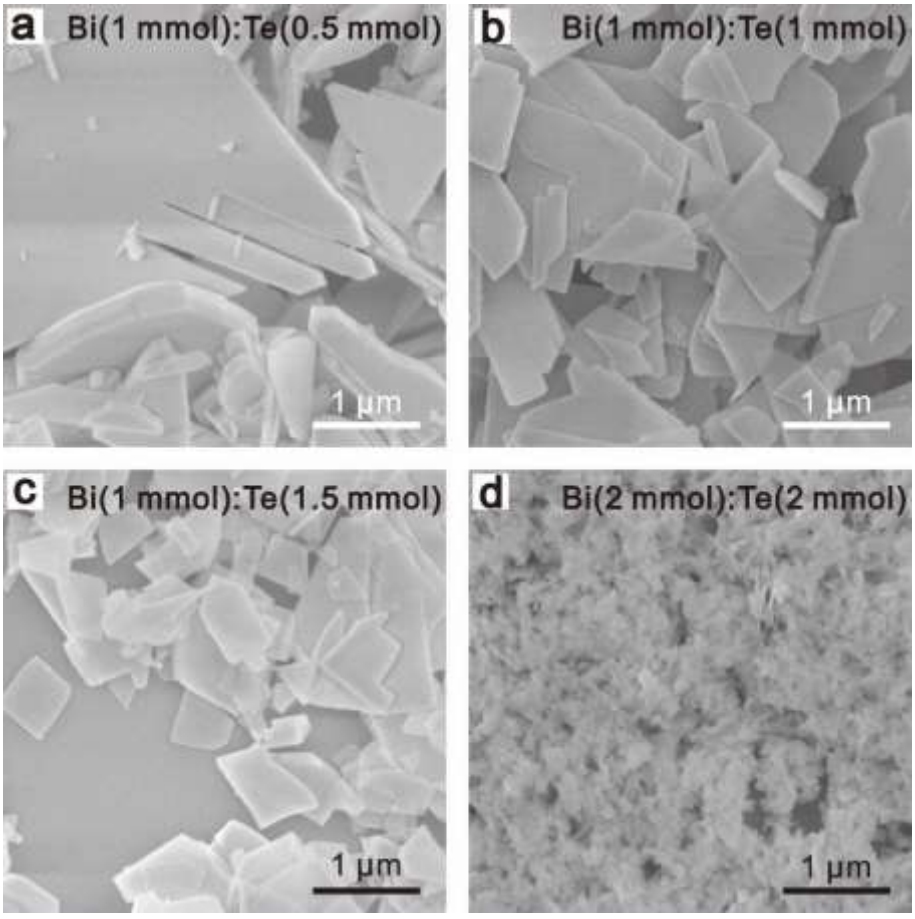

Figure S2. Morphology control of the Bi_2TeO_5 nanocrystals by tuning the precursors. The added $Bi(OOCCH_3)_3$ - $K_2TeO_3 \cdot H_2O$ is set to **(a)** 1 mmol-0.5 mmol, **(b)** 1 mmol-1 mmol, **(c)** 1 mmol-1.5 mmol and **(d)** 2 mmol-2 mmol respectively. The other same growth parameters are set as: 40 ml EG/6ml H_2O mixed solvent; 10 mmol KOH.

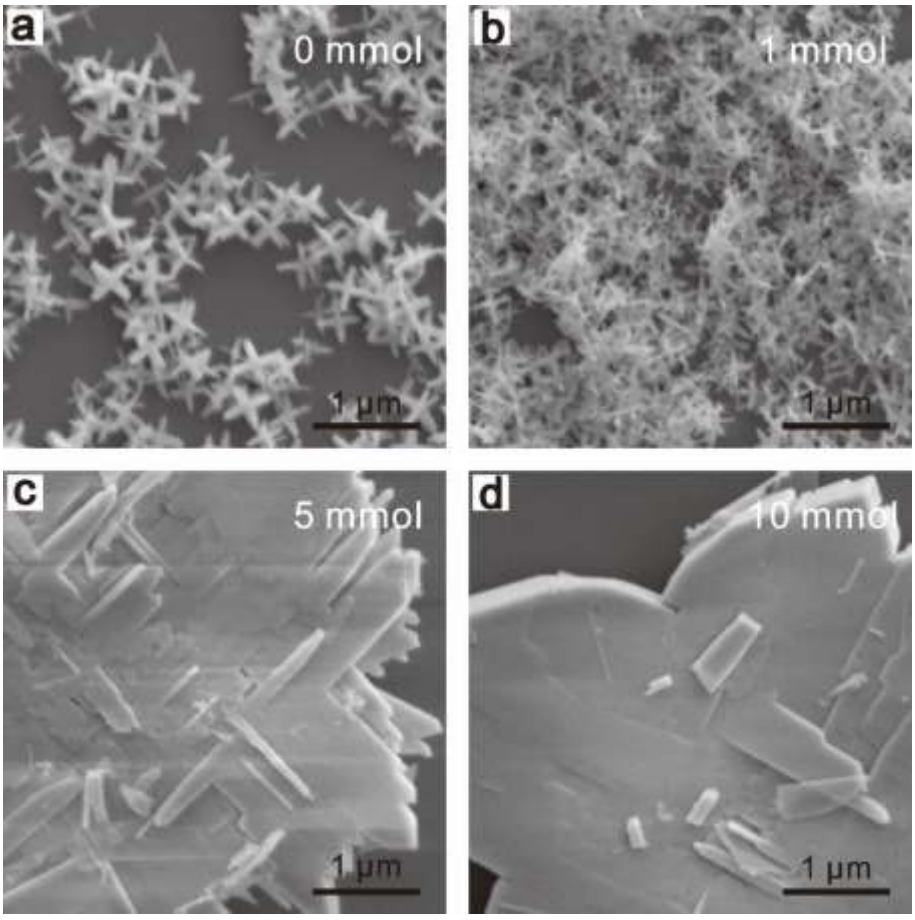

Figure S3. Morphology control of the Bi_2TeO_5 nanocrystals by KOH. The added KOH is set to **(a)** 0, **(b)** 1, **(c)** 5 and **(d)** 10 mmol in the 4 samples respectively. The other same growth parameters are set as: 40 ml EG/6ml H_2O mixed solvent; 1 mmol $Bi(OOCCH_3)_3$ and 0.5 mmol $K_2TeO_3 \cdot H_2O$.

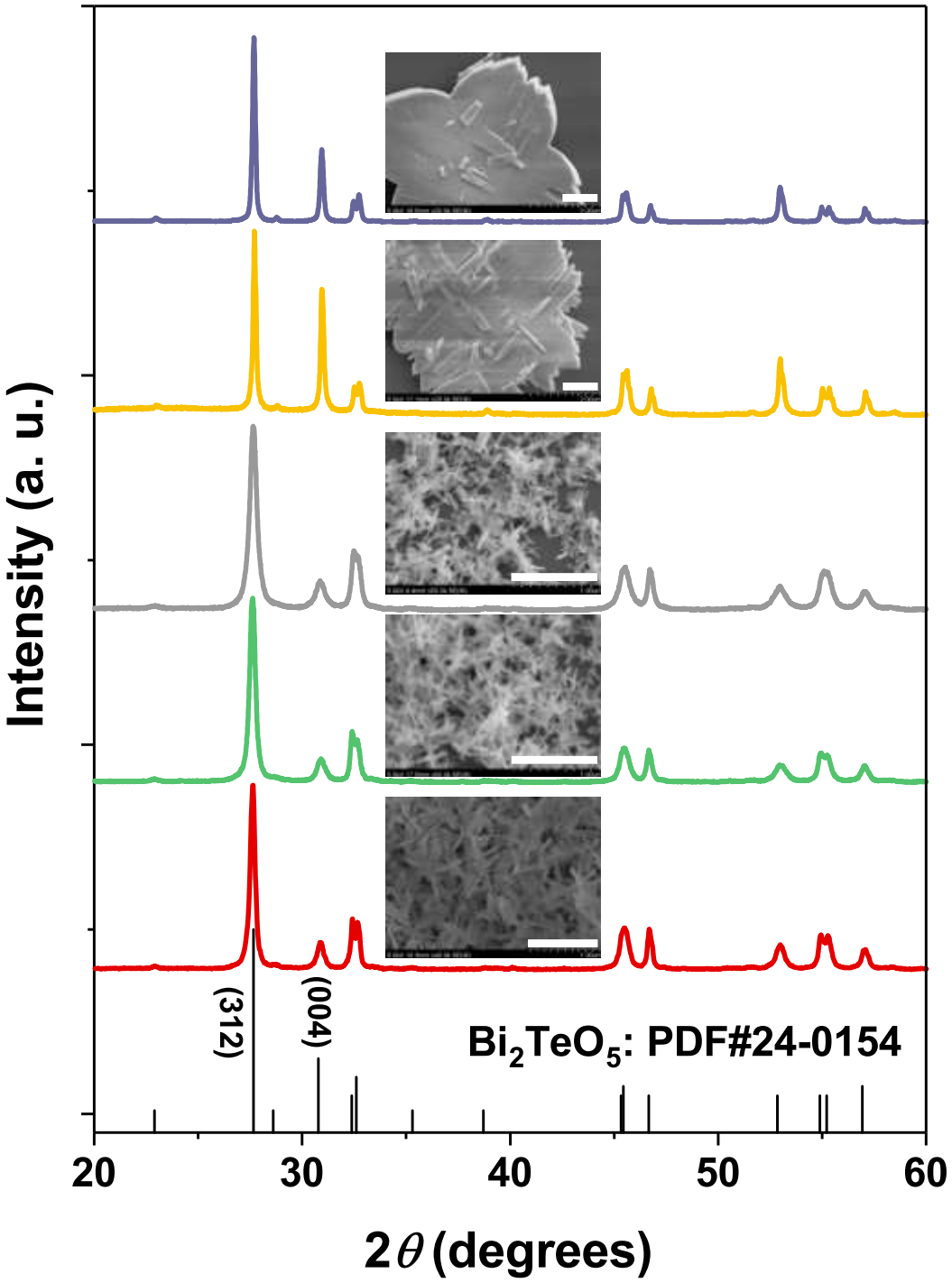

Figure S4. XRD patterns of 5 different Bi_2TeO_5 nanocrystals under different growth conditions, which agree well with the reference Bi_2TeO_5 crystal structure (PDF#24-0154, Cell: 16.45 Å×5.52 Å×11.61 Å, α=β=γ=90°). The scale bars in the inset SEM images are 1 μm. The peak (004) increases as the crystal size of the samples increase, indicating the tendency of forming layered structures when those nanocrystals grow larger.