

Supporting information for Preparation, property characterization of $\text{Gd}_2\text{YSbO}_7/\text{ZnBiNbO}_5$ heterojunction photocatalyst for photocatalytic degradation of benzotriazole under visible light irradiation

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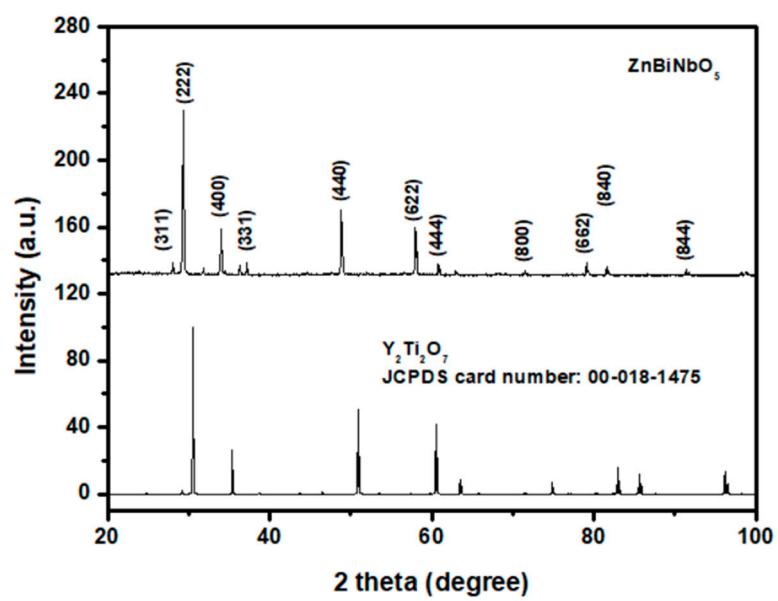


Figure S1. X-ray powder diffraction patterns of ZnBiNbO_5 and JCPDS of $\text{Y}_2\text{Ti}_2\text{O}_7$.

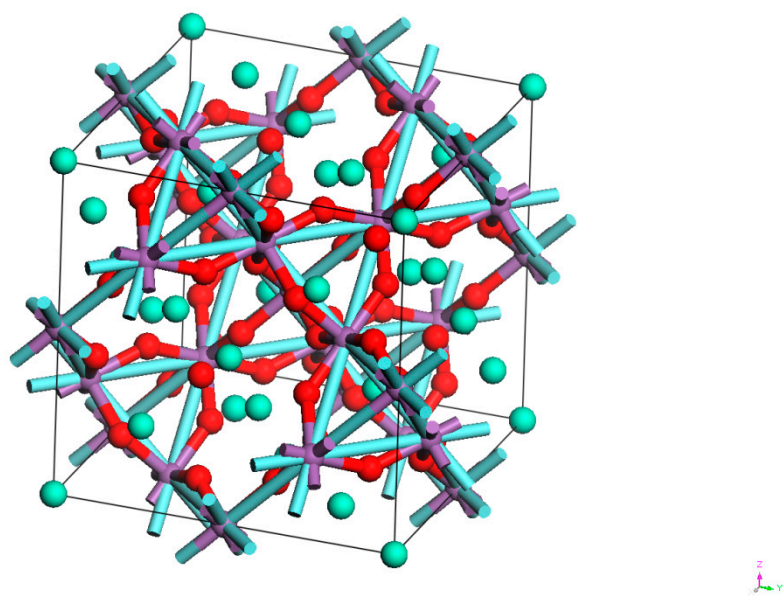


Figure S2. Atomic structure of ZnBiNbO_5 . (Red atom: O, cyan atom: Zn, purple atom: Bi or Nb.).

Table S1. Structural parameters of Gd₂YSbO₇ prepared by solid state reaction method.

Atom	x	y	z	Occupation factor
Gd	0	0	0	1
Y	0.5	0.5	0.5	0.5
Sb	0.5	0.5	0.5	0.5
O(1)	-0.185	0.125	0.125	1
O(2)	0.125	0.125	0.125	1

Table S2. Structural parameters of ZnBiNbO₅ prepared by solid state reaction method.

Atom	x	y	z	Occupation factor
Zn	0.5	0.5	0.5	1
Bi	0	0	0	1
Nb	0.5	0.5	0.5	1
O(1)	0.125	0.125	0.125	0.5
O(2)	0.125	0.125	0.375	1

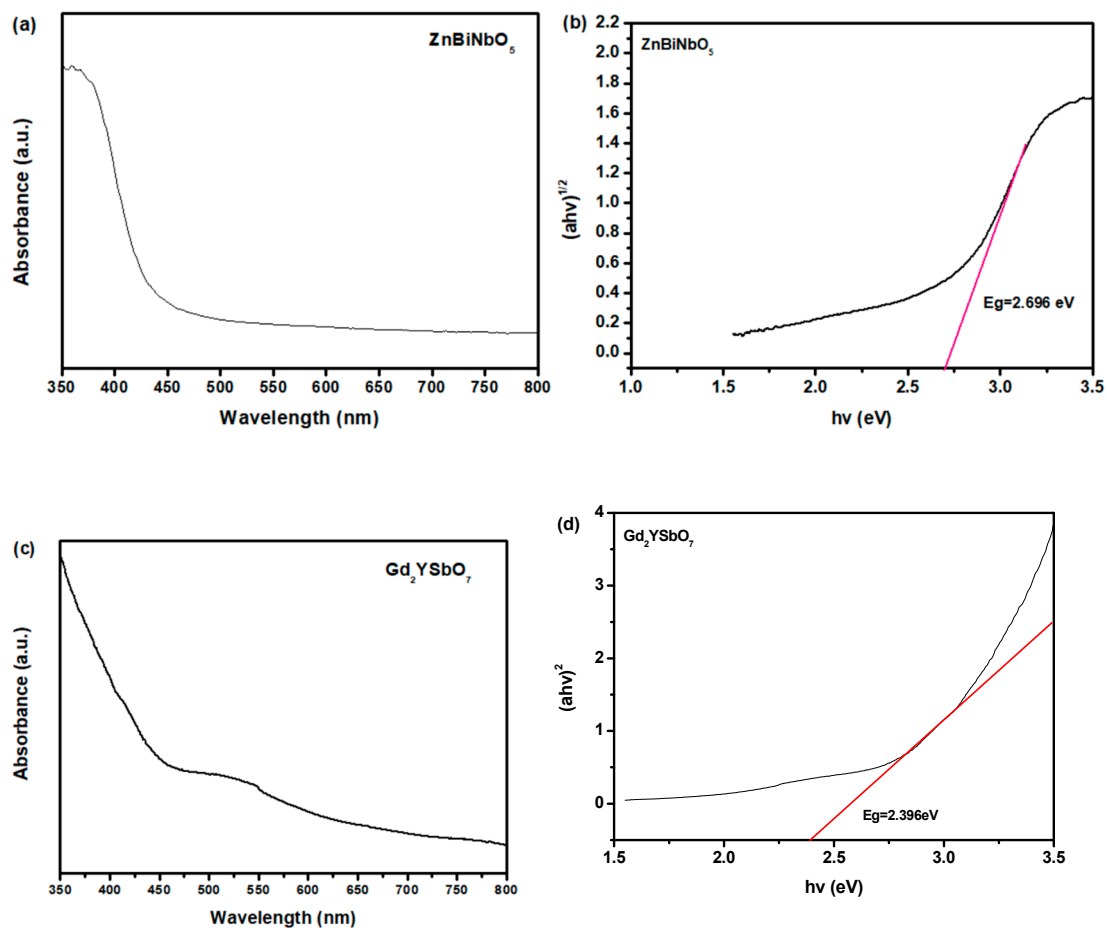


Figure S3. (a) UV-Vis diffuse reflectance spectrum of ZnBiNbO₅ sample; (b) Plot of $(\alpha h\nu)^{1/2}$ versus $h\nu$ for ZnBiNbO₅; (c) UV-Vis diffuse reflectance spectrum of Gd₂YSbO₇ sample; (d) Plot of $(\alpha h\nu)^{1/2}$ versus $h\nu$ for Gd₂YSbO₇ sample.

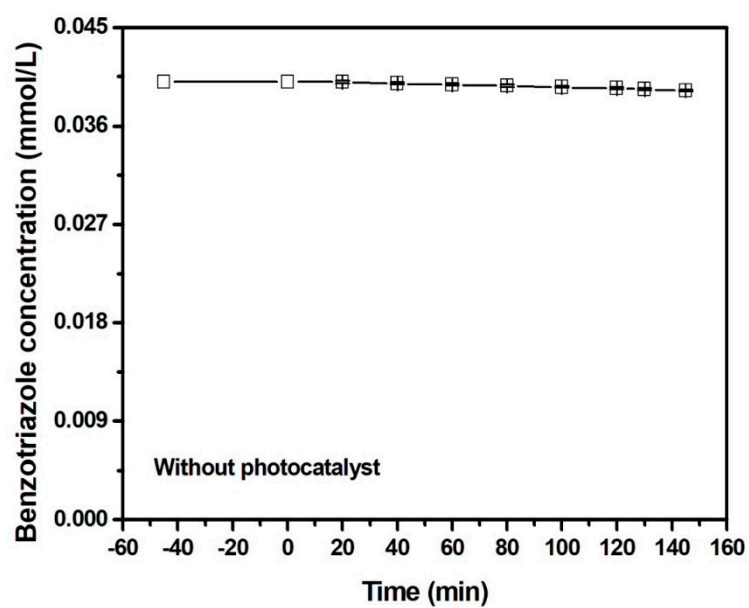
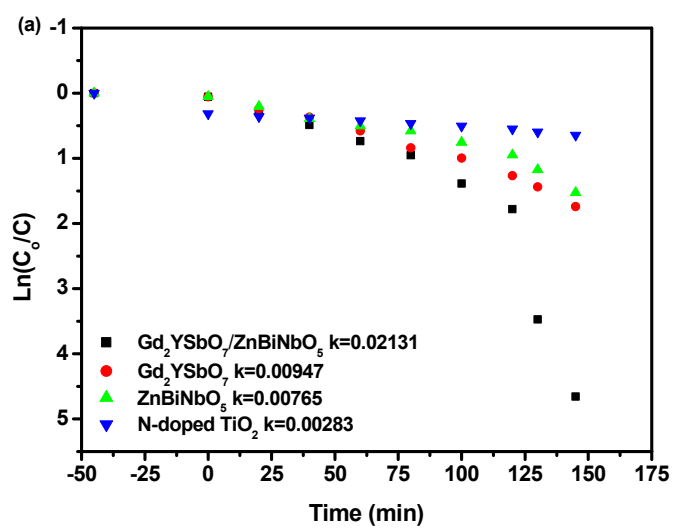


Figure S4. Concentration variation curves of benzotriazole during photocatalytic degradation of benzotriazole in the absence of photocatalyst under VLIR.

Table S3. The removal rate of benzotriazole with Gd₂YSbO₇/ZnBiNbO₅ heterojunction (GZH), S-TiO₂, N-TiO₂, C-TiO₂ or CdS-TiO₂ as photocatalyst.

	GZH	N-TiO ₂	S-TiO ₂	C-TiO ₂	CdS-TiO ₂
Initial concentration of benzotriazole	0.04	0.04	0.04	0.04	0.04

(mmol/L)					
Visible light irradiation time					
	145	145	145	145	145
(min)					
Removal rate	99.05%	47.30%	45.31%	44.15%	75.28%



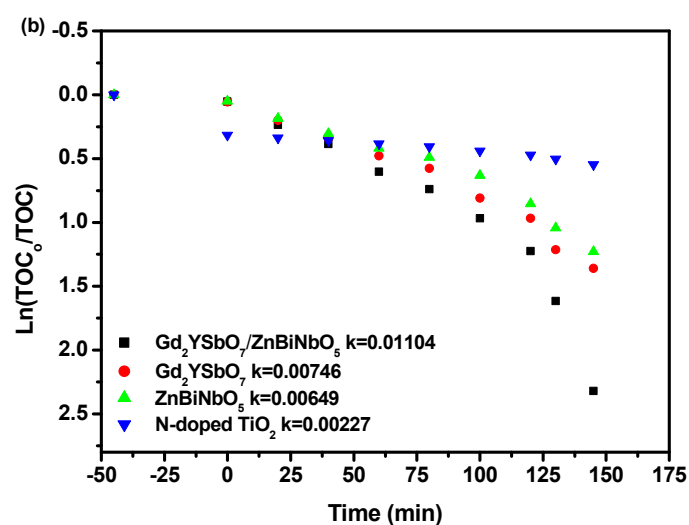


Figure S5. (a) Observed first-order kinetic plots for the photocatalytic degradation of benzotriazole with $\text{Gd}_2\text{YSbO}_7/\text{ZnBiNbO}_5$ heterojunction as photocatalyst or with Gd_2YSbO_7 as photocatalyst or with ZnBiNbO_5 as photocatalyst or with NTO as photocatalyst under VLIR; (b) Observed first-order kinetic plots for total organic carbon during photocatalytic degradation of benzotriazole in chemical industry wastewater with $\text{Gd}_2\text{YSbO}_7/\text{ZnBiNbO}_5$ heterojunction as photocatalyst or with Gd_2YSbO_7 as photocatalyst or with ZnBiNbO_5 as photocatalyst or with NTO as photocatalyst under VLIR.

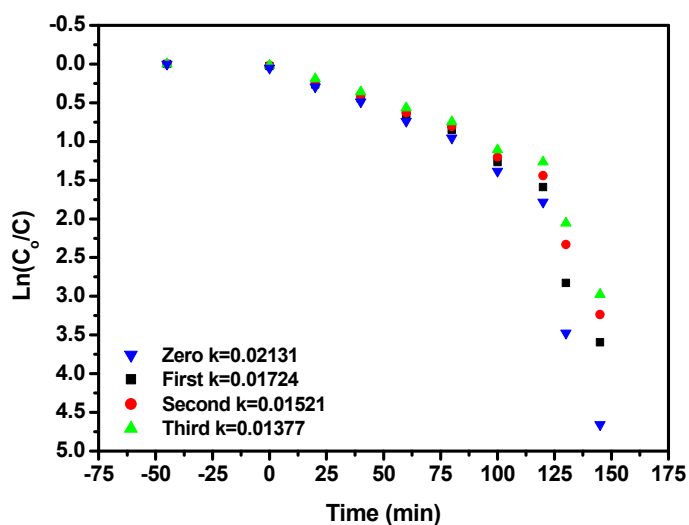


Figure S6. Observed first-order kinetic plots for the photocatalytic degradation of benzotriazole with $\text{Gd}_2\text{YSbO}_7/\text{ZnBiNbO}_5$ heterojunction as photocatalyst under VLIR for three cycle degradation tests.

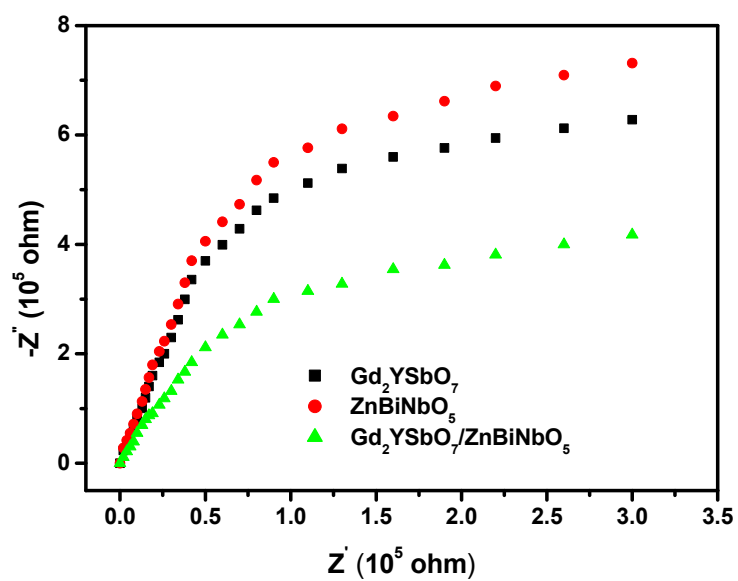
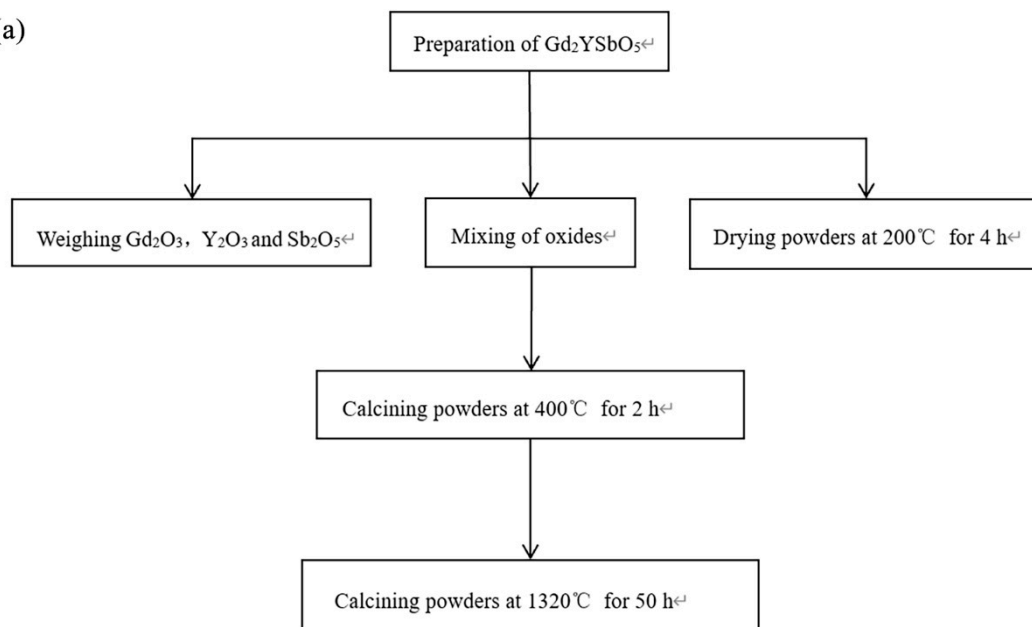
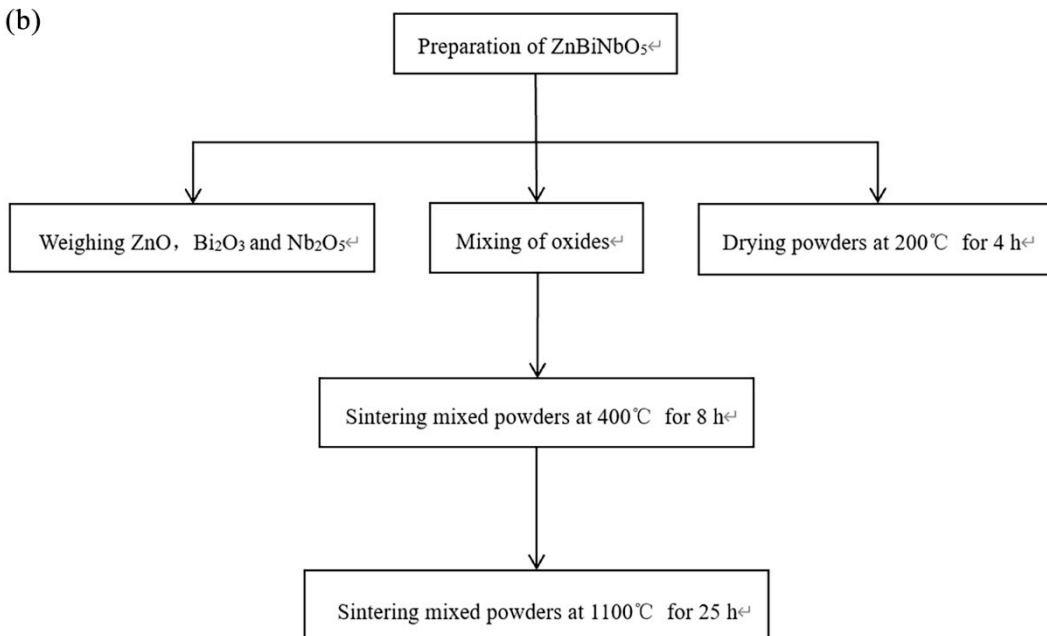


Figure S7. Nyquist impedance plots of $Gd_2YSbO_7/ZnBiNbO_5$ heterojunction photocatalyst or Gd_2YSbO_7 photocatalyst or $ZnBiNbO_5$ photocatalyst.

(a)



(b)



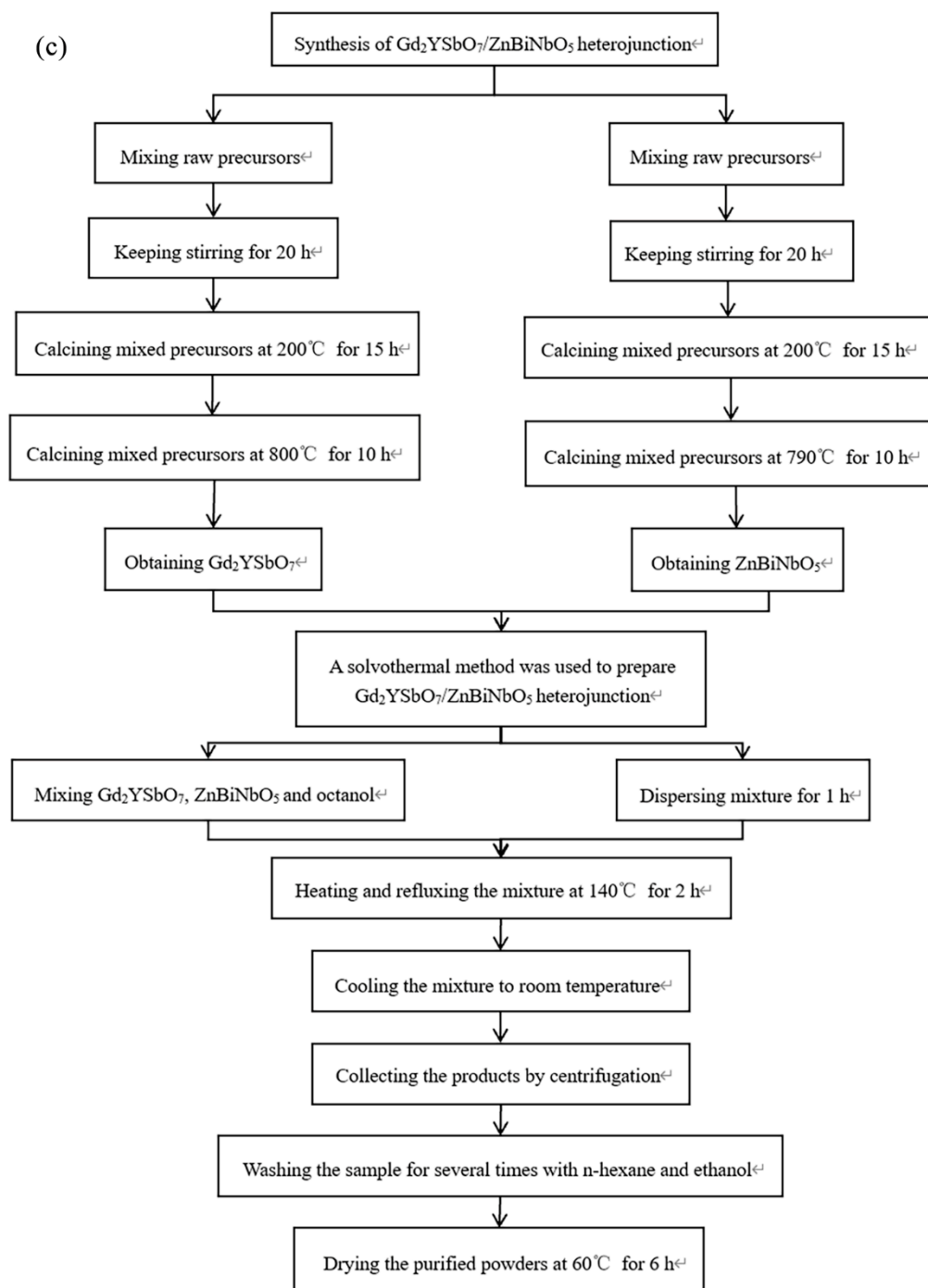


Figure S8. (a) Schematic representation of the synthesis process of the Gd_2YSbO_7 ; (b) Schematic representation of the synthesis process of the ZnBiNbO_5 ; (c) Schematic representation of the synthesis process of the $\text{Gd}_2\text{YSbO}_7/\text{ZnBiNbO}_5$ heterojunction photocatalyst.