

Electronic Supplementary Information

Self-assembled hierarchical Bi₁₂TiO₂₀/graphene nanoarchitectures with excellent simulated sunlight photocatalytic activity

Wan Guo,^a Yuxin Yang,^b Yingna Guo,^a Yanqin Jia,^a Hongbo Liu^c and Yihang Guo*^a

^a Faculty of Chemistry, Northeast Normal University, Changchun 130024, P.R. China

^b School of Environment, Northeast Normal University, Changchun 130024, P.R. China

^c Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, Changchun 130033, P.R. China

* Corresponding author.

Tel. or fax: +86 431 85098705. E-mail address: guoyh@nenu.edu.cn (Y. Guo)

1. Catalyst preparation

Synthesis of Bi₁₂TiO₂₀. Bi₁₂TiO₂₀ was prepared via a similar solvothermal route according to our previous work [20]. Bi(NO₃)₃•5H₂O (2.910 g) was added into ethanol (30 mL). With continuous stirring, TTIP (0.15 mL) was added to the above suspension. Subsequently, NaOH (5 mol L⁻¹) aqueous solution was added dropwise until pH reached 13–14. After being stirred for another 2 h, the mixture was transferred into a Teflon-lined stainless steel autoclave and heated to 180 °C with a heating ramp of 2 °C min⁻¹ for 24 h, and then it was allowed to cool down naturally. The yellow-green solid product was collected and washed thoroughly with distilled water and ethanol until the acidity of the eluate is neutral. Finally, it was dried at 55 °C for 12 h.

Table S1 Controlled experiments using different scavengers for the photocatalytic degradation of PNP mediated by Bi₁₂TiO₂₀/GR(2) under simulated sunlight irradiation (320 nm < λ < 680 nm).

Photocatalyst	k'_{app} or k_{app} (h ⁻¹)	PNP	
		<i>R</i>	$k_{\text{app}}/k'_{\text{app}}$ (%) ^a
Bi ₁₂ TiO ₂₀ /GR(2) (no scavenger)	1.037	0.98	100
Bi ₁₂ TiO ₂₀ /GR(2) (1 mM EDTA-2Na)	0.051	0.99	4.9
Bi ₁₂ TiO ₂₀ /GR(2) (1 mM BQ)	0.018	0.97	1.7
Bi ₁₂ TiO ₂₀ /GR(2) (100 mM CH ₃ OH)	0.401	0.99	38.7
Bi ₁₂ TiO ₂₀ /GR(2) (1 mM <i>t</i> -BuOH)	1.021	0.97	98.5
Bi ₁₂ TiO ₂₀ /GR(2) (10 mM <i>t</i> -BuOH)	0.896	0.97	86.4

^a k'_{app} : pseudo-first-order apparent rate constant determined in the absence of scavenger.

Fig. S1 UV-vis/DRS of the mechanically mixed $\text{Bi}_{12}\text{TiO}_{20}/\text{GR}(2)$ relative to $\text{Bi}_{12}\text{TiO}_{20}$.

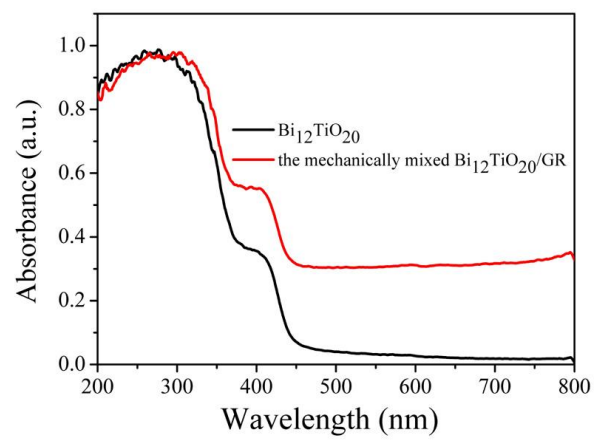


Fig. S2 SEM image of the mechanically mixed $\text{Bi}_{12}\text{TiO}_{20}/\text{GR}(2)$.

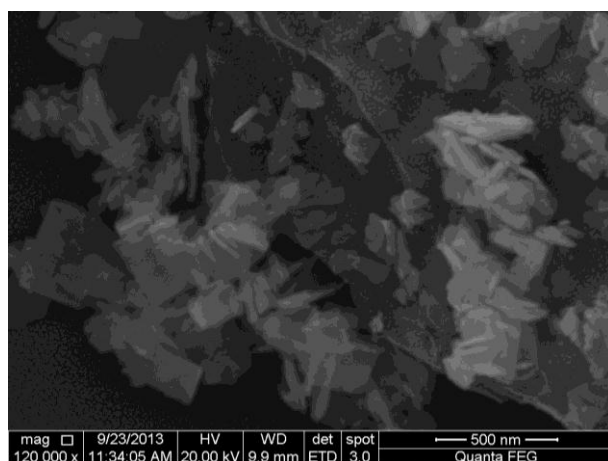


Fig. S3 The mass spectra (a, b) and ion chromatogram (c) of compounds 1-6 detected from the PNP photodegradation process in the simulated sunlight-irradiating Bi₁₂TiO₂₀/GR system (320 nm < λ < 680 nm).

