Supplementary Information (SI) for Journal of Materials Chemistry C.

Ultrasonication-Assisted Room-Temperature Synthesis of Morphology-Controlled Gallium Oxide Nanoparticles for High-Performance Photoelectronic Device Applications

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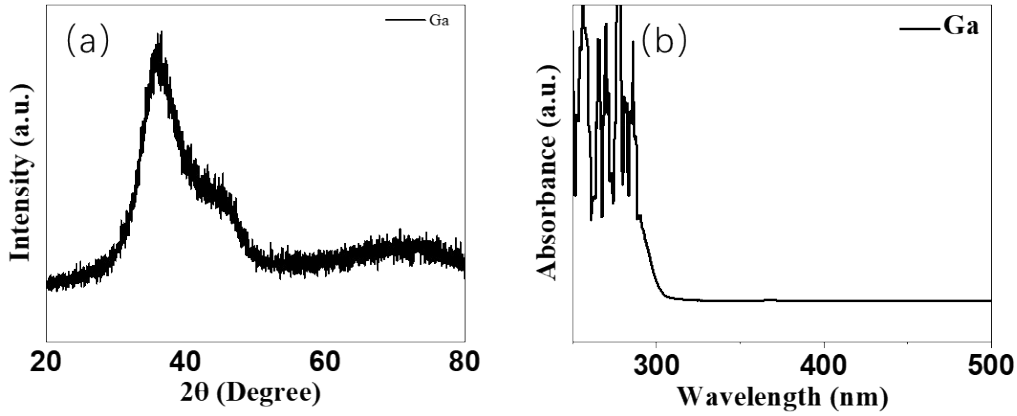

Figure S1 (a) XRD patterns and (b) Absorption edge of the Ga nanospheres.

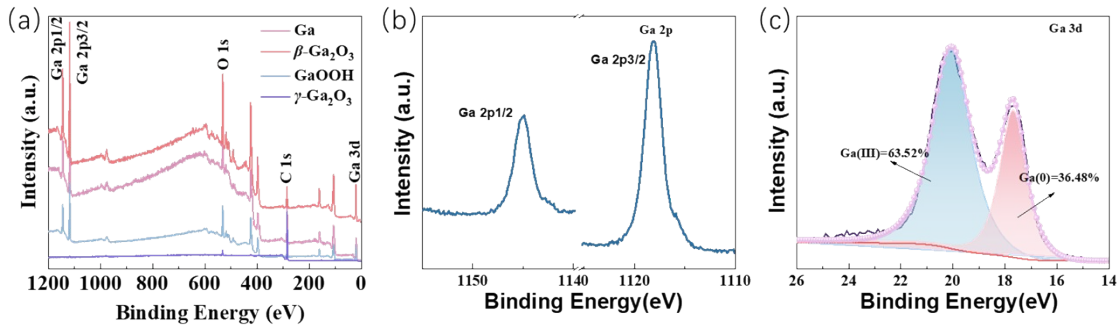

Figure S2 (a) The typical XPS survey spectrum of all the samples. XPS spectra of fabricated Ga nanospheres (b) Ga 2p, (c) Ga 3d.

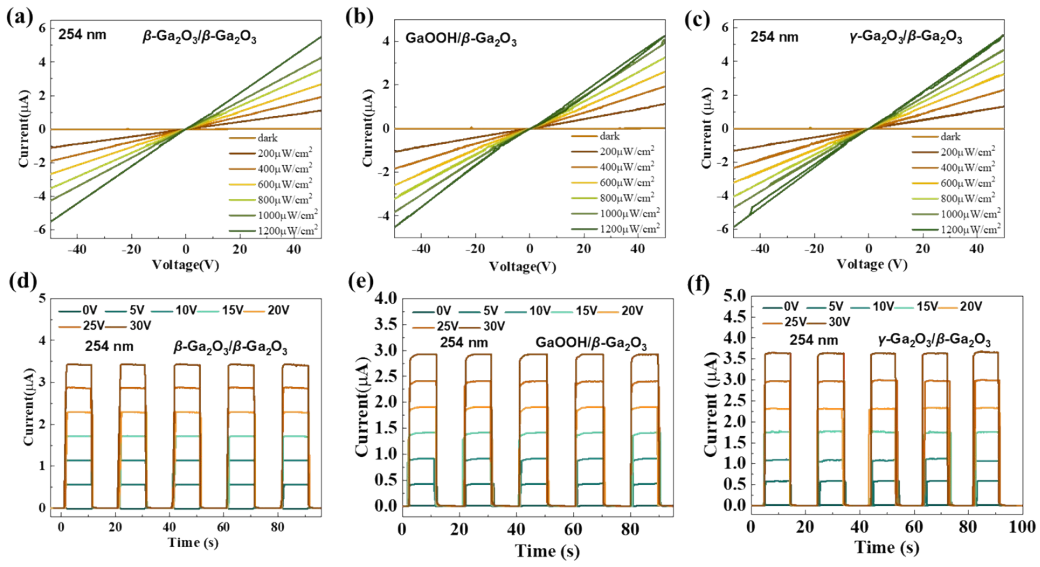

Figure S3 The *I-V* curves of the fabricated devices under different light power intensities (a) *β*-Ga_2O_3 nanospheres/*β*-Ga_2O_3 thin films, (b) GaOOH nanorods/*β*-Ga_2O_3 thin films, and (c) *γ*-Ga_2O_3 nanospheres/*β*-Ga_2O_3 thin films. The *I-t* curves

of the fabricated under different voltages (d) *β*-Ga_2O_3 nanospheres/*β*-Ga_2O_3 thin films, (e) GaOOH nanorods/*β*-Ga_2O_3 thin films, and (f) *γ*-Ga_2O_3 nanospheres/*β*-Ga_2O_3 thin films.

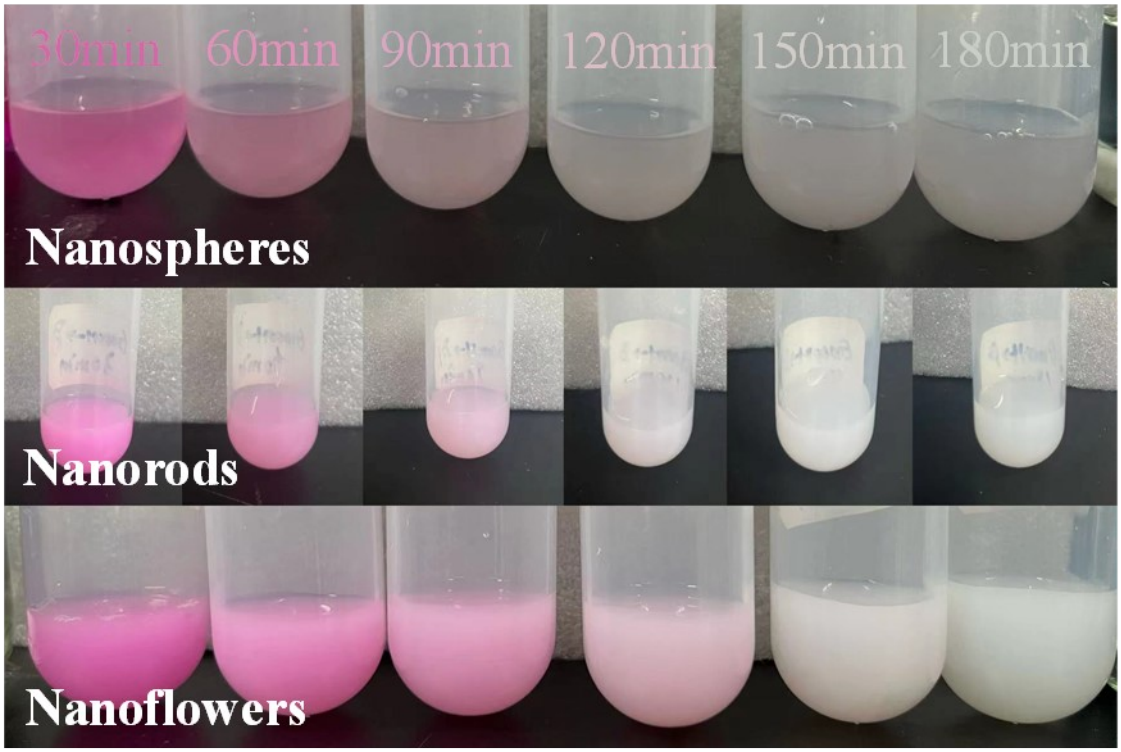

Figure S4 Time-dependent photocatalytic process.

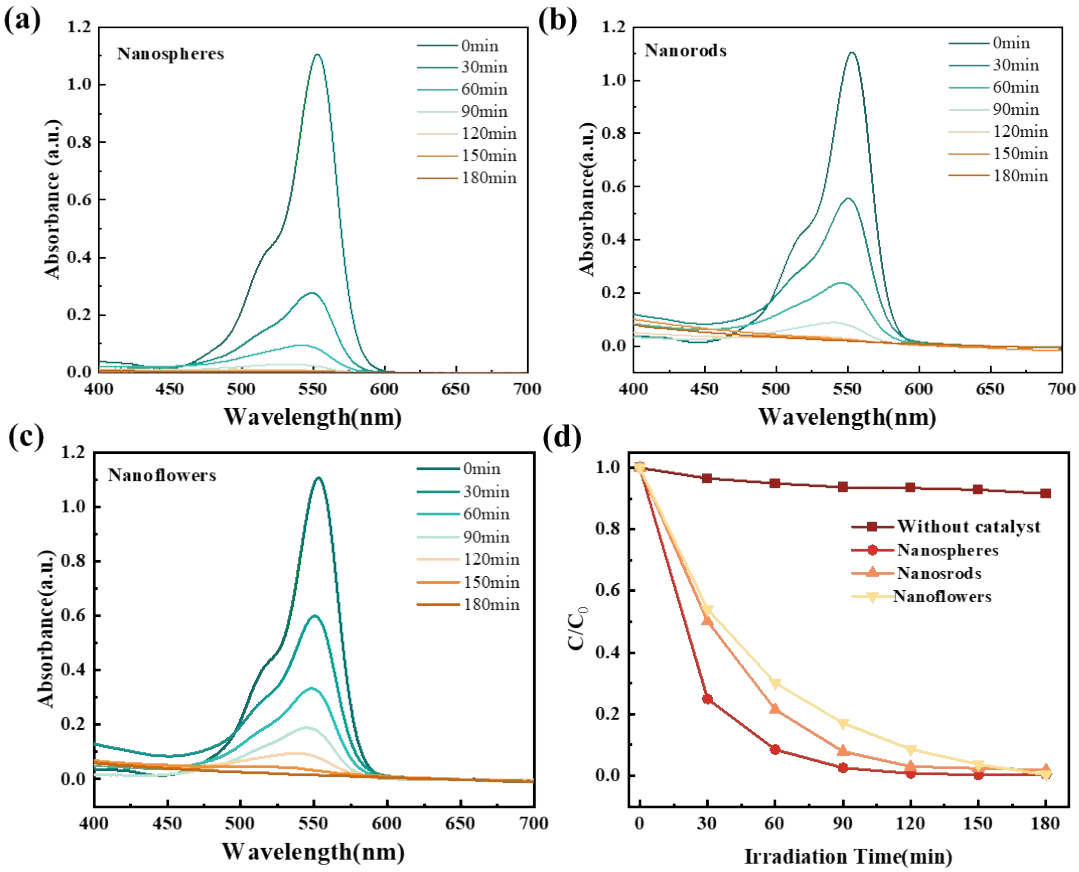

Figure S5 Absorbance spectra of RhB solutions under different UV irradiation times with β-Ga_2O_3 (a) nanospheres, (b) nanorods, and (c) nanoflowers.

Table S1 The adsorption energy calculated by VASP.

	E_{tot} (eV)	E_{sur} (eV)	E_0(eV)
H_2O	-386.096	-371.333	-14.2173
EDA	-436.318	-371.333	-64.0895
Oleylamine	-682.17	-371.333	-308.657

Table S2 Specific preparation methods for nanospheres, nanorods, and nanoflowers.

Preparation condition	Pecursor solution	Morphology	Crystalline phase
Ultrasonic time：120min Ultrasonic power：300W	H_2O	nanorods	GaOOH
	Oleylamine	nanospheres	Ga (Annealing at 700°C to obtain β-Ga_2O_3)
	H_2O/EDA	nanoflowers	γ-Ga_2O_3