

Supporting information

Reduced graphene oxide/ZnIn₂S₄ nanocomposite photocatalyst with enhanced photocatalytic performance for the degradation of naproxen under visible light irradiation

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Texts: 2

Tables: 1

Figures: 4

Text S1

Characterization The samples were evaluated using an X-ray powder diffractometer (XRD, D8 Advanced, Bruker Co, Germany). Fourier transform infrared spectroscopy (FTIR) spectra were recorded on a Nicolet 460 spectrometer (Thermo Scientific, USA). The surface morphology and microstructure of the samples were examined with a field emission scanning electron microscope (FEI Nova Nano SEM 450, Netherlands) and a high-resolution transmission electron microscope (JEM-2100, Japan) with an accelerating voltage of 200 kV. X-ray photoelectron spectroscopy (XPS) were collected by a Kratos AXIS Supra instrument. UV-vis diffuse reflectance spectra (DRS) measurements were conducted on a spectrophotometer (Shimadzu UV-2550, Japan). Electrochemical analysis was conducted on an electrochemical station (CH1760D, China) in a conventional three-electrode quartz cell system. Electrochemical impedance spectroscopy (EIS) was recorded by using an alternating voltage of 5 mV amplitude in the frequency range of 10^5 Hz to 10^{-2} Hz with the open circuit voltage in 0.5 M Na_2SO_4 solution that worked as electrolyte. Electron paramagnetic resonance (EPR) measurements were carried out on a Bruker Elexsy580 spectrometer, with 5, 5-Dimethyl-1-pyrroline-N-oxide (DMPO) as the spin-trapping agent.

Text S2

LC-MS/MS analysis The intermediate products of NPX formed during photocatalytic degradation process were analyzed by LC-MS/MS, which consisted of an HPLC system (Waters, USA) and a TSQ Quantum mass spectrometer (ESI source, Thermo Scientific Inc., USA) with a Athena C18-WP column (2.1×100 mm, $3 \mu\text{m}$, $100 \text{\AA}$). The sample injection volume was 10 μL . The A and B mobile phases were 0.1% formic acid in Milli-Q water and acetonitrile, respectively, at a flow rate of 0.25 mL min^{-1} . The elution started at 5% B, then linearly increased to 95% B over 15 min and was kept at 95% B for 5 min. After that, the elution was decreased to 95% B in the following 1 min and kept at 95% B for 4 min. The ESI conditions were as follows: spray voltage=4500 V, sheath gas pressure=20 au, aux gas pressure=5au, capillary temperature =320 °C. MS chromatograms were obtained in both total ion current (TIC) mode, using full scans

(m/z 50–400) for mass spectra acquisition, and selected ion monitoring (SIM) mode.

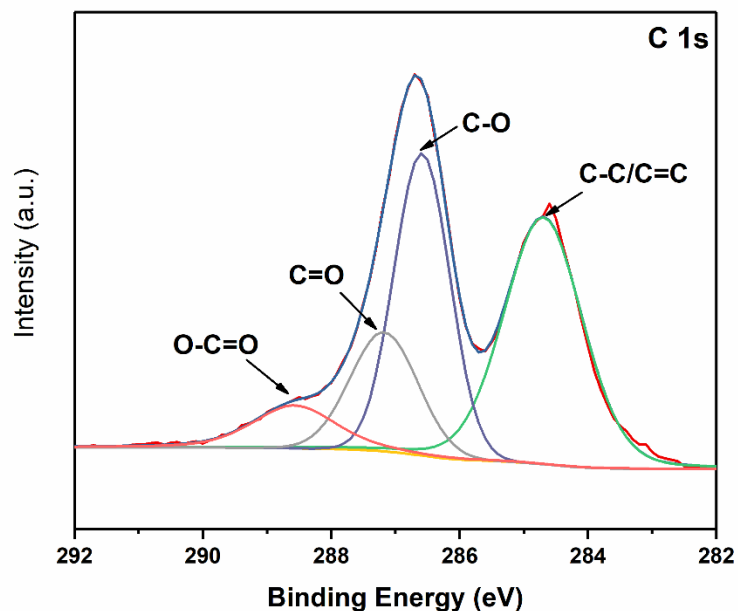


Fig. S1. High-resolution XPS spectra of C 1s in GO.

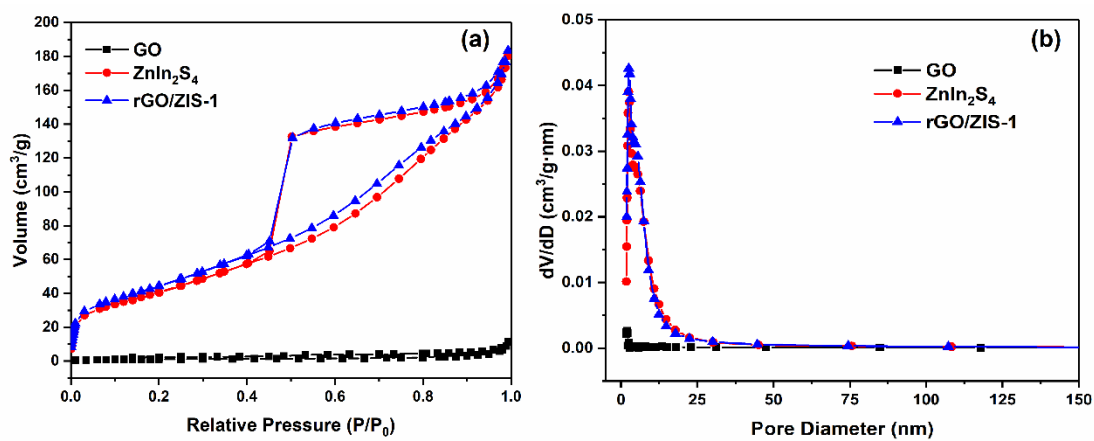


Fig. S2. Nitrogen adsorption-desorption isotherms (a) and corresponding pore size distribution(b).

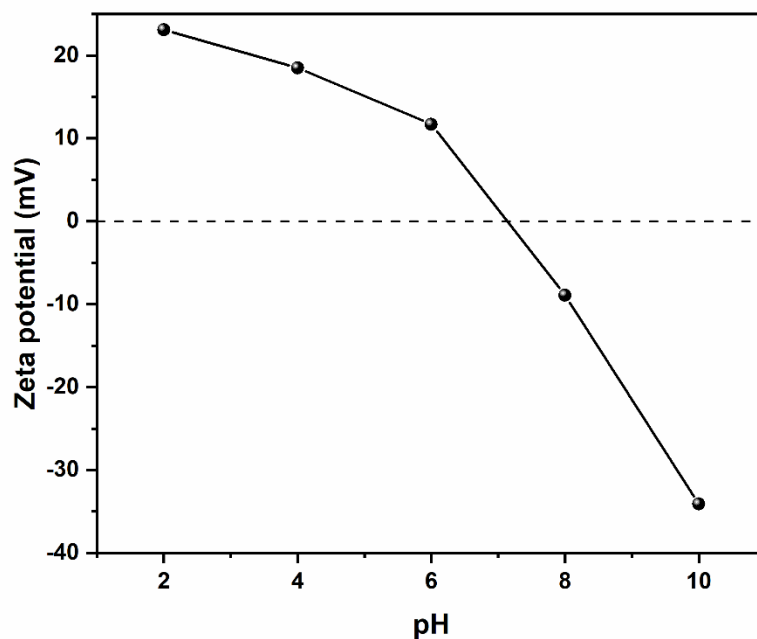


Fig. S3. The Zeta potential of 1% rGO/ZIS in different solution pH at 25 °C

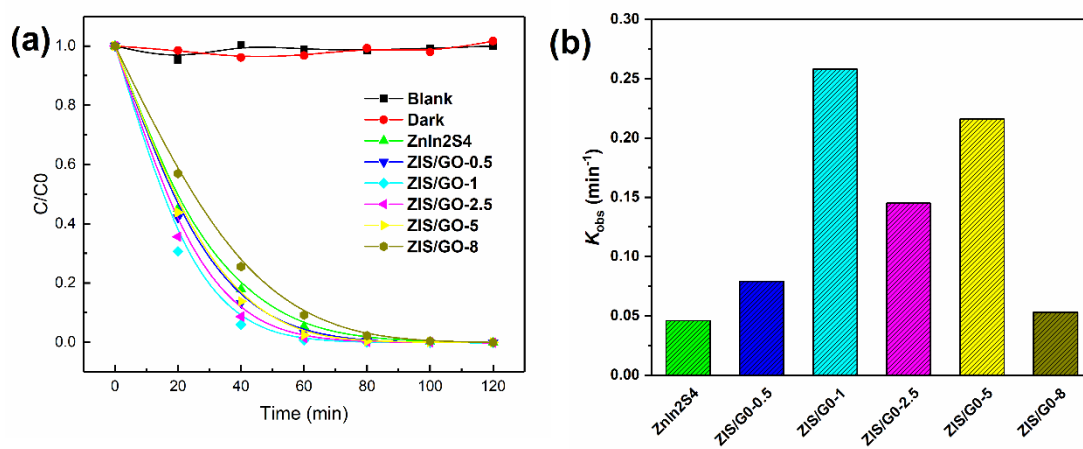


Fig. S4. (a) photocatalytic degradation of DCF with different photocatalysts and (b) plots of $-\ln(C/C_0)$ vs irradiation time. Reaction conditions: $[DCF] = 10 \text{ mg} \cdot \text{L}^{-1}$, $[\text{photocatalyst}] = 0.2 \text{ g} \cdot \text{L}^{-1}$, natural pH, $\lambda > 420 \text{ nm}$.

Table S1 BET experimental results of GO, ZnIn₂S₄ and rGO/ZnIn₂S₄

Sample	BET surface area (m ² ·g ⁻¹)	Pore volume (cm ³ ·g ⁻¹)	Pore diameters (nm)
GO	4.01	0.018	14.760
ZnIn ₂ S ₄	153.35	0.312	6.130
rGO/ ZnIn ₂ S ₄	166.40	0.316	5.864