Supporting information for

Enhanced photocatalytic activity of g-C_3N_4-ZnO/HNTs composite heterostructure photocatalysts for degradation of tetracycline under visible light irradiation

[a]Jinze Li, [a]Mingjun Zhou, [a]Zhefei Ye, [b]Huiqin Wang, [b]Changchang Ma, [a]Pengwei Huo[*], [a]Yongsheng Yan[*]

[a]School of Chemistry & Chemical Engineering, Jiangsu University, Zhenjiang 212013, People's Republic of China,

[b]School of Environment, Jiangsu University, Zhenjiang 212013, People's Republic of China,

[*] Corresponding author Tel.: +86 511 8879 0187 Fax. : +86 511 8879 1800
E-mail address: huopw@mail.ujs.edu.cn(P.W. Huo); yys@mail.ujs.edu.cn(Y.S. Yan)

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1. **Photoelectrochemical Measurements**

Incident-photon-to-current conversion efficiencies (IPCE) were calibrated with a electrochemical system (CHI 660B, Shanghai, China) using a standard three-electrode quartz cells with 0.5 M Na_2SO_4 electrolyte solution, a Pt wire and a saturated calomel electrode (SCE) were used as the counter electrode and the reference electrodes. The process of preparing the working electrode according to the follows. 30 milligrams of as-prepared sample was suspended in 5 mL the mixed solution of ethanol and ethanediol which the volume ratio was 1:1, 0.5 mM polyvinyl pyrrolidone [40] and 0.1mmol oleinic acid were added into the solution. The mixture was dip-coated on a 20 mm × 10 mm indium-tin oxide (ITO) glass electrode after ultrasound for 20 minutes. The electrode was then heated in a tubular furnace at 200 °C for 3 hours. The visible irradiation was obtained from a 300 W Xe lamp (Newport 6255) without the UV-cutoff filter. Electrochemical impedance spectroscopy (EIS) was performed in a 0.5 M Na_2SO_4 solution with a frequency range from 0.1 Hz to 100 kHz at 0.5 V. The amplitude of applied sine wave potential in each case was 5 mV which was carried out using a ZENNIUM electrochemical workstation (Zahner Instruments, Germany), and all electrochemical signals were recorded by a CHI660 B electrochemical analyzer (Chen Hua Instruments, Shanghai, China). All electrodes were same as the electrodes using in IPCE.

2. Electron Spin Resonance Spectroscopy

The formation of $\bullet O_2^-$ and •OH were detected by electron spin resonance (ESR) measurements which carried on a Brucker A300 ESR spectrometer at room temperature, and the ESR signals of spin-trapped paramagnetic species was verified with 5,5-diamethyl-1-pyrroline N-oxide (DMPO). The involvement of $\bullet O_2^-$ was detected in methanol due to the instability of $\bullet O_2^-$ in water and the involvement of •OH was examined in ultrapure water[1]. Fifty microliter aliquots of sample solutions were put into the quartz capillary tubes with internal diameters of 0.9 mm. After The quartz capillary tubes were inserted into the ESR cavity after sealed. The spectra were recorded during a 450 W xenon lamp solar simulator irradiation at selected times.

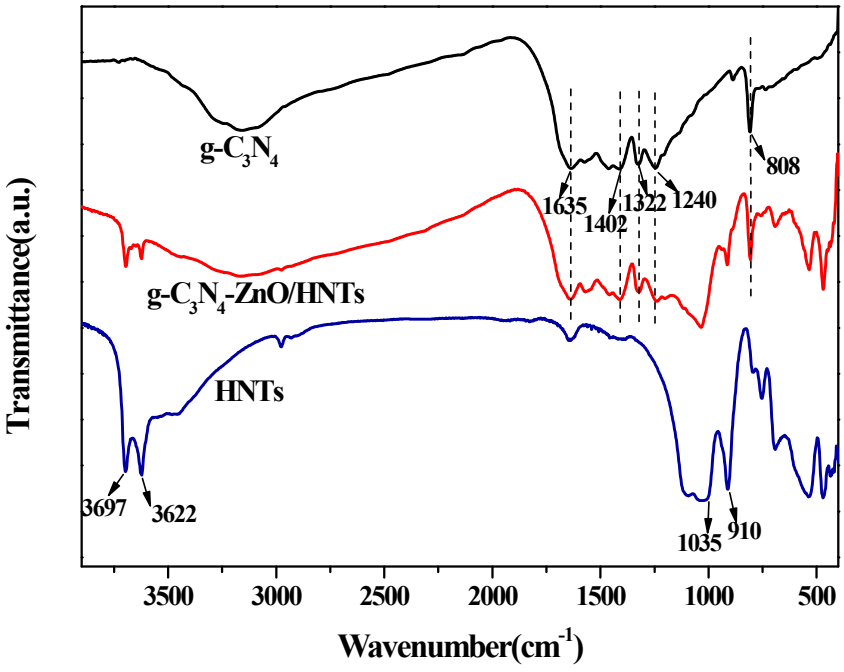

Fig. S1. FT-IR spectra of HNTs, g-C_3N_4 and g-C_3N_4-ZnO/HNTs photocatalysts.

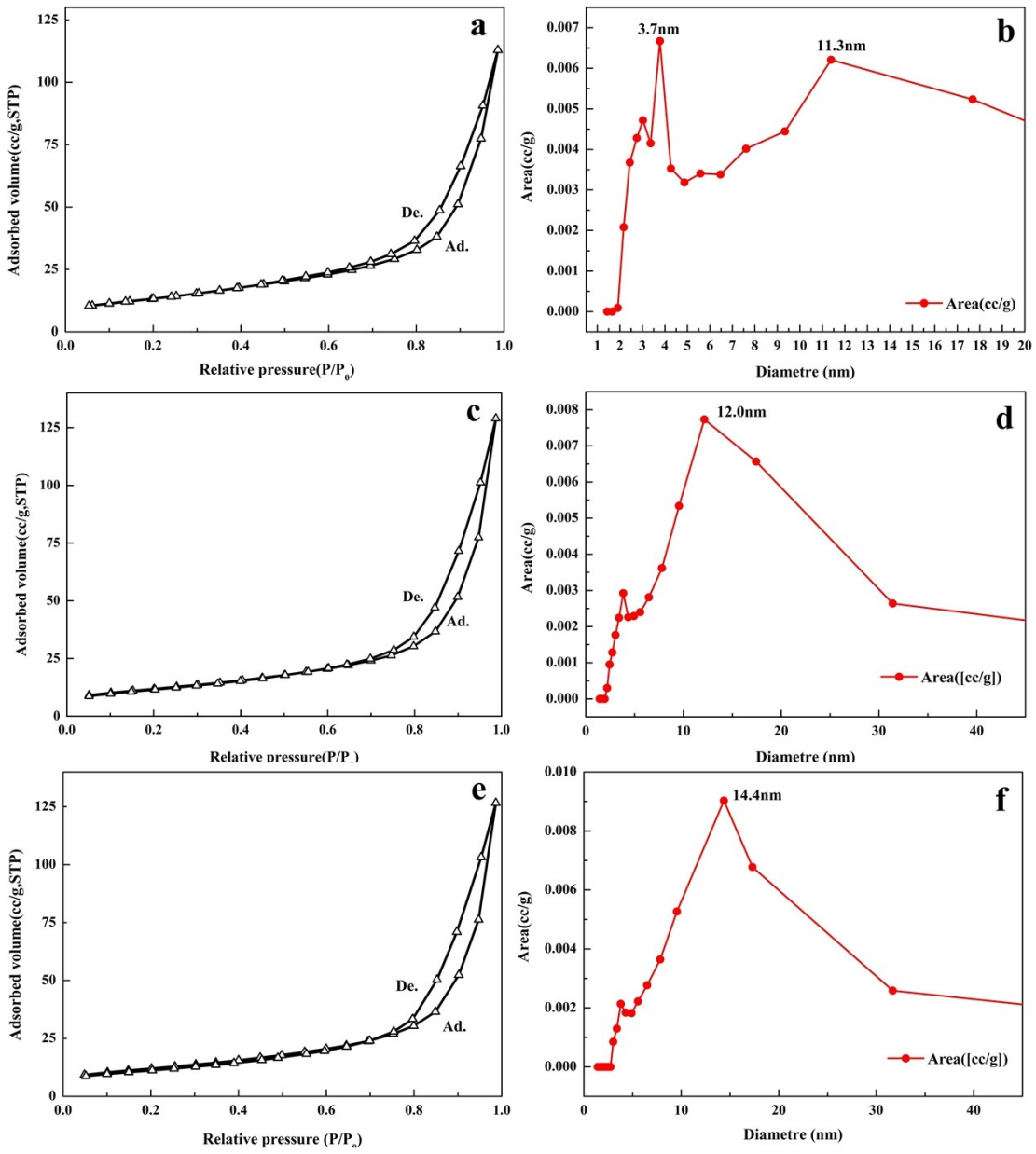

Fig. S2. N_2 adsorption-desorption isotherm and corresponding pore-size distribution curves of (a) (b)HNTs, (c) (d)ZnO/HNTs, and (e) (f)g-C_3N_4-ZnO/HNTs.

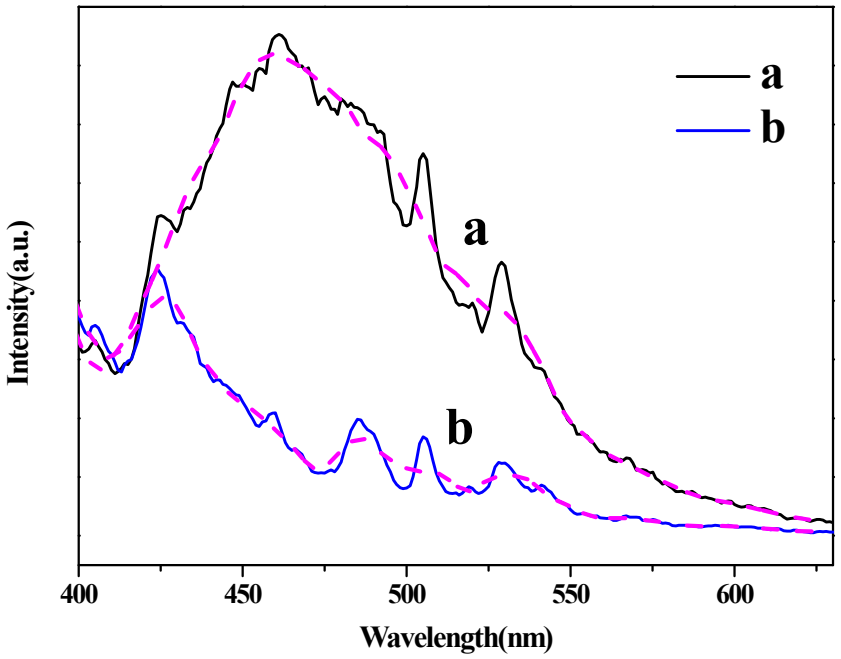

Fig. S3. PL spectra of (a) g-C_3N_4 and (b) g-C_3N_4-ZnO/HNTs.

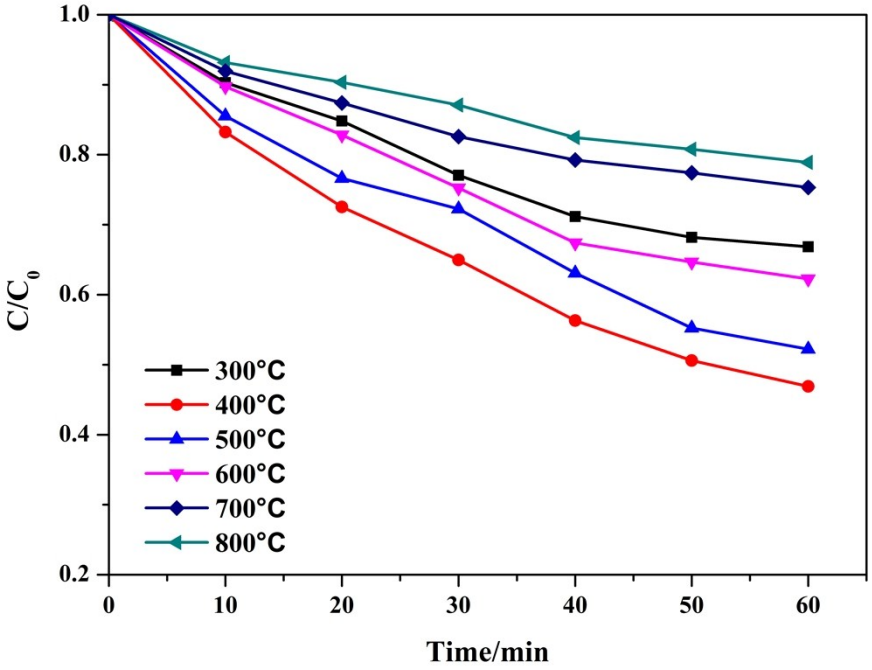

Fig. S4. Photocatalytic degradation of TC with ZnO/HNTs (with different calcination heat) as photocatalysts under visible-light irradiation.

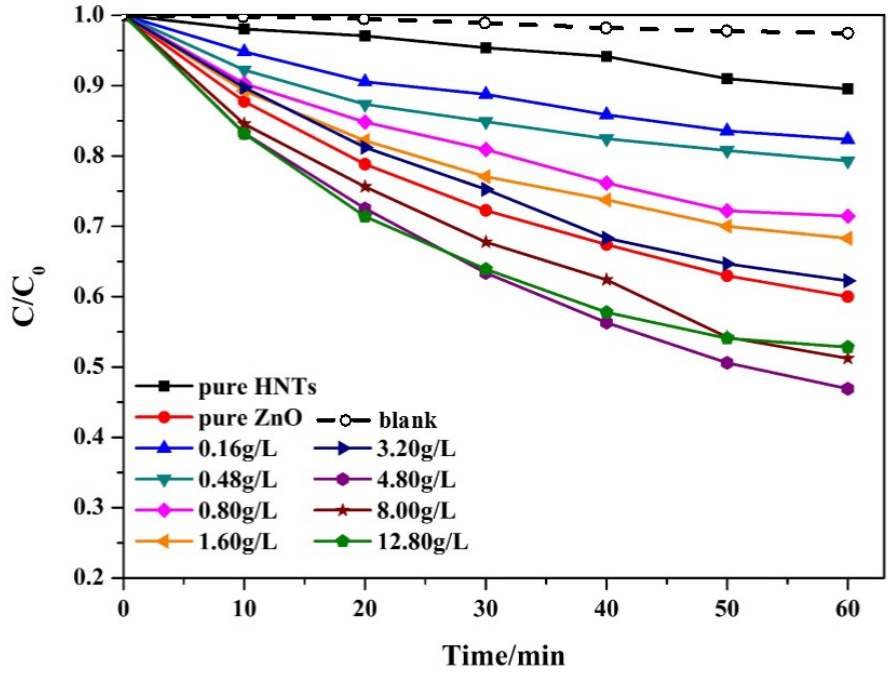

Fig. S5. Photocatalytic degradation of TC with ZnO/HNTs (with different concentration of $Zn(NO_3)_2$) as photocatalysts under visible light irradiation.

1. W. Wang, T. W. Ng, W. K. Ho, J. Huang, S. Liang, T. An, G. Li, J. C. Yu and P. K. Wong, *Appl. Catal. B: Environ.*, 2013, **129**, 482-490.