Supporting Information

Improved Interfacial Charge Transfer and Visible Light Activity of Reduced Graphene Oxide-Graphitic Carbon Nitride Photocatalysts

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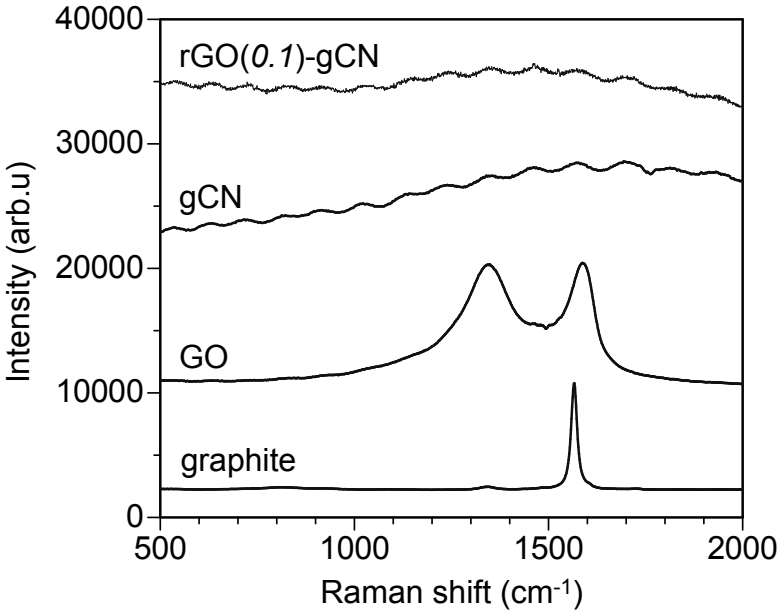

Fig. S1 Raman spectra of the graphite flakes, GO, gCN and rGO(0.1)-gCN

From Fig. S1, the graphene exhibited one sharp G band, while GO displayed two distinct peaks at 1347 and 1590 cm^{-1}, which were attributed to the D and G bands, respectively. As for the gCN and rGO(*0.1*)-gCN samples, no prominent peaks were observed due to the strong fluorescence background from the gCN.

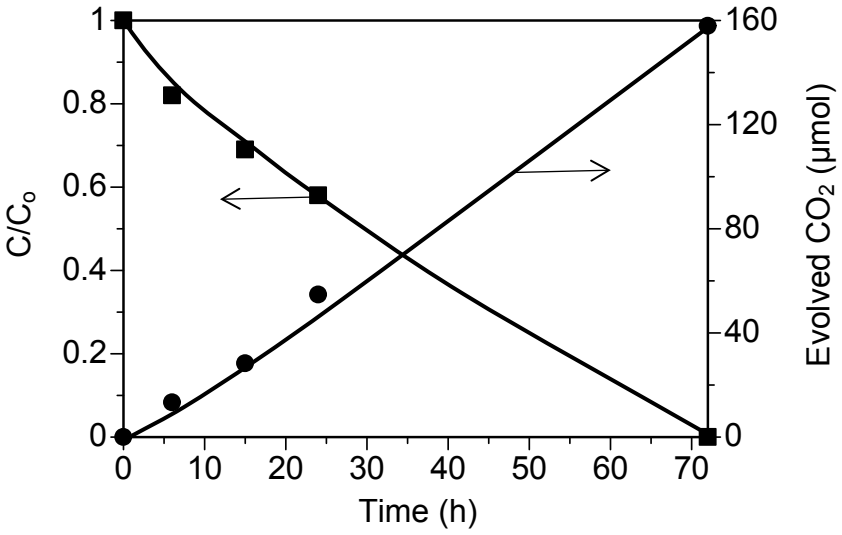

Fig. S2 The ratio of converted phenol (C/C_o) and the evolution of CO_2 gas during degradation of phenol under visible light irradiation over the rGO(*0.1*)-gCN photocatalyst.

Table S1 The ratio between the experimentally detected CO_2 and the one calculated from converted phenol

Time (h)	Detected CO_2 (µmol)[a]	Calculated CO_2 (µmol)[b]	Ratio
6	13.29	28.75	0.46
15	28.28	49.41	0.57
24	54.73	66.08	0.83
72	157.87	159.39	0.99

[a]The CO_2 was obtained from experimental results. [b]The CO_2 was calculated by assumption that total degradation of phenol occurred. If total degradation of phenol occurs, 1 mol of phenol will produce 6 mol of CO_2.

Fig. S2 shows that CO_2 was produced continuously under visible light irradiation in the presence of rGO(*0.1*)-gCN as the photocatalyst. Table S1 shows the calculated ratio between the experimentally evolved CO_2 and expected one from the converted phenol. When most of phenol was degraded, the ratio was very close to one. This result strongly indicated that the total degradation of phenol to CO_2 and H_2O occurred on the rGO(*0.1*)-gCN photocatalyst.

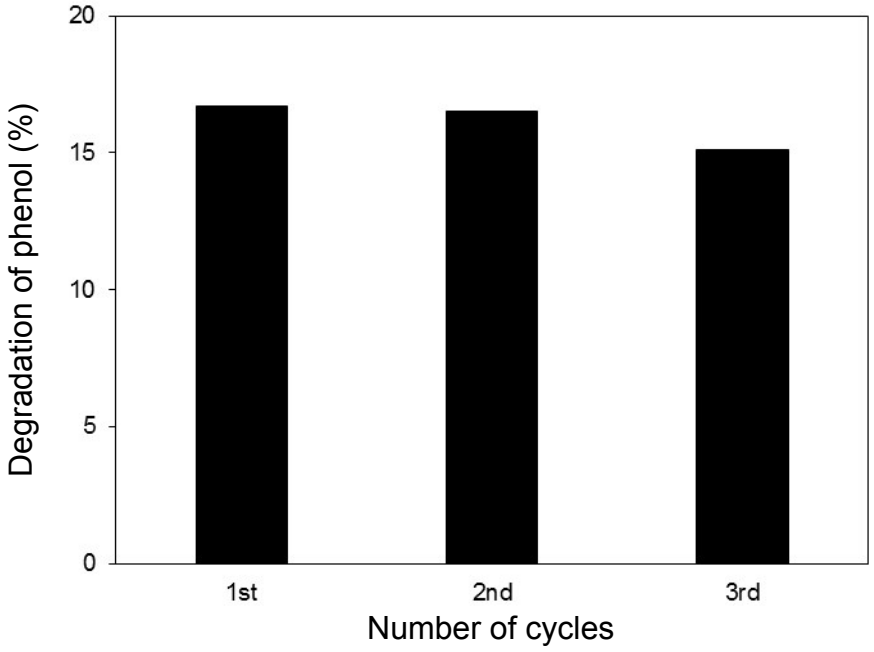

Fig. S3 Reusability of the rGO(*0.1*)-gCN for degradation of phenol under 3 h visible light irradiation.

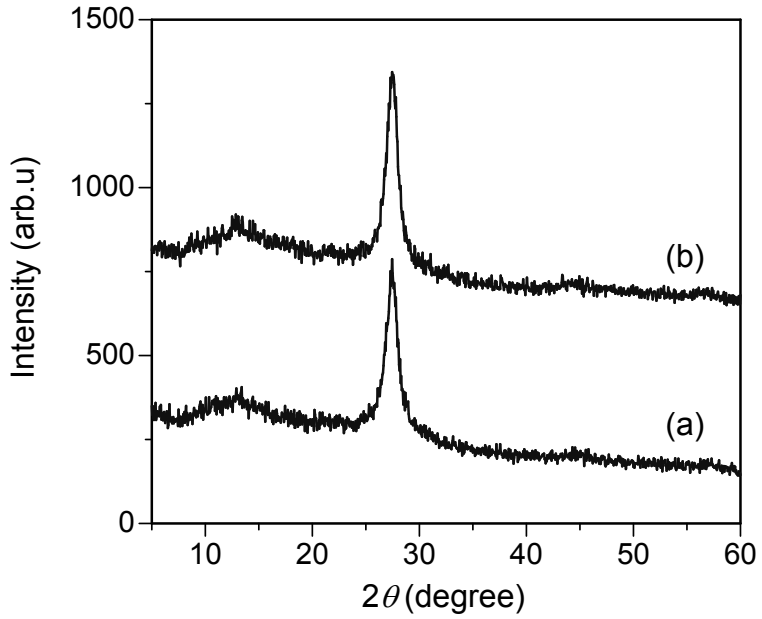

Fig. S4 XRD patterns of the rGO(*0.1*)-gCN (a) before, and (b) after three successive cycles of photocatalytic reaction.

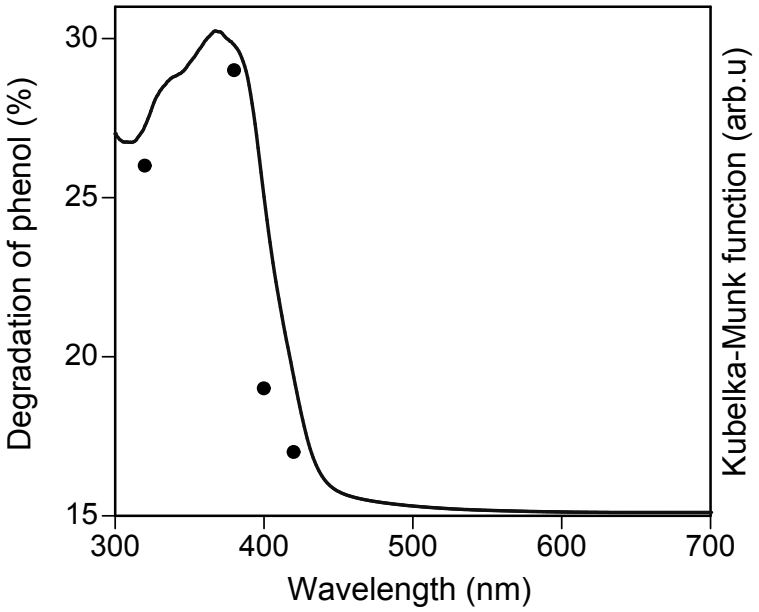

Fig. S5 DR UV-Vis spectrum of the rGO(*0.1*)-gCN (line) and the degradation of phenol (closed circle) under different light wavelengths using cut-off filters at 320, 380, 400 and 420 nm.

Calculation of quantum efficiency

Quantum efficiency was calculated from the percentage ratio between the number of converted phenol and number of absorbed photon as shown in Eq. (1).

$$Quantum\ efficiency = \frac{Nconverted}{Nphoton} \times 100\%$$

(1)

The number of converted phenol was calculated from Eq. (2), while the number of adsorbed photon was determined from Eq. (3) and (4).

$$Nconverted = \frac{No.\ of\ mol\ of\ converted\ phenol}{time} (mol\ s^{-1})$$

(2)

$$Nphoton = \frac{I \times A}{U_\lambda} (mol\ s^{-1})$$

(3),

where I is the light intensity absorbed by the photocatalyst (97.6 μW cm^{-2}), A is the area of the reactor with the photocatalyst exposed to the light (16.7 cm^2), U_λ is the mole photon energy of the representative wavelength.

$$U_\lambda = \frac{hc \times N_A}{\lambda} (J\ mol^{-1})$$

(4),

where h is the Plank constant, c is the speed of light in vacuum, N_A is the Avogadro number, λ is the representative wavelength of the light source used (365 nm).