Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Nanoporous 2D Semiconductors Encapsulated by Quantum-Sized Graphitic Carbon Nitride: Tuning Directional Photoinduced Charge Transfer via Architecture Modulation

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Appendix: experiment section

1. Synthesis of bulk g-C_3N_4

10g urea was heated in a covered crucible with a ramp rate of about 8 ^{o}C/min from room temperature to 550 ^{o}C and then holding it under air condition for 2 h, after which the yellow product obtained after cooling was bulk g-C_3N_4.

2. Synthesis of bulk CdS

According to conventional chemical precipitation, bulk CdS was synthesized by adding $CdCl_2$ aqueous solution (50 mL 0.5 M) into Na_2S aqueous solution (50 mL 0.5 M) under constantly stirring at ambient conditions. After stirring for 30 min, bulk CdS precipitation was collected and dried in air at 60 ^{o}C for 12 h.

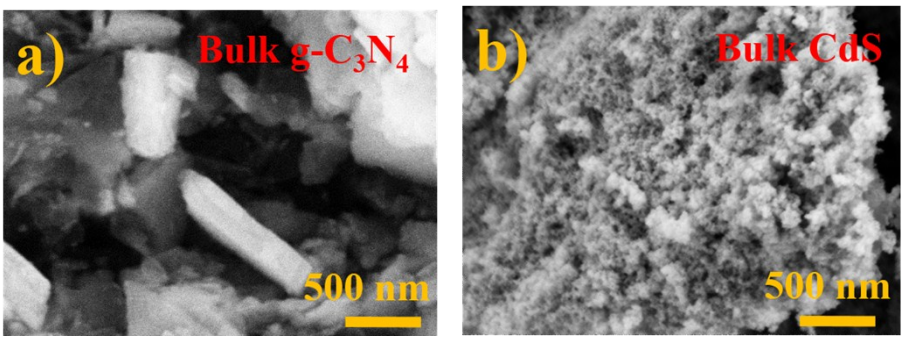

Fig. S1. FESEM images of (a) bCN and (b) bCdS.

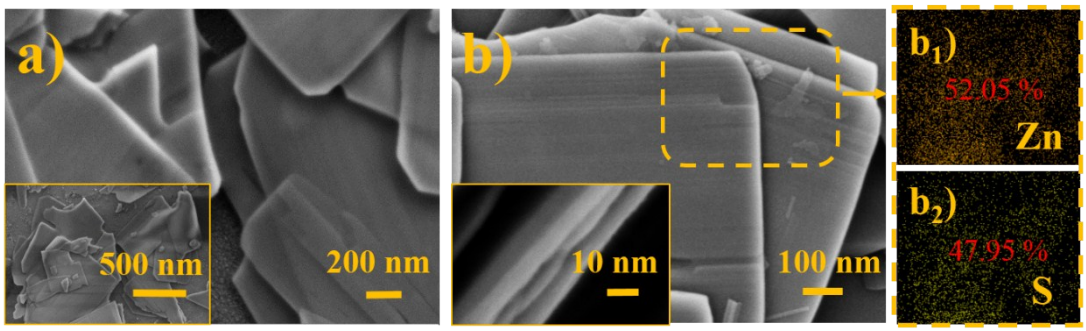

Fig. S2. (a-b) FESEM images of ZnS NSs precursor template for fabrication of CdS NSs.

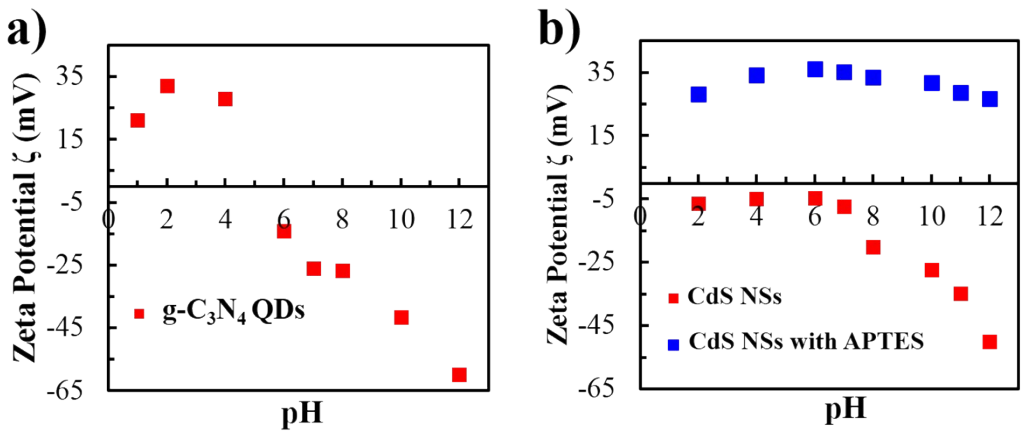

Fig. S3. Zeta potentials of (a) g-C_3N_4 QDs, (b) CdS NSs and CdS NSs with APTES.

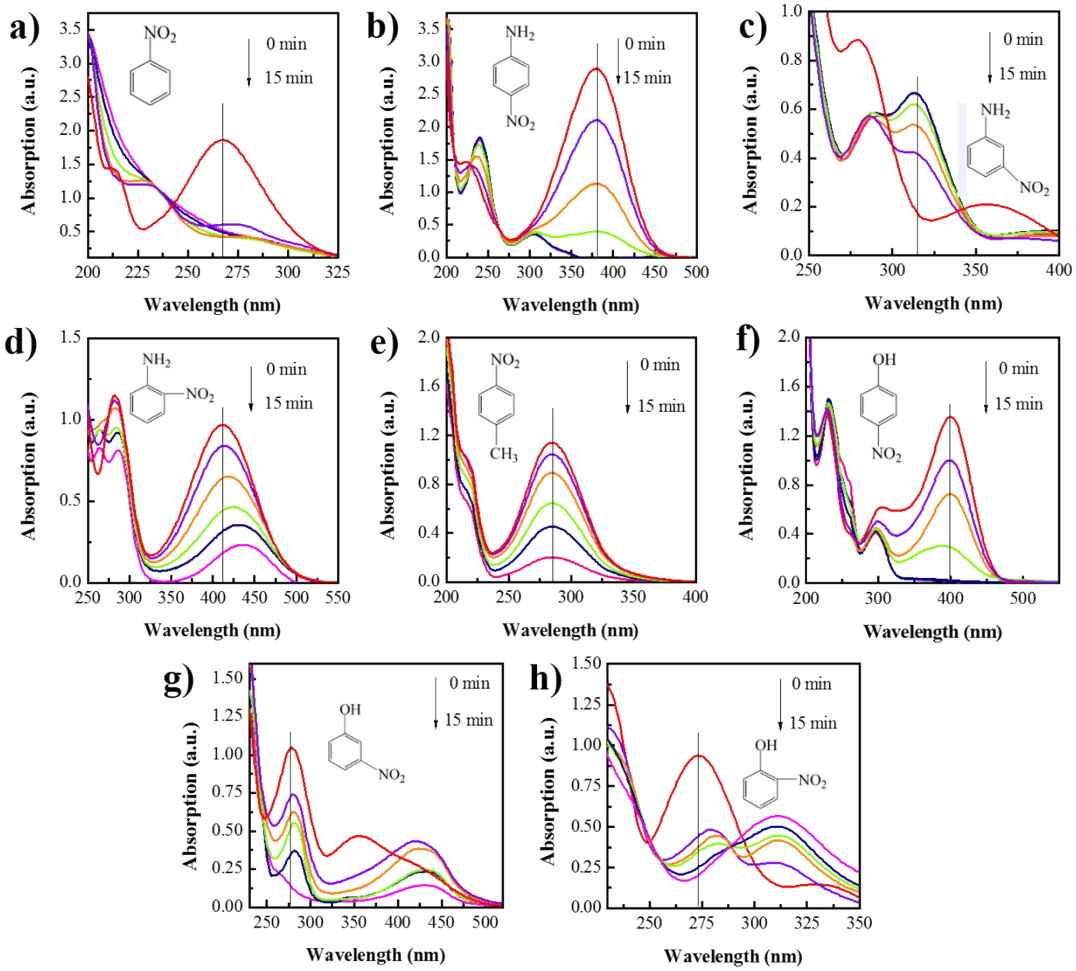

Fig. S4. Time-dependent UV-vis absorption spectra of (a) NB, (b) 4-NA, (c) 3-NA, (d) 2-NA, (e) 4-NT, (f) 4-NP, (g) 3-NP and (h) 2-NP (30 ppm) taken at regular time interval over 2%CN-CdS NSs heterostructure.

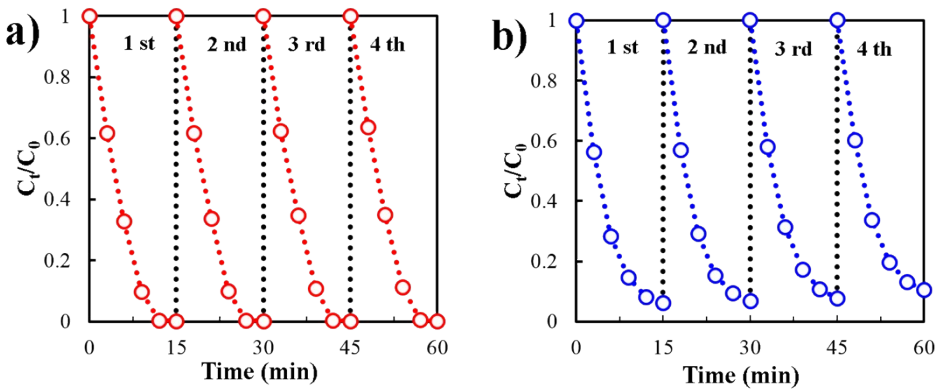

Fig. S5. Cyclic experiments for photo-reduction of (a) 4-NA and photo-oxidation of (b) Rh B over 2%CN-CdS NSs heterostructures visible light irradiation (λ>420 nm).

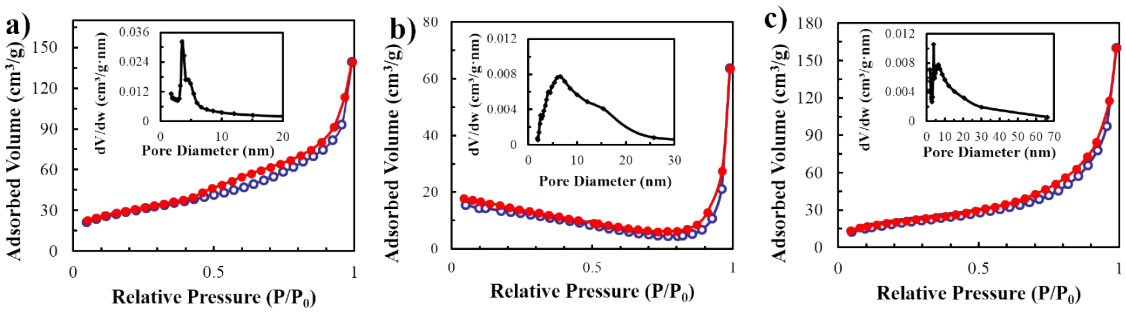

Fig. S6. BET measure of (a) CdS NSs, (b) g-C_3N_4 QDs and (c) 2%CN-CdS NSs.

Tab. S1. BET surface area, pore volume and pore size of different samples.

	BET surface area (m^2/g)	**Pore volume** (cm^3/g)	**Pore size** (nm)
CdS NSs	103.4	0.21	8.4
g-C_3N_4 QDs	5.7	0.083	43.6
2%CN-CdS NSs	68.9	0.25	14.0

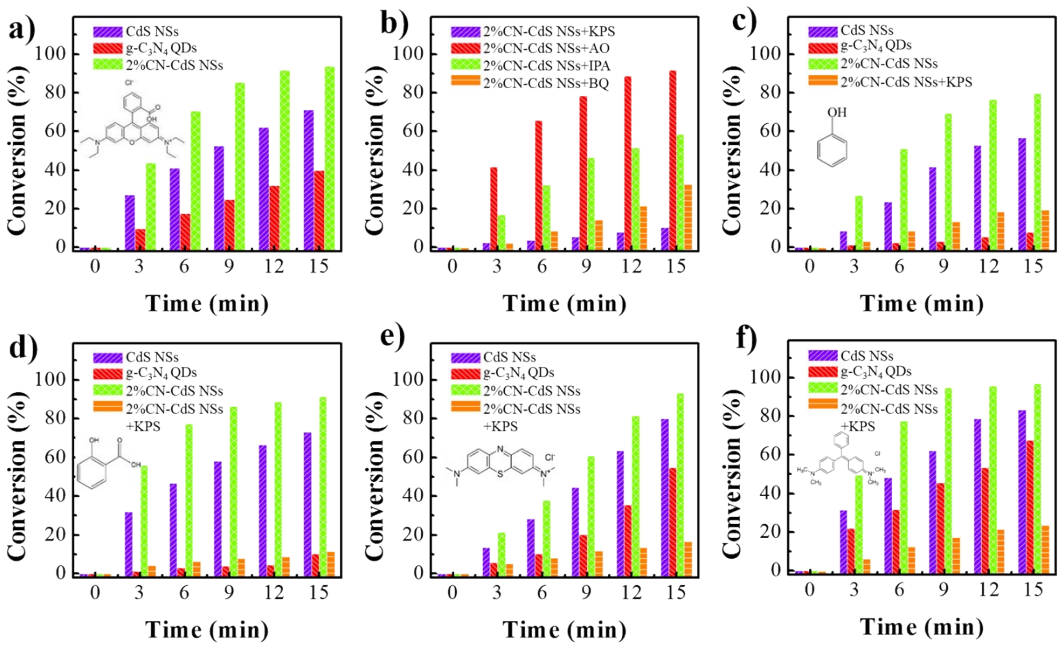

Fig. S7. Photocatalytic degradation of (a) RhB, (c) phenol, (d) SA, (e) MB and (f) MGO over CdS NSs, g-C_3N_4 QDs and 2%CN-CdS NSs heterostructure under visible light irradiation (λ>420 nm) at ambient conditions. (b) Control experiments by adding different scavengers for quenching different active species during the photocatalytic degradation of RhB over 2%CN-CdS NSs heterostructure.

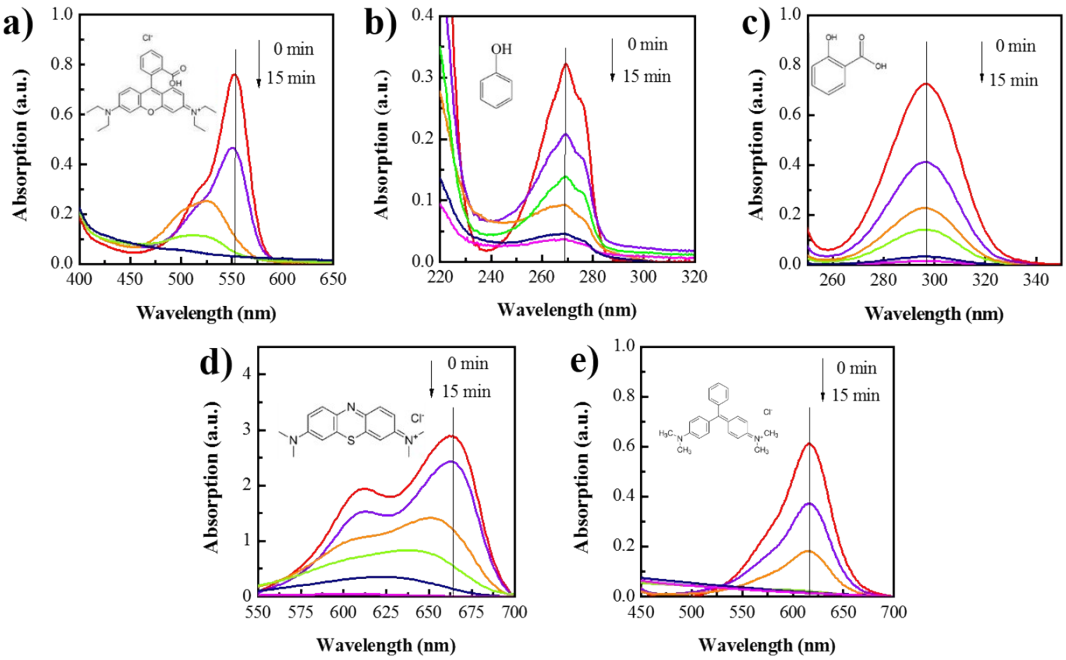

Fig. S8. Time-dependent UV-vis absorption spectra of (a) RhB, (b) phenol, (c) SA, (d) MB and (e) MGO (30 ppm) taken at regular time interval over 2%CN-CdS NSs heterostructure.

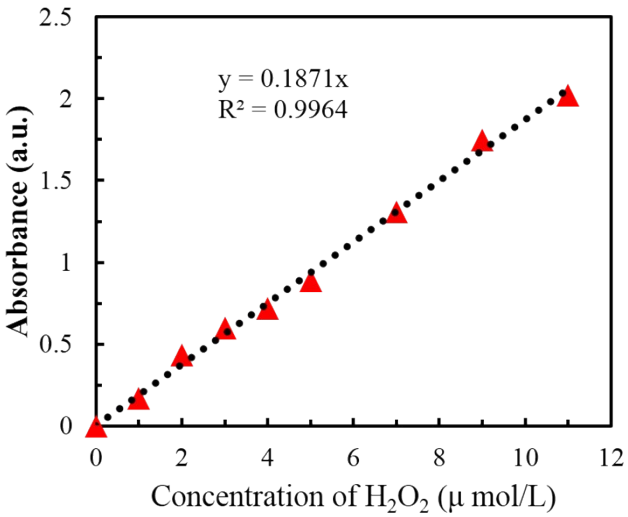

Fig. S9. Linear correlation between the concentration of H_2O_2 and light absorbance in the UV-vis absorption curves.