Supporting Information

Synthesis of nano-sized hybrid C_3N_4/TiO_2 sample for enhanced and steady solar energy absorption and utilization

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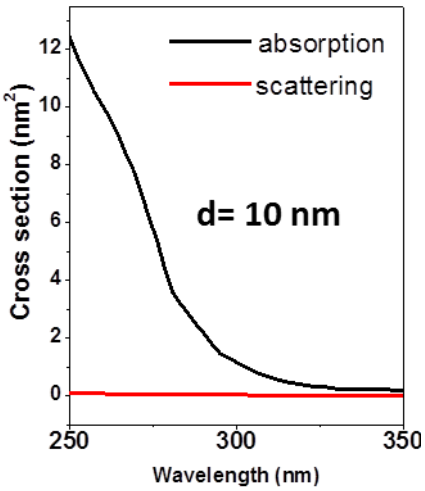

Figure S1. The electrodynamic calculation of the 10 nm TiO_2 based on Rayleigh scattering law.

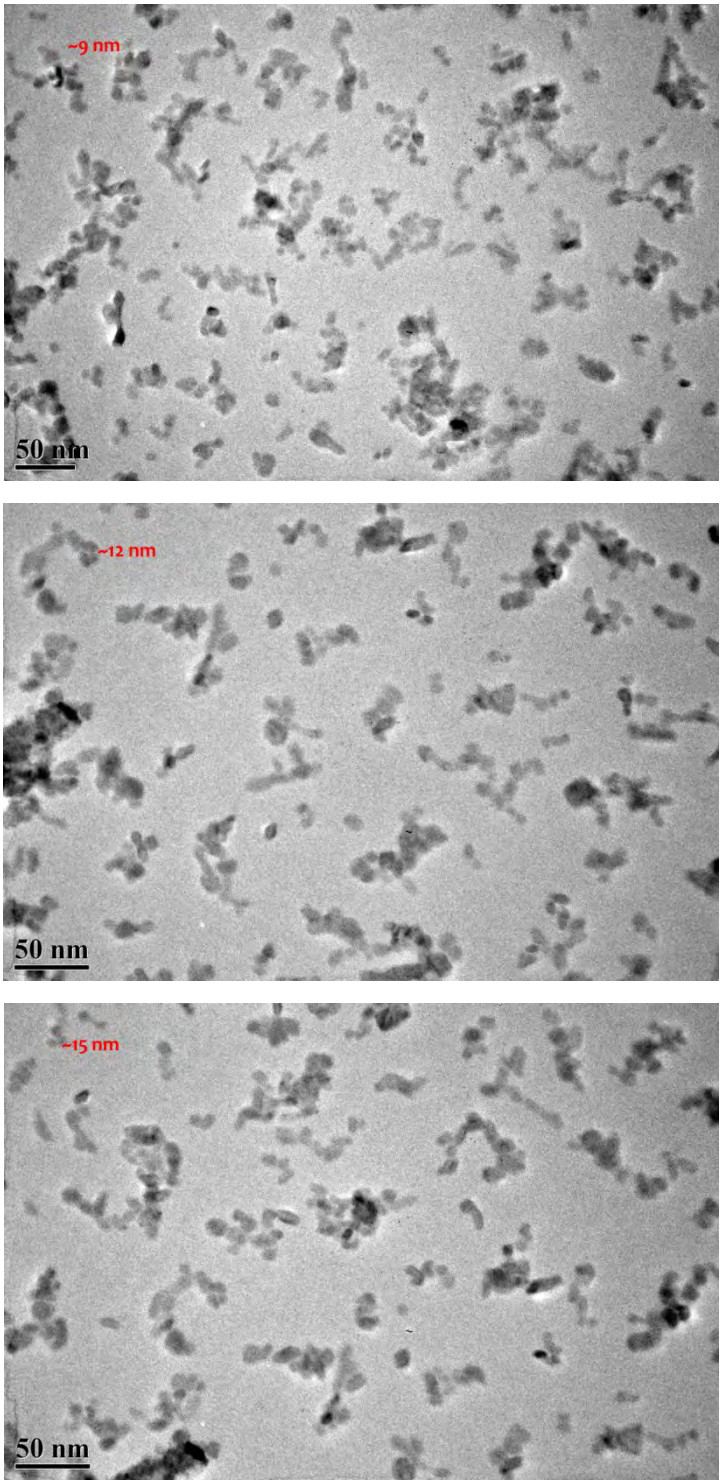

Figure S2. TEM images of CN-TiO_2-9, CN-TiO_2-12 and CN-TiO_2-15 samples under study.

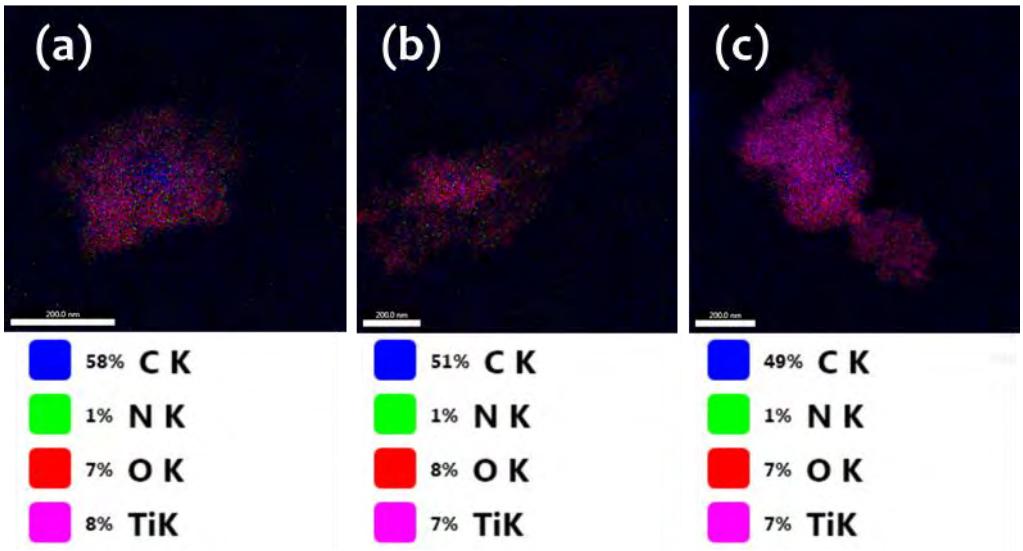

Figure S3. The element mapping of the CN-TiO_2 samples, (a) CN-TiO_2-9; (b) CN-TiO_2-12; (c) CN-TiO_2-15.

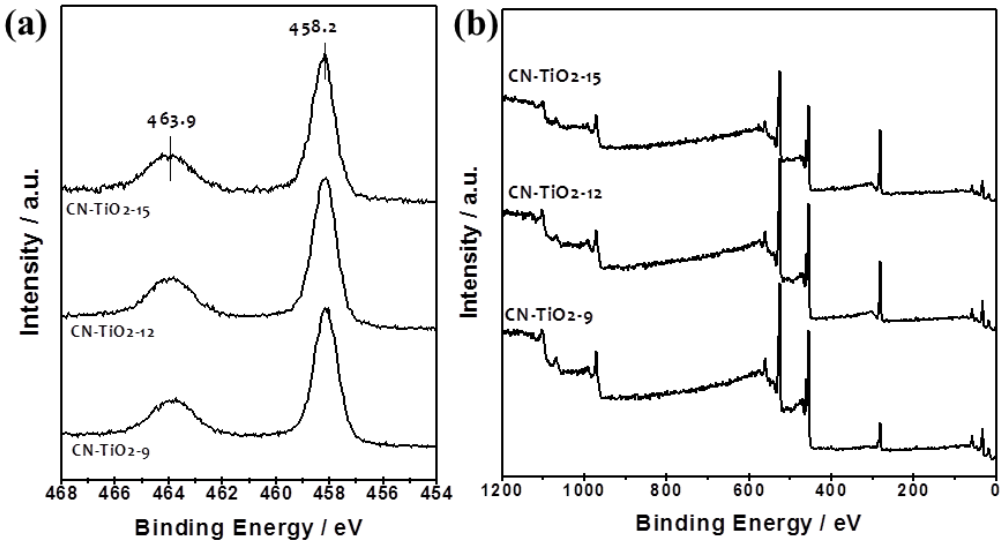

Figure S4. XPS spectra of CN-TiO_2 heterojunction samples, (a) Ti 2p, (b) survey spectrum.

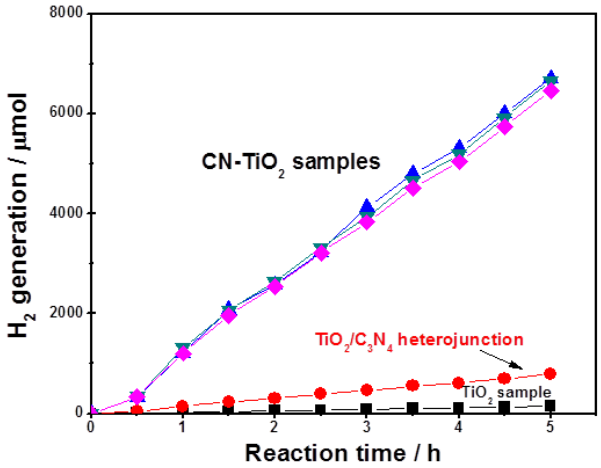

Figure S5. Photocatalytic hydrogen evolution under the 150 W xenon lamp of the CN-TiO_2 samples, reference TiO_2/C_3N_4 heterojunction and 10 nm anatase TiO_2.

Table S1 Comparison of H_2 generation based on g-C_3N_4 photocatalyst

Photocatalyst	Reactant solution	Light source	Activity (μmol h^{-1})	AQY (%)	Reference
g-C_3N_4 nanosheets	3 wt% of Pt co-catalyst; Aqueous TEOA solution (10%), 0.20 mol K_2HPO4	300 W Xe lamp (λ>400 nm)	947	26.1% (420 nm)	Angew.Chem. 2015, 127,13765
PTI-C_3N_4	3 wt% of Pt co-catalyst; Aqueous TEOA solution (10%)	300 W Xe lamp(λ>420 nm)	204	15% (400 nm) 7% (420 nm)	Angew. Chem. Int. Ed. 2014, 53, 11001
(ATCN)-C_3N_4	3 wt% of Pt co-catalyst; Aqueous TEOA solution (10%)	300 W Xe lamp (λ>420 nm)	ca. 750	8.8% (420 nm)	Energy Environ. Sci. 2014, 7, 1902
g-C_3N_4 (urea and thiourea)	1 wt% of Pt co-catalyst; Aqueous methanol solution (20%), pH = 13.3 (KOH)	300 W Xe lamp (λ>400 nm)	66.9	6.67% (400 nm)	Chem. Commun. 2014, 50, 15521
tri-s-triazine-based g-C_3N_4	3 wt % Pt 100 mL containing 10 mL of the 10 vol % TEOA with the addition of phosphates	300 W Xe lamp	770	50.7% at 405 nm	ACS Catal. 2016, 6, 3921
g-C_3N_4 herterojunction	200 mL 10 vol% TEOA aqueous solution	150W Xe lamp	**1400**	-	**This work**
		405 LED	**52**	**6.9%**	

Table S2 Comparison of H_2 generation based on TiO_2/C_3N_4 heterojunction photocatalyst

Entry	Co-catalyst	Total mass of catalysts	Reactant solution	Light source	Activity (μmol $h^{-1}g^{-1}$)	Reference
1	Pt (1.0 at%)	5 mg	10 mL triethanolamine (TEOA, 15 vol%) aqueous solution	300 W Xe lamp (λ>400 nm)	32	Nanoscale, 2016, 8, 11034
2	Pt (0.5wt.%)	0.3 g	400mL methanol solution (H_2O: CH_3OH= 7:1, in volume)	450W high-pressure mercury lamp (blocked by A $NaNO_2$ aqueous solution)	74.7	Journal of Alloys and Compounds, 2011, 509, L26
3	-	0.1 g	100 mL 10 vol% TEOA aqueous solution	300 W Xe lamp (λ>400 nm)	39.18	RSC Advance,2015, 5,101214
4	Pt (1.0 wt.%)	0.1 g	100 ml oxalic acid solution (0.025 M)	300 W Xe lamp (λ>420 nm)	~80	Dalton Transactions, 2015, 44, 13030
5	Pt	20 mg	50 mL methanol solution (H_2O: CH_3OH= 4:1, in volume)	300 W Xe lamp	8931	Nano Research 2015, 8, 1199
6	-	0.1 g	120 mL methanol solution (H_2O: CH_3OH= 3:1, in volume)	500 W Xe lamp	559.7	International Journal of Hydrogen Energy, 2014, 39, 6354
7	Pt (3.0 wt.%)	15 mg	10 mL TEOA aqueous solution	300 W Xe lamp	3127	Journal of Solid State Chemistry, 2014, 220, 54
8	Pt (1.0 wt.%)	0.1 g	100 mL 10 vol% TEOA aqueous solution	150W Xe lamp	1540	Applied Catalysis B: Environmental, 2016, 191, 130
9	Pt (1.0 wt.%)	0.1g	200 mL 10 vol% TEOA aqueous solution	150W Xe lamp	**14000**	**This work**
				405 LED	**520**	

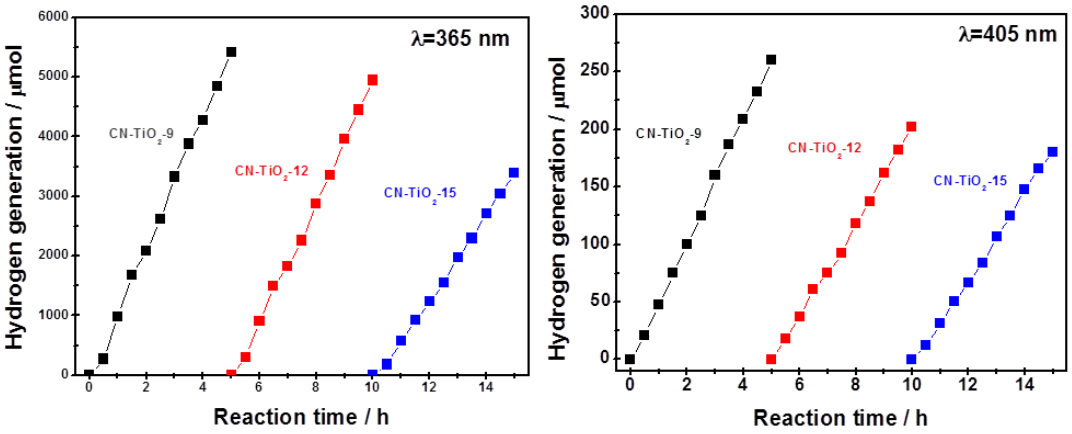

Figure S6. Photocatalytic hydrogen evolution of the CN-TiO_2 samples under the monochromatic light of 365 and 405 nm.

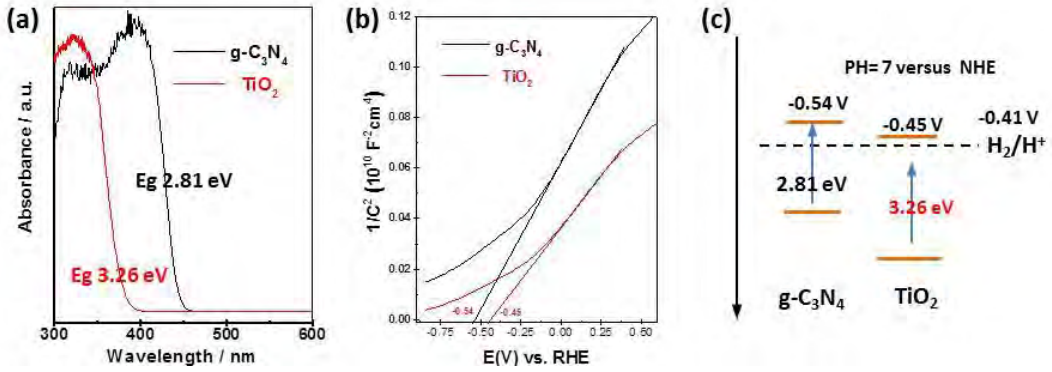

Figure S7. (a) UV–vis diffuse reflection spectra of g-C_3N_4 and TiO_2; (b) Mott–Schottky plots, the measurements were carried out in 0.5M Na_2SO_4 solution in the dark with the fixed frequency of 1 kHz; (c) The schematic illustration of the band structure.

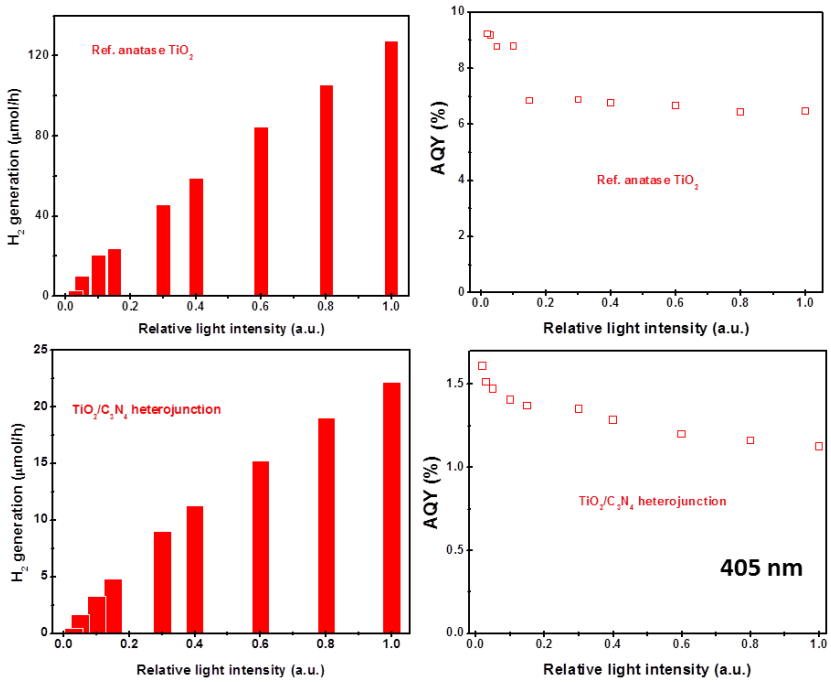

Figure S8. Hydrogen evolution rate under the special LED lamp with different relative light intensity of the reference anatase TiO_2 (365 nm irradiation) and TiO_2/C_3N_4 heterojunction (405 nm irradiation).

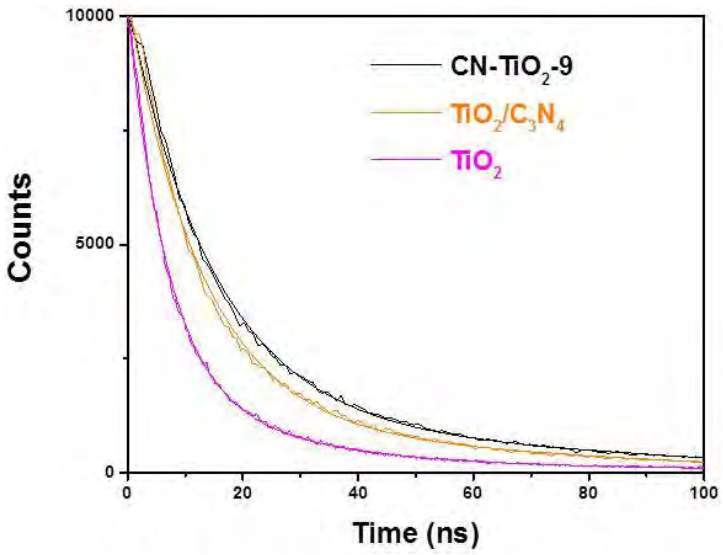

Figure S9. Nanosecond-level time-resolved fluorescence spectra of CN-TiO_2-9, TiO_2/C_3N_4 and TiO_2 samples. The spectra were monitored at 440 nm under 325 nm excitation at room temperature..