Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

The synergetic effect of Ti_3C_2 MXene and Pt as co-catalysts for highly efficient photocatalytic hydrogen evolution over g-C_3N_4

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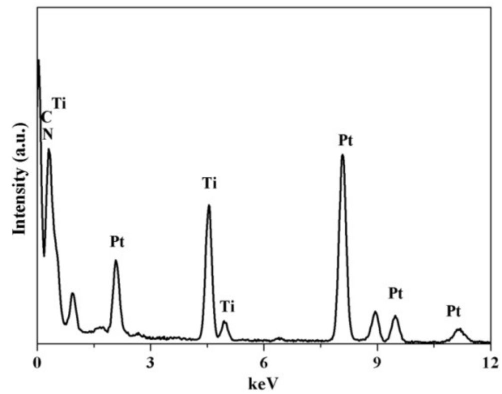

Figure S1 EDS spectrum of g-C_3N_4/Ti_3C_2/Pt photocatalysts.

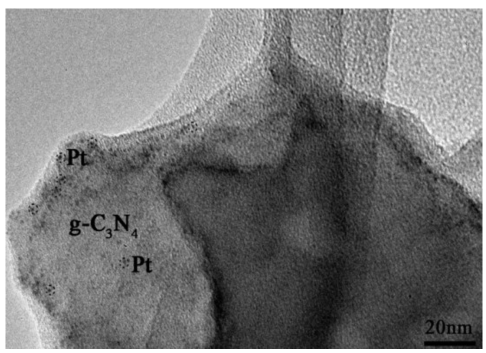

Figure S2 TEM image of g-C_3N_4 modified with Pt nanoclusters.

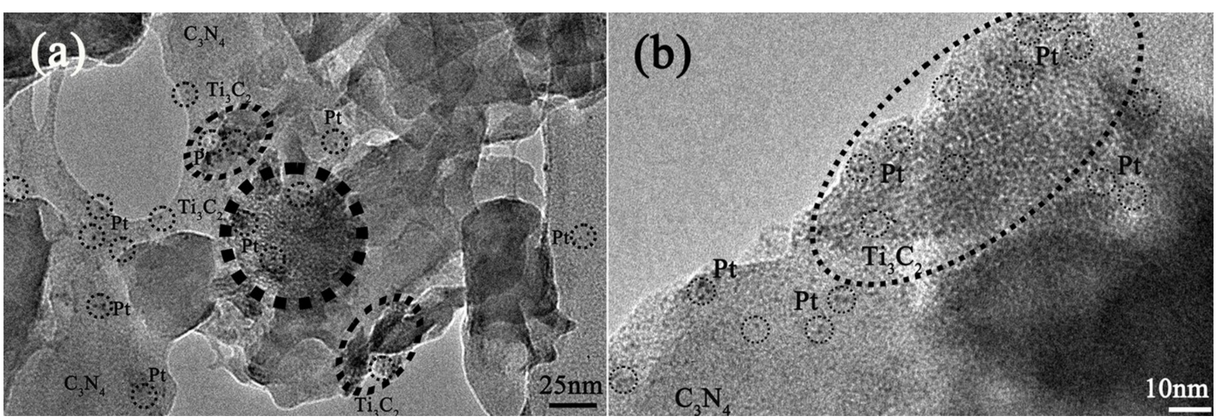

Figure S3 TEM image of g-C_3N_4/Ti_3C_2/Pt photocatalysts..

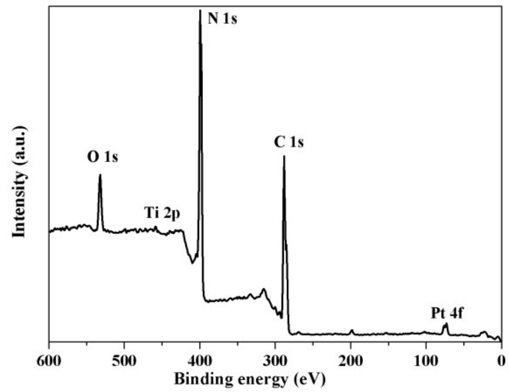

Figure S4 Survey XPS spectrum of g-C_3N_4/Ti_3C_2/Pt photocatalysts.

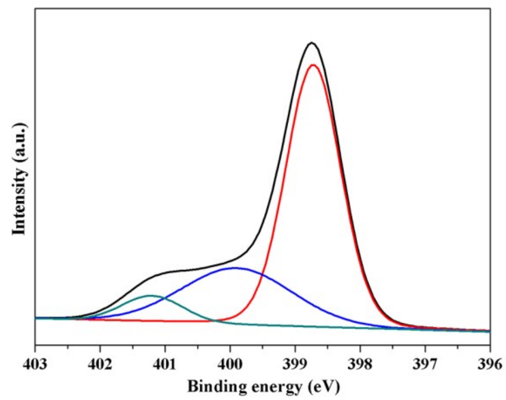

Figure S5 N 1s spectrum of g-C_3N_4.

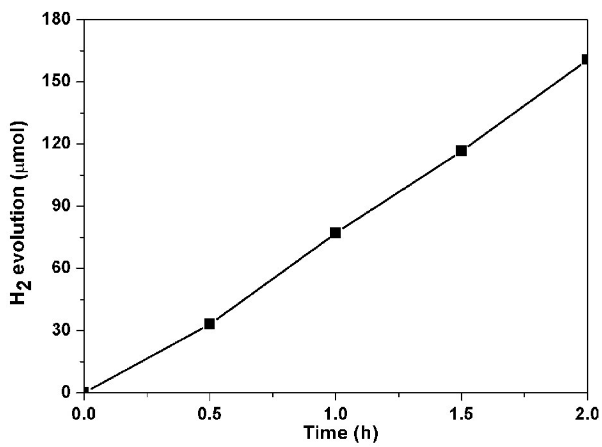

Figure S6 H_2 evolution over g-C_3N_4/Ti_3C_2/Pt under visible light irradiation (λ >420 nm).

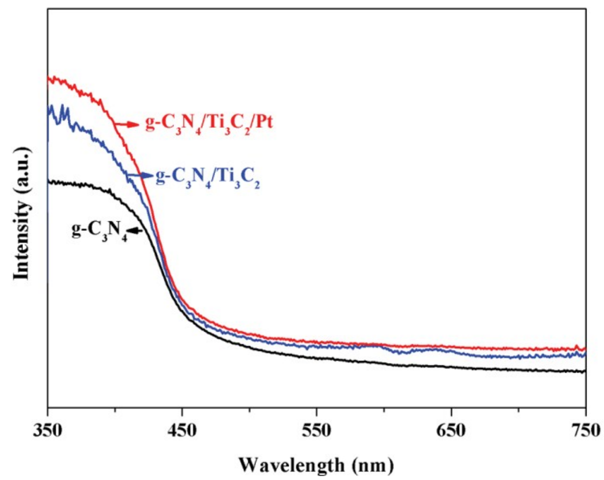

Figure S7 DRS spectra of g-C_3N_4, g-C_3N_4/Ti_3C_2 and g-C_3N_4/Ti_3C_2/Pt photocatalysts.

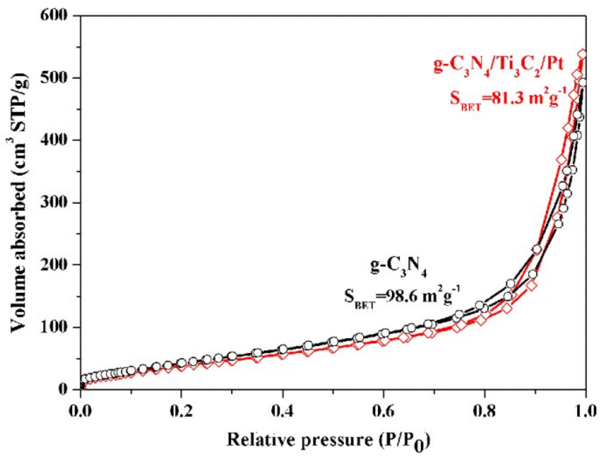

Figure S8 N2 adsorption isotherms of g-C_3N_4 and g-C_3N_4/Ti_3C_2/Pt photocatalysts.

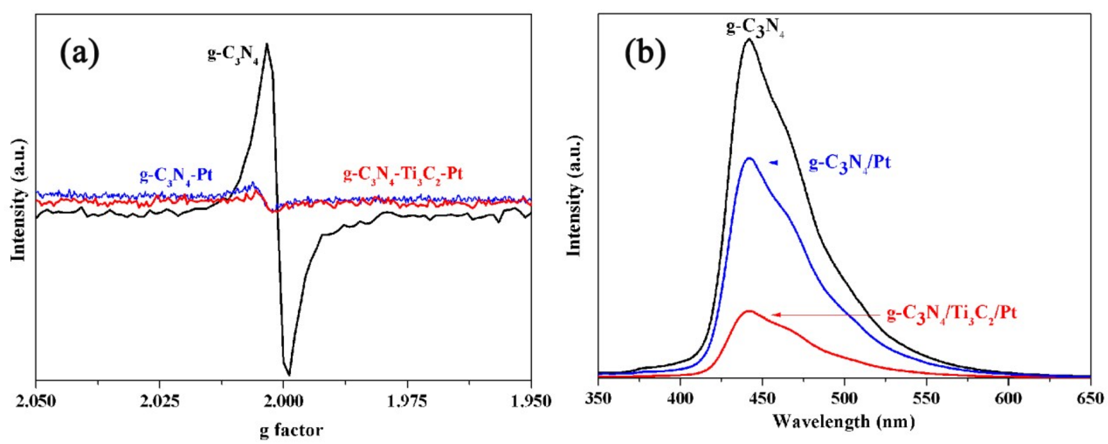

Figure S9 (a) ESR spectra of g-C_3N_4, g-C_3N_4/Pt and g-C_3N_4/Ti_3C_2/Pt; (b) PL spectra of g-C_3N_4, g-C_3N_4/Pt and g-C_3N_4/Ti_3C_2/Pt.

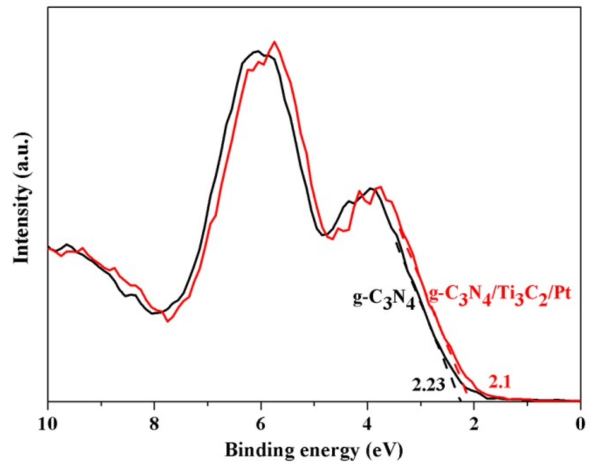

Figure S10 N 1s spectrum of g-C_3N_4.

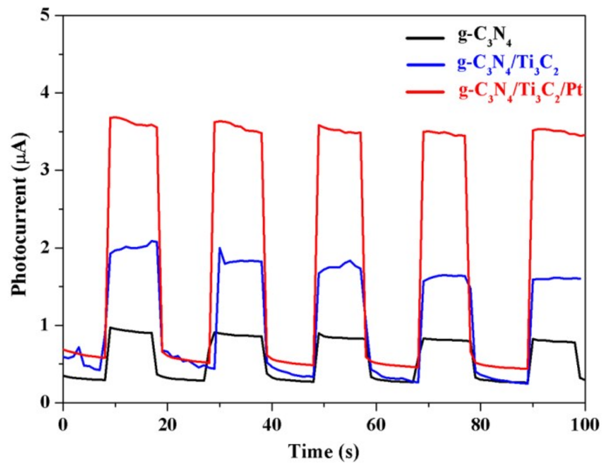

Figure S11 Transient photocurrent response spectra of g-C_3N_4, g-C_3N_4/Ti_3C_2 and g-C_3N_4/Ti_3C_2/Pt under visible light irradiation.

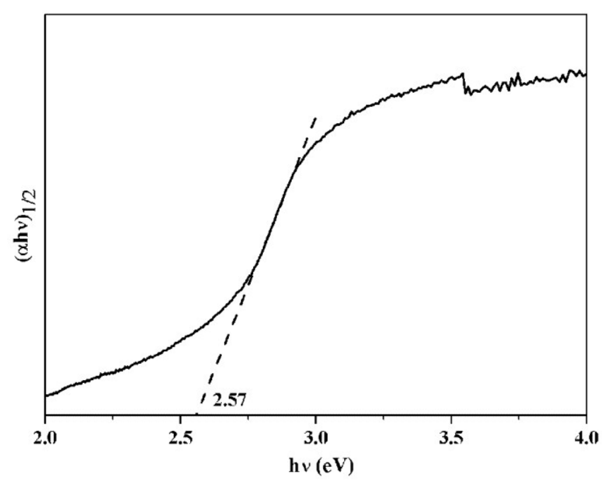

Figure S12 The plots of $(\alpha h\nu)^{1/2}$ versus hν of g-C_3N_4.

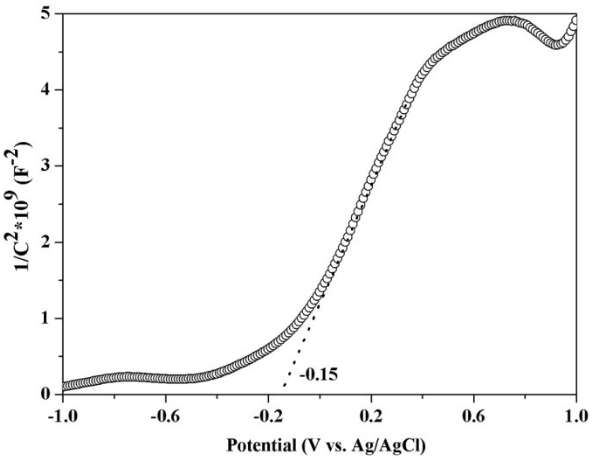

Figure S13 Mott-schottky plot of Ti_3C_2 Mxene.

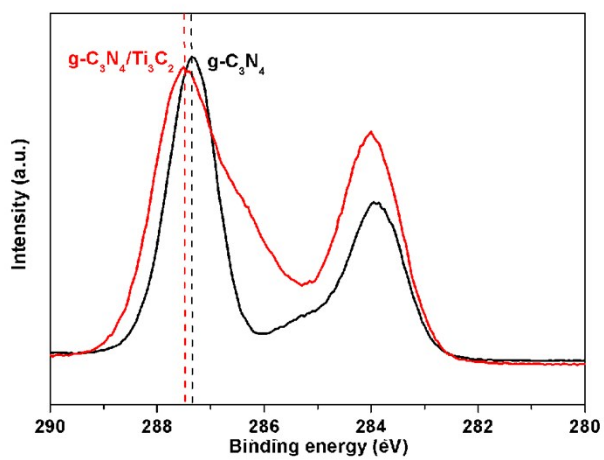

Figure S14 C 1s XPS spectra of g-C_3N_4 and g-C_3N_4/Ti_3C_2.

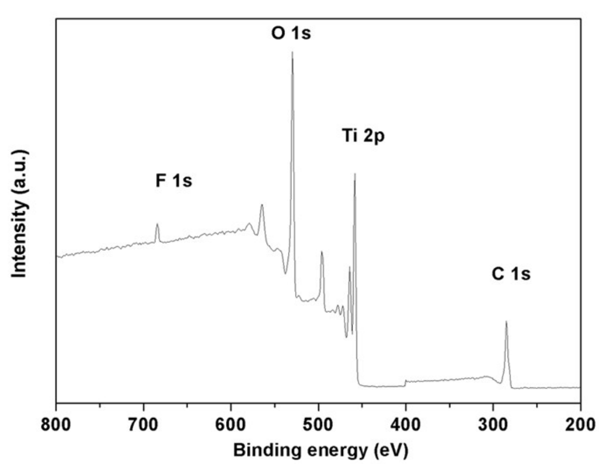

Figure S15 Survey XPS spectrum of Ti_3C_2 nanoparticles.

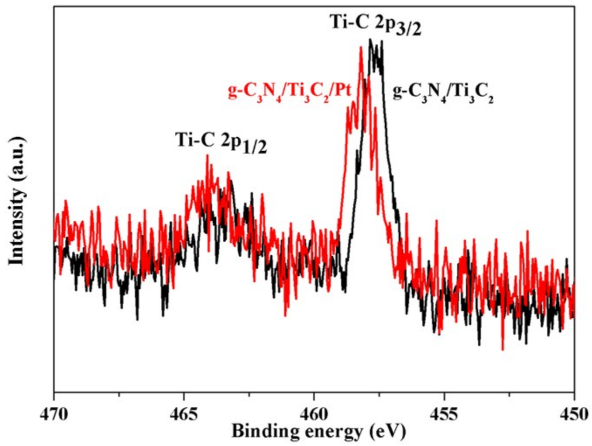

Figure S16 Ti 2p XPS of $g-C_3N_4/Ti_3C_2$ and $g-C_3N_4/Ti_3C_2/Pt$.

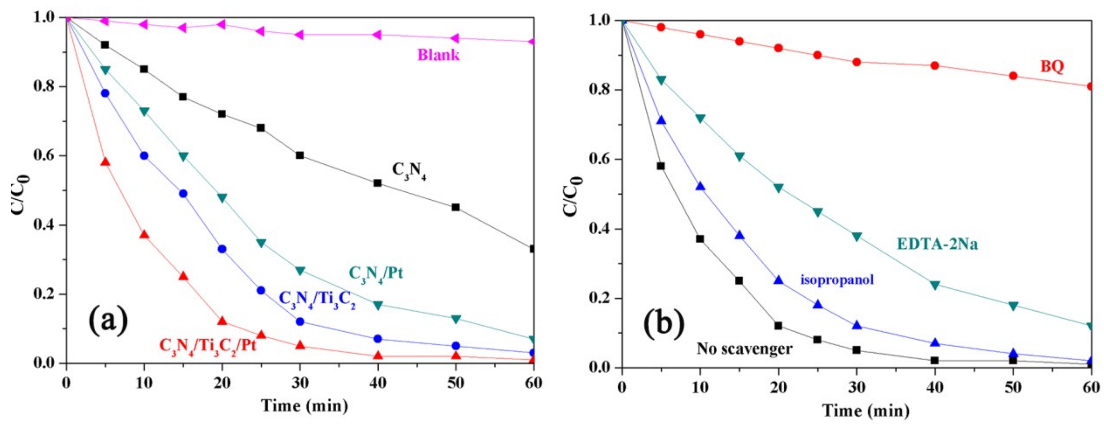

Figure S17 (a) Photodegradation of methyl orange over different photocatalysts; (b) Photodegradation of methyl orange over $g-C_3N_4/Ti_3C_2/Pt$, with the addition of h^+,•OH and•O_2^- scavengers.

Table S1 Comparison of several $g-C_3N_4$-based photocatalysts reported for hydrogen production.

Sample	Hydrogen evolution rate μmol h^{-1}	Hydrogen evolution rate μmol h^{-1} g^{-1}	Efficiency	Ref.
Graphitic carbon/carbon nitride	≈23.75 μmol h-1	≈475 μmol h-1 g-1	/	1
$Au-C_3N_4-MoS_2$	52.5 μmol h^{-1}	1050 μmol h^{-1} g^{-1}	/	2
$g-C_3N_4/SrTa_2O_6$	37. 2 μmol h^{-1}	744 μmol h^{-1} g^{-1}	2.62% at 420 nm	3
$Ni_2P/g-C_3N_4$	14.5 μmol h^{-1}	362.4 μmol h^{-1} g^{-1}	1.8% at 420 nm	4
P-doped $g-C_3N_4$	57 μmol h^{-1}	570 μmol h^{-1} g^{-1}	/	5
$C-TiO_2/g-C_3N_4$	/	1145.6 μmol h^{-1} g^{-1}	6.2% at 420 nm	6
$NiCoP@NiCo-Pi/g-C_3N_4$	26.71 μmol h^{-1}	534.2 μmol h^{-1} g^{-1}	2.9% at 420 nm	7

I-doped g-C_3N_4	44.5 μmol h^{-1}	890 μmol h^{-1} g^{-1}	3.0% at 420 nm	8
Au cluster-NP/C_3N_4	/	230 μmol h^{-1} g^{-1}	1.7% at 550 nm	9
P-doped g-C_3N_4	67 μmol h^{-1}	670 μmol h^{-1} g^{-1}	5.68% at 420 nm	10
g-C_3N_4/Co_2P/K_2HPO_4	27.81 μmol h^{-1}	556.2 μmol h^{-1} g^{-1}	/	11
g-C_3N_4/Ti_3C_2/Pt	**77 μmol h^{-1}**	**2100 mmol h^{-1} g^{-1}**	**3.1% at 420 nm**	**This work**

[a] Light source: λ>420 nm

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