Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Efficient photocatalytic hydrogen evolution with end-group-functionalized cobaloxime catalysts in combination with graphite-like C_3N_4

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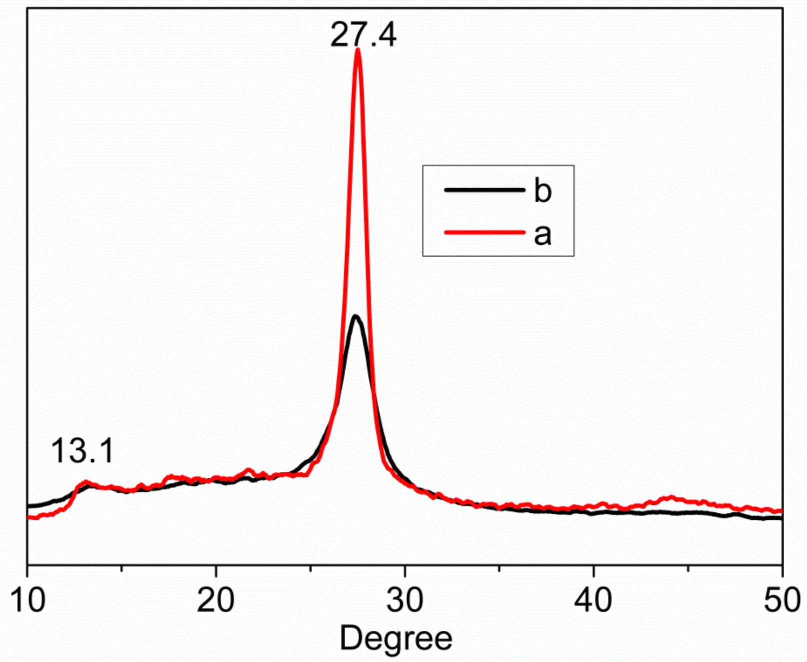

Fig. S1 XRD patterns of g-C_3N_4 before (a) and after (b) photocatalysis reaction

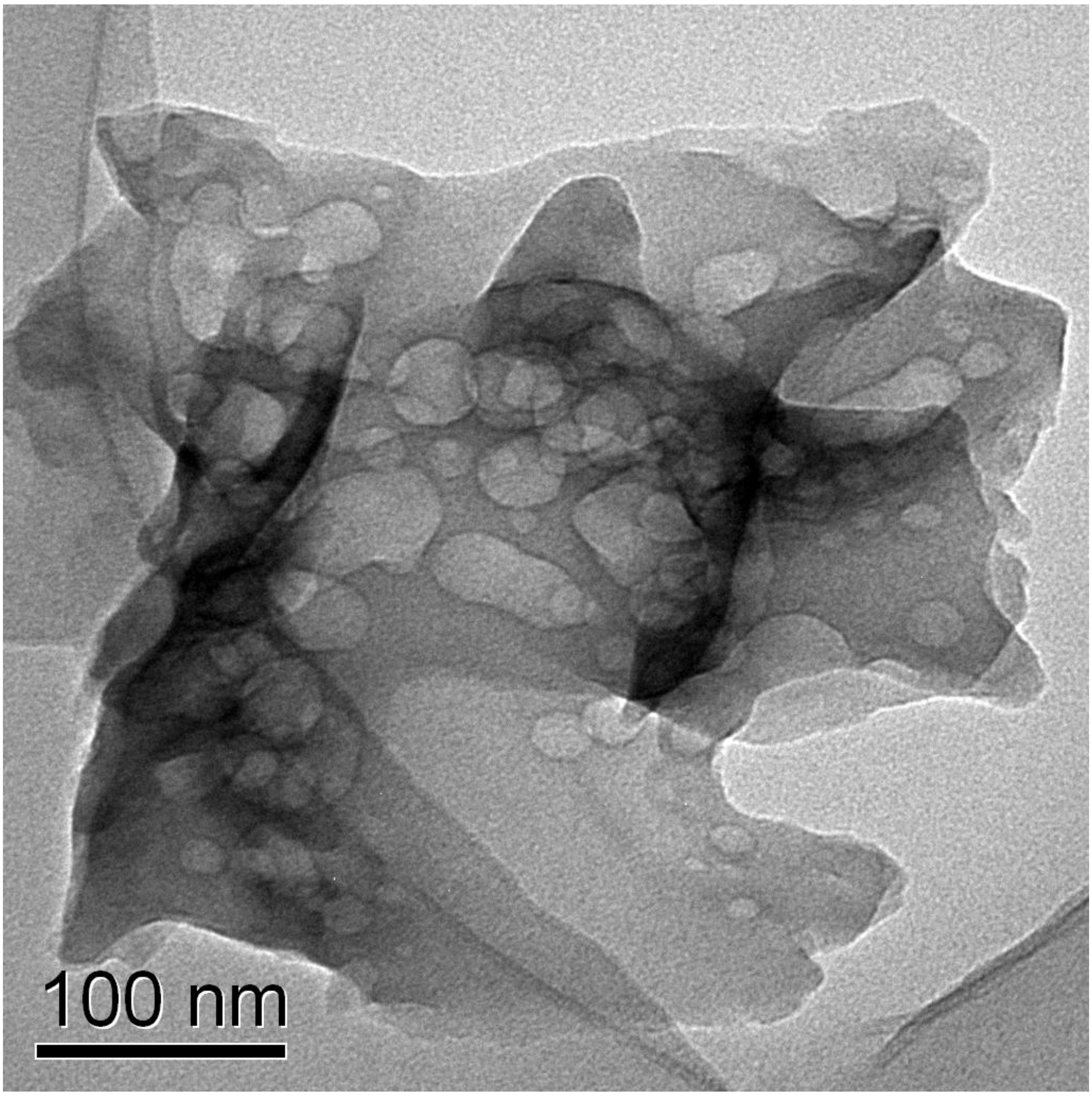

Fig. S2 TEM image of g-C_3N_4 before photocatalysis reaction

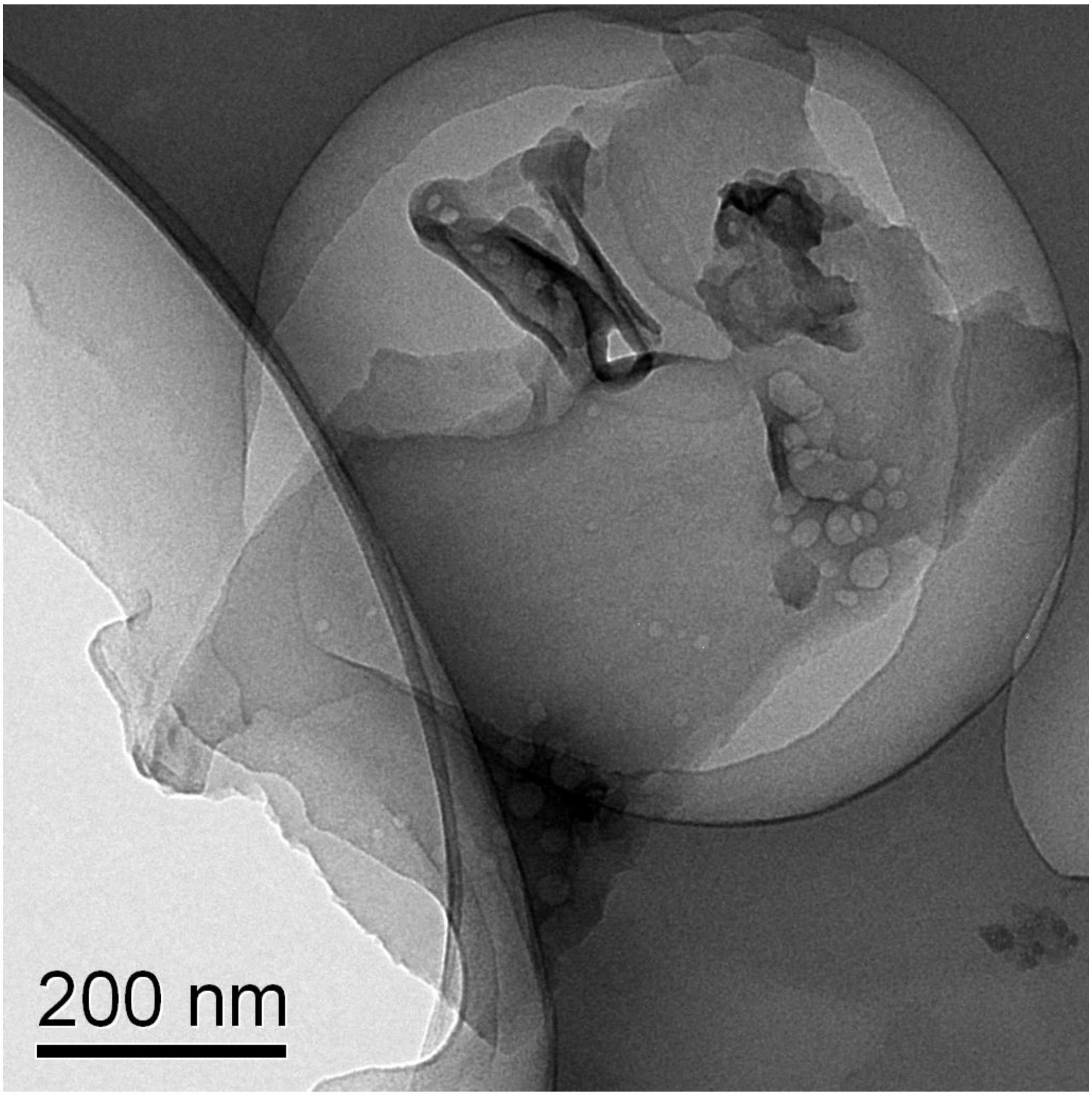

Fig. S3 TEM image of g-C_3N_4 after photocatalysis reaction following the conditions: C1 (1×10^{-4} M), g-C_3N_4 (4 mg), 5 vol% TEOA in CH_3CN-H_2O (9/1, v/v) solution (5 mL) at pH=9, irradiation light >400 nm in 12 h.

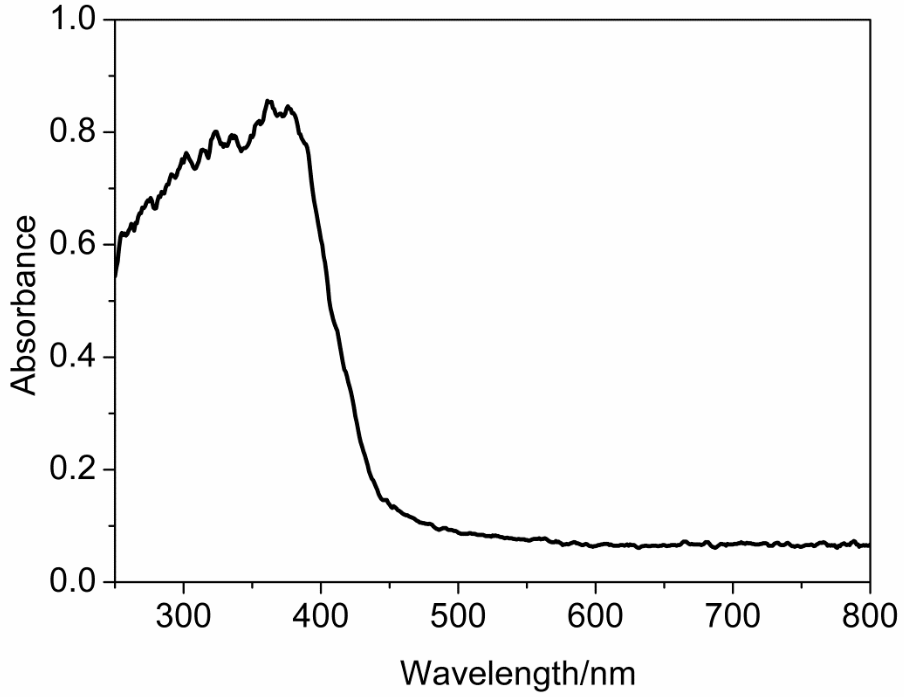

Fig. S4 the UV-vis DRS spectrum of g-C_3N_4

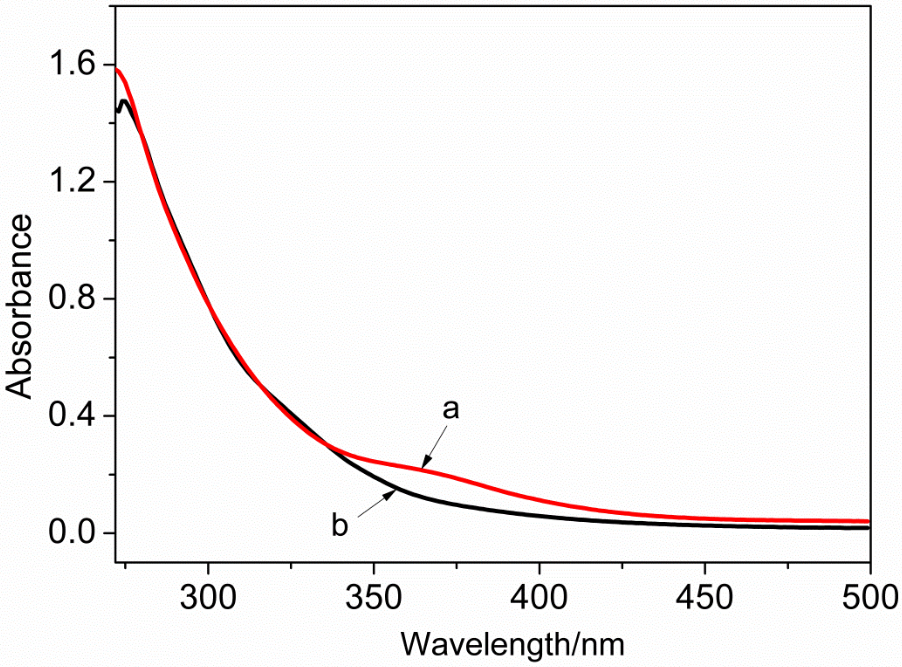

Fig. S5 Comparison of UV-vis absorption spectra between (a) **C1** (1×10^{-4} M) in reaction solution and (b) the resulting clear solution after removing g-C_3N_4 from the **C1**/g-C_3N_4 system after photocatalysis

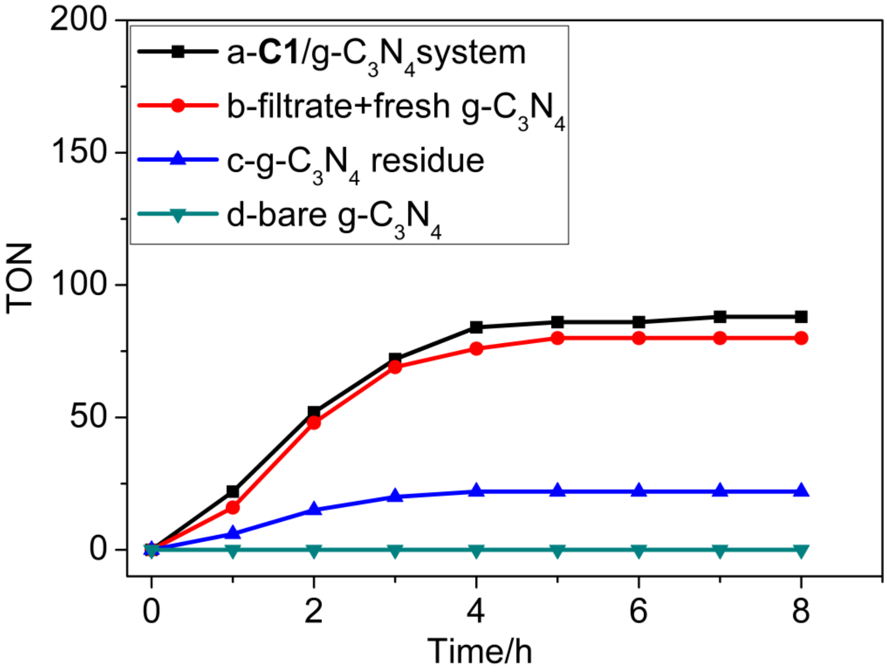

Fig. S6 Comparison of hydrogen production for (a) the original **C1**/g-C_3N_4 system containing **C1** (1×10^{-4} M), g-C_3N_4 (4 mg) and TEOA (5 vol%) in CH_3CN-H_2O (9/1, v/v) solution at pH 10, (b) readdition of the fresh g-C_3N_4 (4 mg) to the filtrate of the original **C1**/g-C_3N_4 system, (c) readdition of the 5 vol% TEOA acetonitrile aqueous solution (9/1, v/v) to the g-C_3N_4 residue of the original **C1**/g-C_3N_4 system and (d) the bare g-C_3N_4 (4 mg) in CH_3CN-H_2O (9/1, v/v) solution at pH 10.

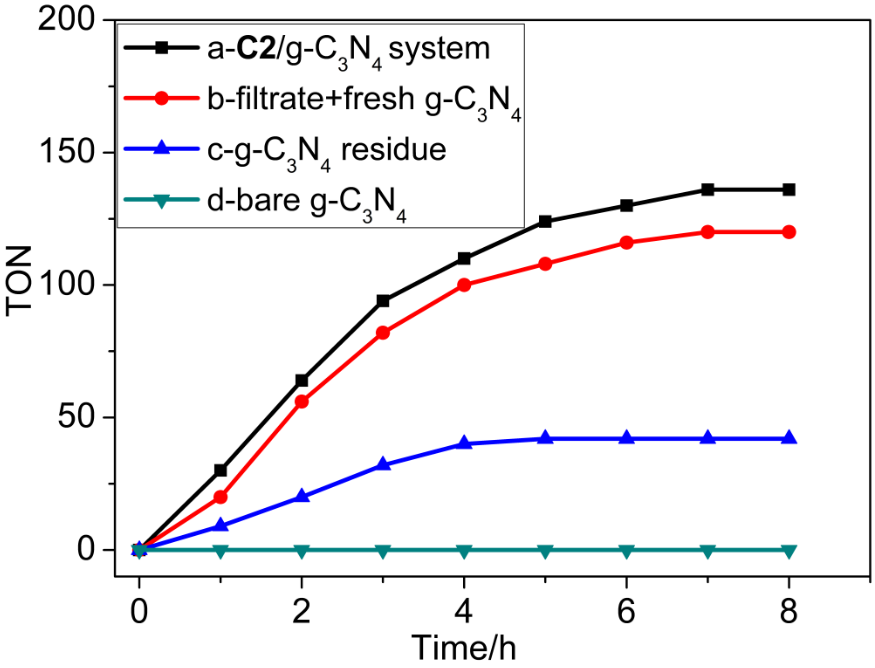

Fig. S7 Comparison of hydrogen production for (a) the original **C2**/g-C_3N_4 system containing **C2** (1×10^{-4} M), g-C_3N_4 (4 mg) and TEOA (5 vol%) in CH_3CN-H_2O (9/1, v/v) solution at pH 10, (b) readdition of the fresh g-C_3N_4 (4 mg) to the filtrate of the original **C2**/g-C_3N_4 system, (c) readdition of the 5 vol% TEOA acetonitrile aqueous solution (9/1, v/v) to the g-C_3N_4 residue of the original **C2**/g-C_3N_4 system and (d) the bare g-C_3N_4 (4 mg) in CH_3CN-H_2O (9/1, v/v) solution at pH 10.

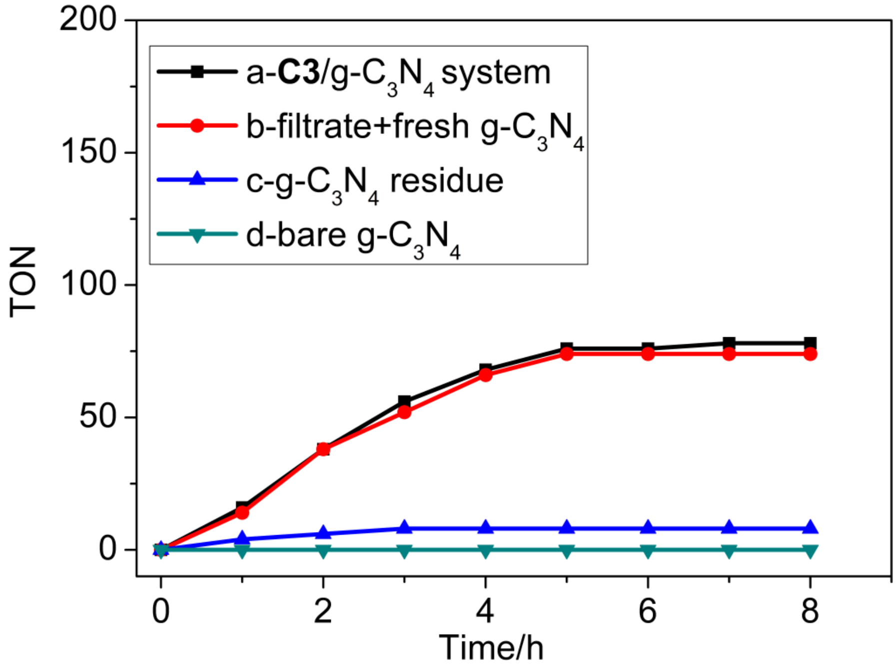

Fig. S8 Comparison of hydrogen production for (a) the original **C3**/g-C_3N_4 system containing **C3** (1×10^{-4} M), g-C_3N_4 (4 mg) and TEOA (5 vol%) in CH_3CN-H_2O (9/1, v/v) solution at pH 10, (b) readdition of the fresh g-C_3N_4 (4 mg) to the filtrate of the original **C3**/g-C_3N_4 system, (c) readdition of the 5 vol% TEOA acetonitrile aqueous solution (9/1, v/v) to the g-C_3N_4 residue of the original **C3**/g-C_3N_4 system and (d) the bare g-C_3N_4 (4 mg) in CH_3CN-H_2O (9/1, v/v) solution at pH 10.

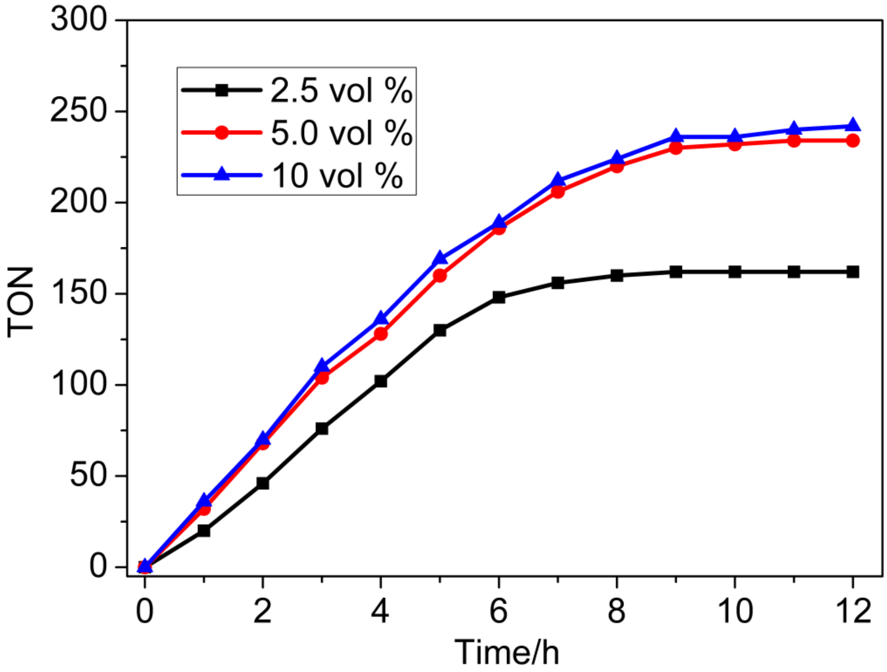

Fig. S9 the dependence of H_2 evolution on the concentration of TEOA from 2.5 vol % to 10 vol % under the following conditions: **C1** (1×10^{-4} M) and g-C_3N_4 (4 mg) in CH_3CN-H_2O (9/1) solution (5 mL) at pH=9.

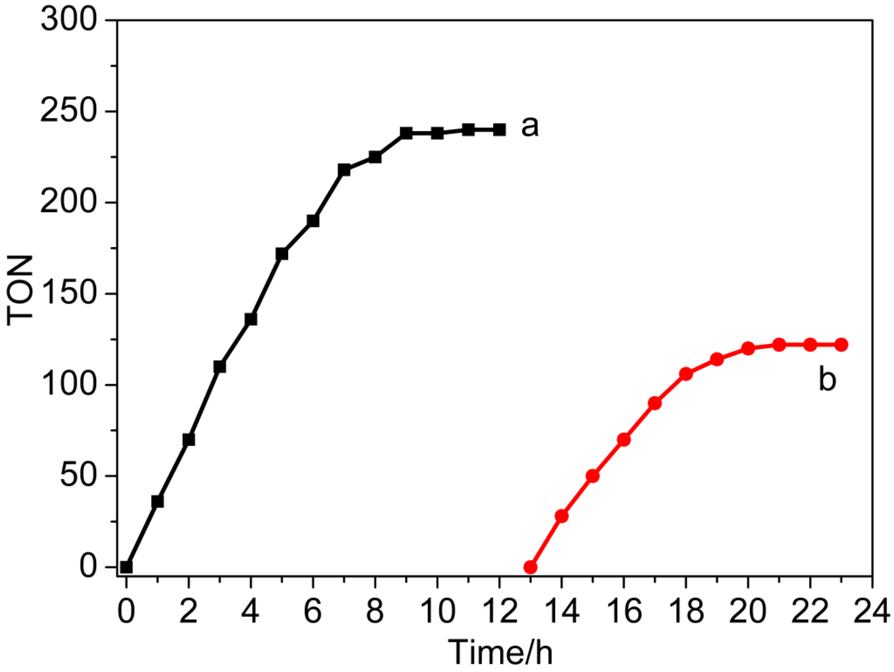

Fig. S10 (a) H_2 production from the system containing g-C_3N_4 (4 mg) and **C1** (1×10^{-4} M) in a 5 vol% TEOA acetonitrile aqueous solution at pH 9; (b) readdition of **C1** (0.5 μmol) to the solution after 12 h of irradiation.

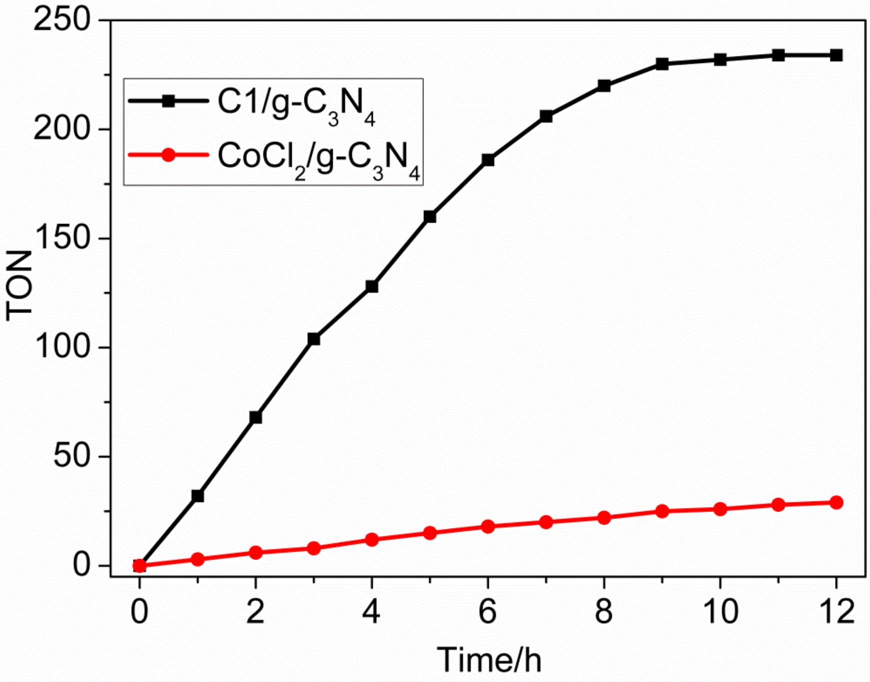

Fig. S11 Time dependence of hydrogen production using **C1** and CoCl$_2$ (1×10^{-4} M) under the following conditions: g-C$_3$N$_4$ (4 mg) and 5 vol% TEOA in CH$_3$CN-H$_2$O (9/1) solution (5 mL) at pH=9.

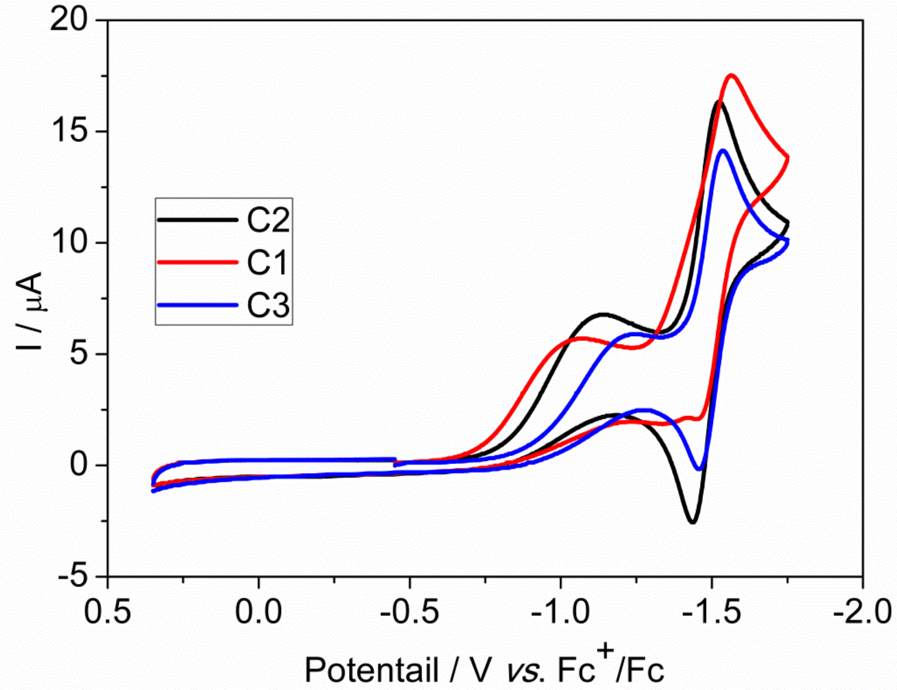

Fig. S12 Cyclic voltammograms of **C1** (0.5 mM), **C2** (0.5 mM) and **C3** (0.5 mM) in CH_3CN (0.1 M NBu_4PF_6, ν = 100 mV s^{-1})

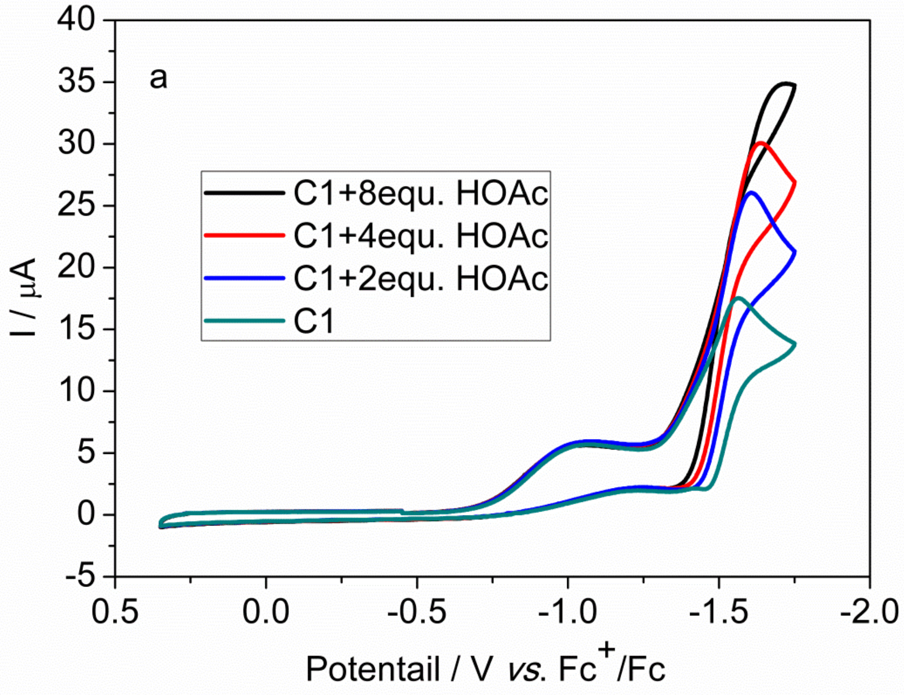

Fig. S13 Electrochemical response of 0.5 mM **C1** to addition of acetic acid in CH_3CN (0.1 M NBu_4PF_6, ν = 100 mV s^{-1})

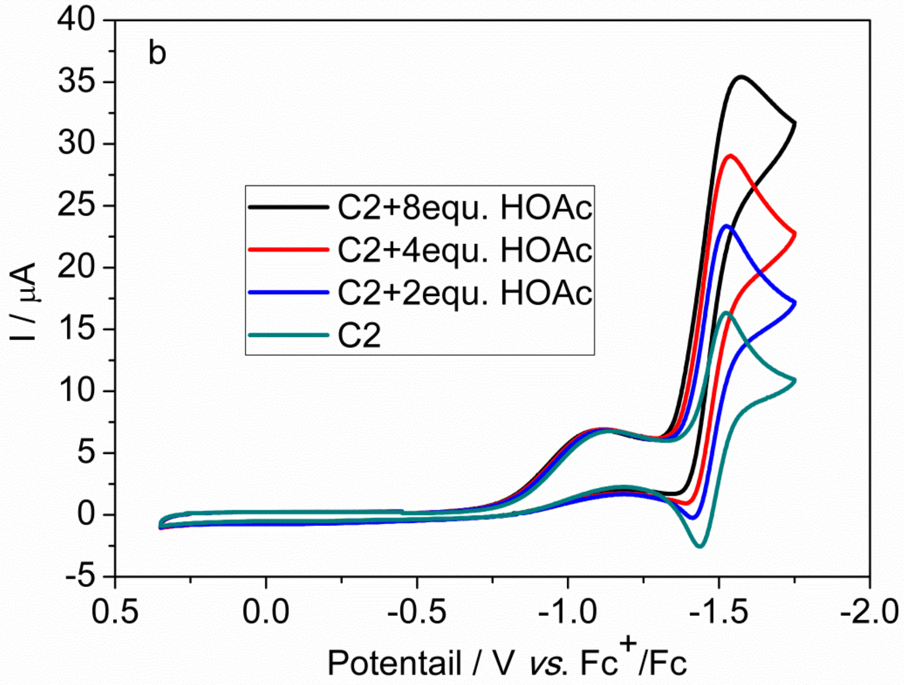

Fig. S14 Electrochemical response of 0.5 mM **C2** to addition of acetic acid in CH_3CN (0.1 M NBu_4PF_6, ν = 100 mV s^{-1})