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

Supporting Information

Highly selective oxidation of glucose to glucaric acid and gluconic acid in water catalyzed by an efficient synergistic photocatalytic system

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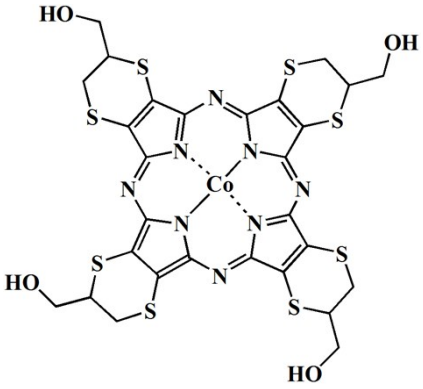

Fig. S1 Molecular structure of cobalt tetra(2-hydroxymethyl-1,4-dithiin)porphyrazine (CoPz).

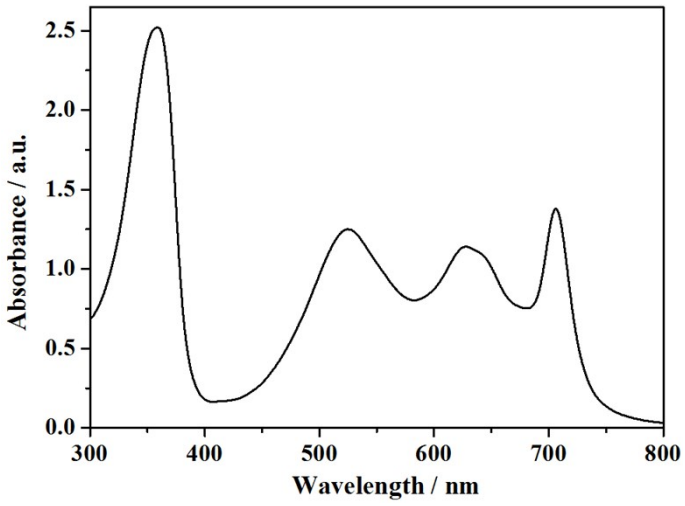

Fig. S2 UV-vis spectrum of metal-free H_2Pz in DMF.

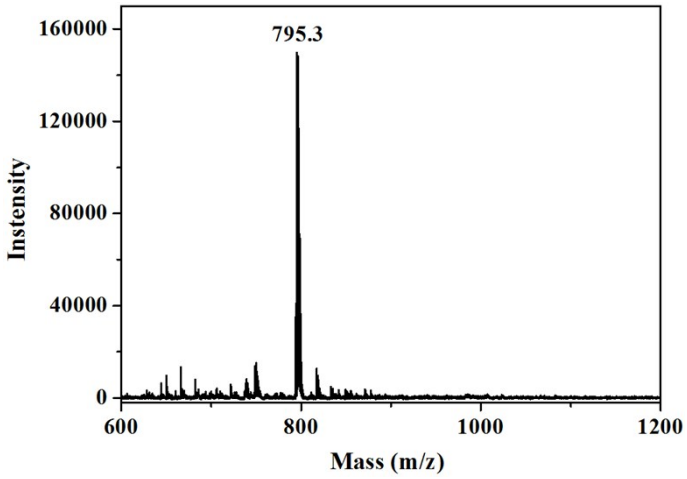

Fig. S3 MALDI-TOF MS of metal-free H_2Pz.

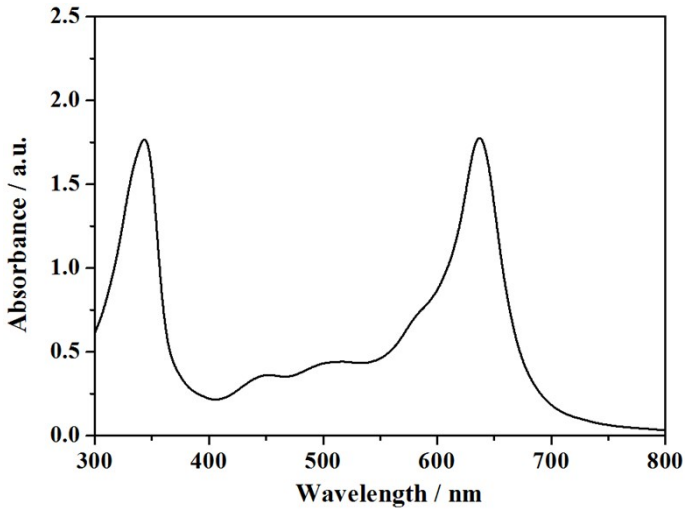

Fig. S4 UV-vis spectrum of CoPz in DMF.

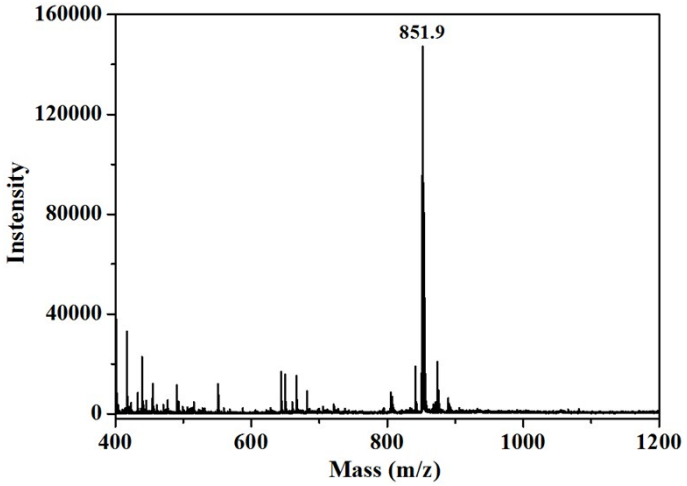

Fig. S5 MALDI-TOF MS of CoPz.

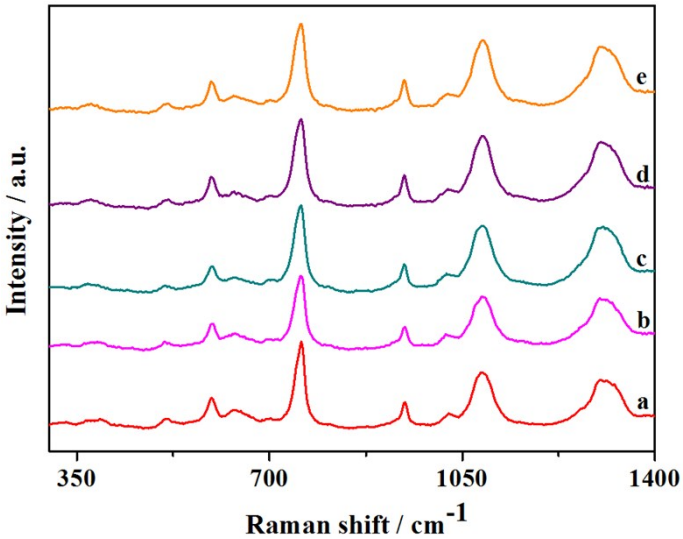

Fig. S6 Raman spectra of TiO_2/HPW(29%)/CoPz(0.25%) (a), TiO_2/HPW(29%)/CoPz(0.5%) (b), TiO_2/HPW(29%)/CoPz(1%) (c), TiO_2/HPW(29%)/CoPz(1.5%) (d) and TiO_2/HPW(29%)/CoPz(2%) (e).

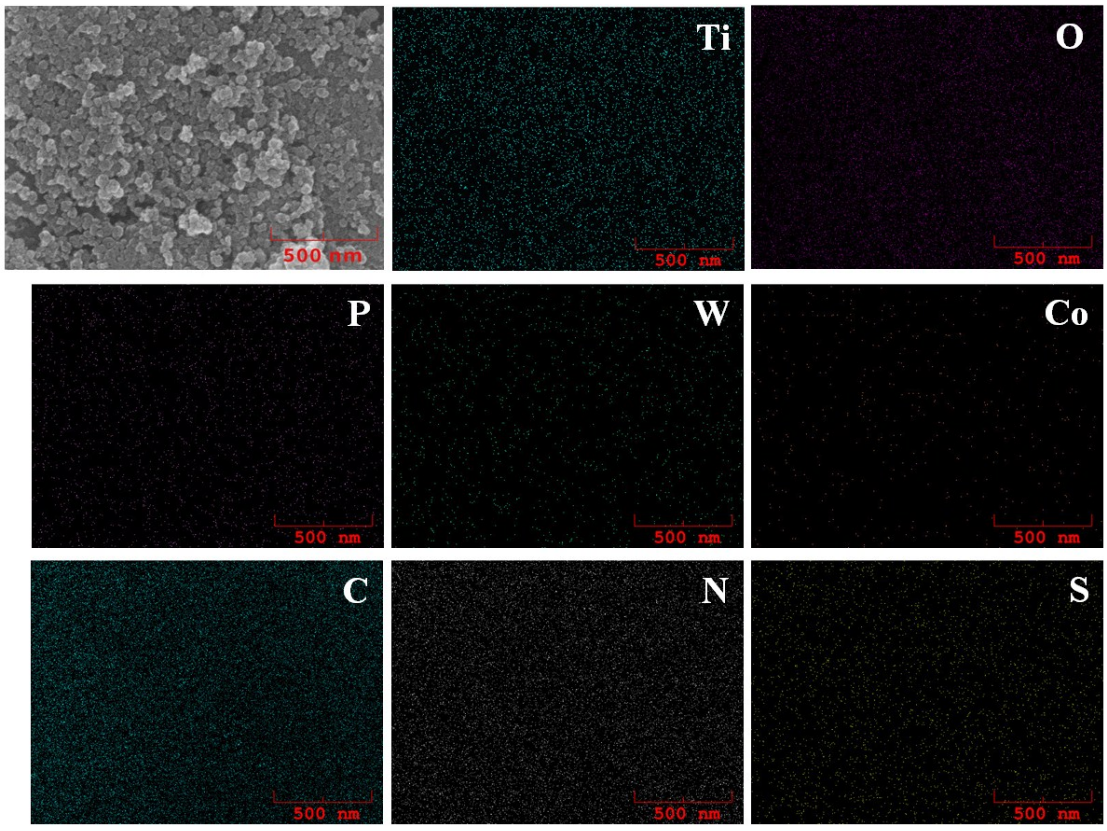

Fig. S7 SEM image of a typical TiO_2/HPW/CoPz composite and the corresponding energy-dispersive X-ray spectrometry (EDS) mapping of Ti, O, P, W, Co, C, N and S elements.

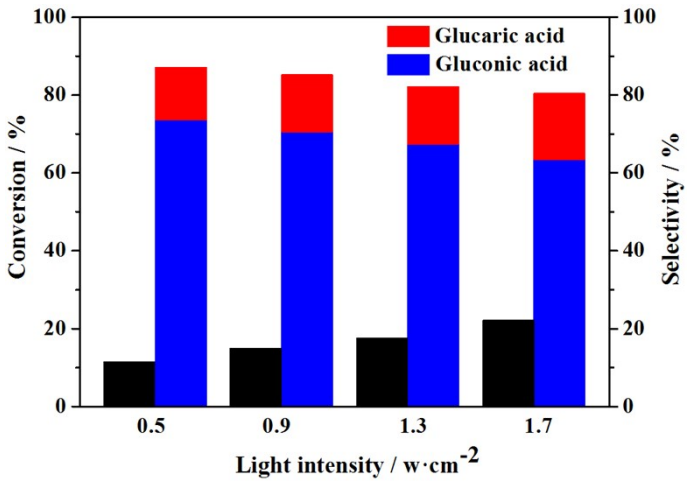

Fig. S8 Effect of light intensity on the conversion of glucose and the selectivity of glucaric acid and gluconic acid. Reaction conditions: TiO_2/HPW(29%)/CoPz(1%) composite (50 mg), aqueous glucose (5 mmol·L^{-1}, 50 mL), reaction for 3 h. (Note: black bar and color bar represent the glucose conversion and the selectivity of acids, respectively.）

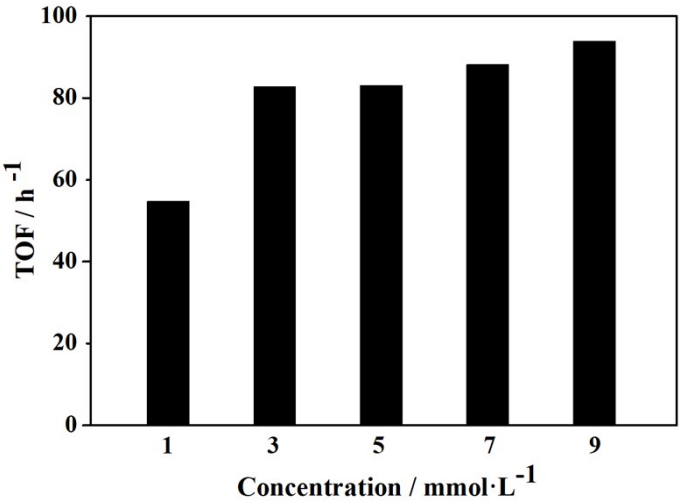

Fig. S9. Turnover frequency (TOF) of glucose oxidation catalyzed by TiO_2/HPW(29%)/CoPz(1%) composite as a function of glucose concentration. TOF values were calculated according to the CoPz content. Reaction conditions: TiO_2/HPW(29%)/CoPz(1%) composite (50 mg), aqueous glucose (50 mL), light intensity (1.70 W·cm^{-2}), reaction for 3 h.

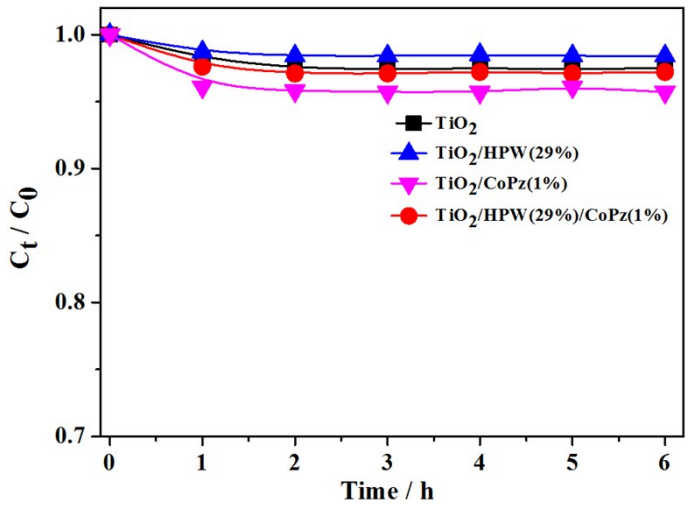

Fig. S10 The adsorption of aqueous glucose on the different catalysts. Conditions: catalyst (50 mg), aqueous glucose (1 mmol·L^{-1}, 50 mL).

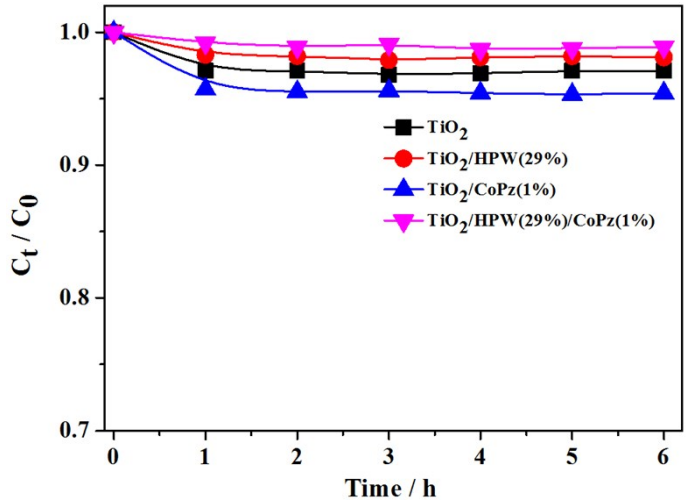

Fig. S11 The adsorption of aqueous gluconic acid on the different catalysts. Conditions: catalyst (50 mg), aqueous glucose (1 mmol·L^{-1}, 50 mL).

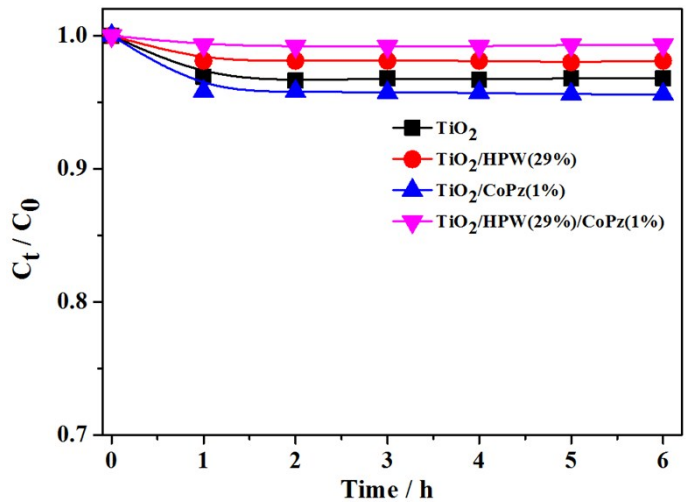

Fig. S12 The adsorption of aqueous glucaric acid on the different catalysts. Conditions: catalyst (50 mg), aqueous glucose (1 mmol·L^{-1}, 50 mL).

Table S1. The zeta potential of different catalysts.

Catalyst	TiO_2	TiO_2/HPW	TiO_2/HPW/CoPz
zeta potential / mV	27	-25	-33