Electronic Supplementary Information

Photocatalytic oxidation of arylalcohols to aromatic aldehydes promoted by hydroxyl radicals over CoP/CdS photocatalyst in water with hydrogen evolution

Yong Xu,[a,b] Ling-Zhen Zeng,[c] Zhi-Chang Fu,[a] Cong Li,[c] Zhi Yang,[c] Yong Chen[a] and Wen-Fu Fu*[a,c]

[a]*Key Laboratory of Photochemical Conversion and Optoelectronic Materials and HKU-CAS Joint Laboratory on New Materials, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Beijing 100190, P.R. China*
E-mail: fuwf@mail.ipc.ac.cn
[b]*University of Chinese Academy of Sciences, Chinese Academy of Sciences, Beijing 100190, P.R. China*
[c]*College of Chemistry and Chemical Engineering, Yunnan Normal University, Kunming 650092, P.R. China*

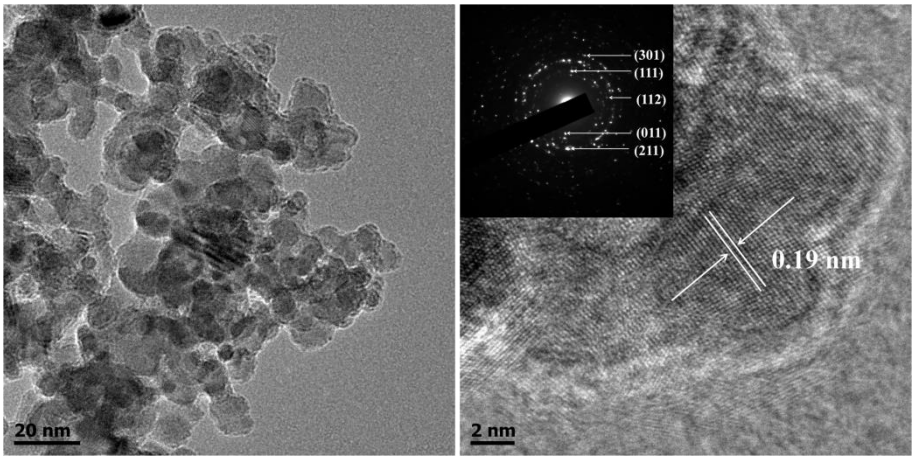

Fig. S1 TEM and HRTEM images, SAED (selected area electron diffraction) pattern (inset) of prepared CoP nanoparticles.

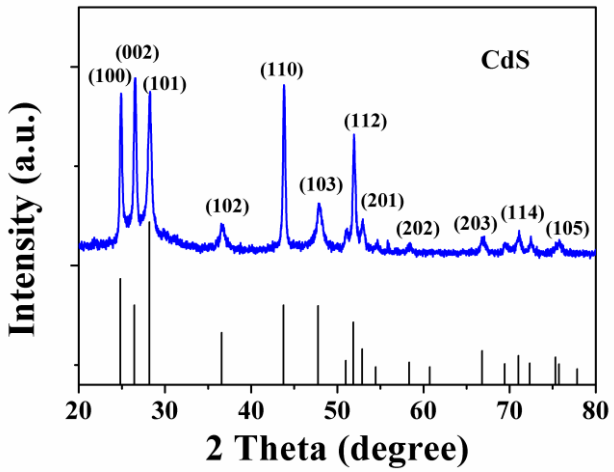

Fig. S2 XRD pattern of prepared CdS.

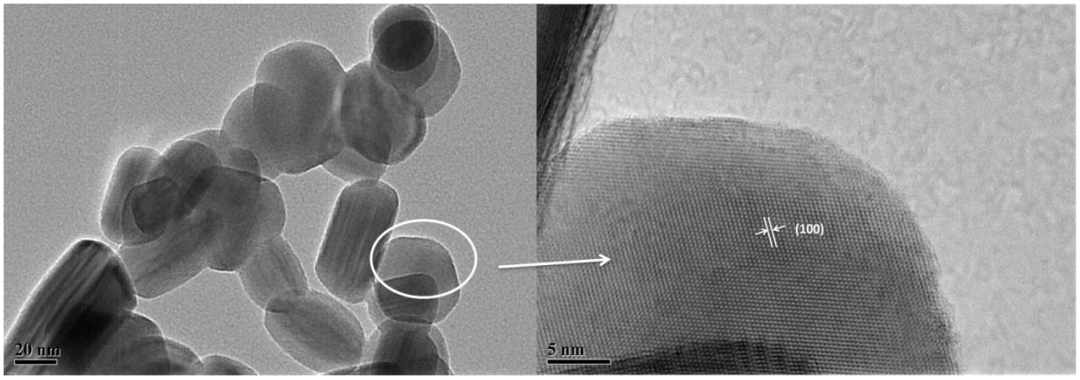

Fig. S3TEM and HRTEM image of CdS.

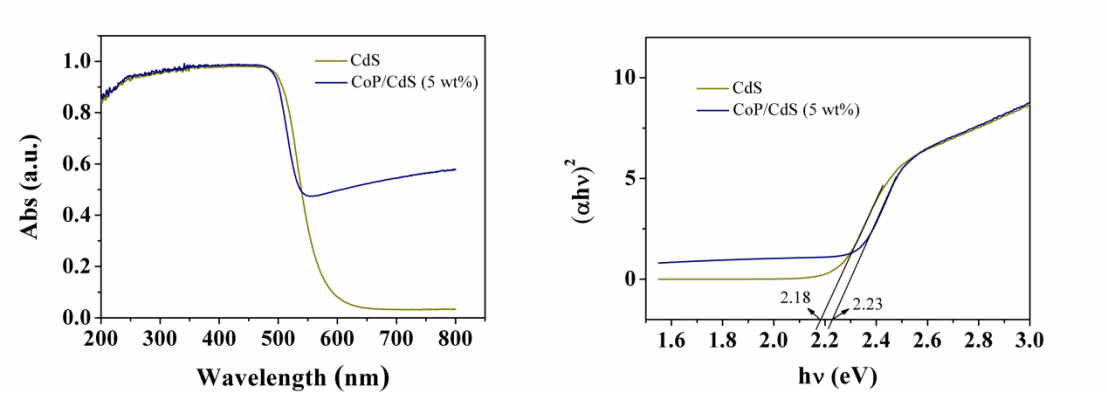

Fig. S4 UV-vis DRS of CdS and CoP/CdS, and corresponding plots of $(\alpha h\upsilon)^2$ vs. Energy ($h\upsilon$) for the band gap energy.

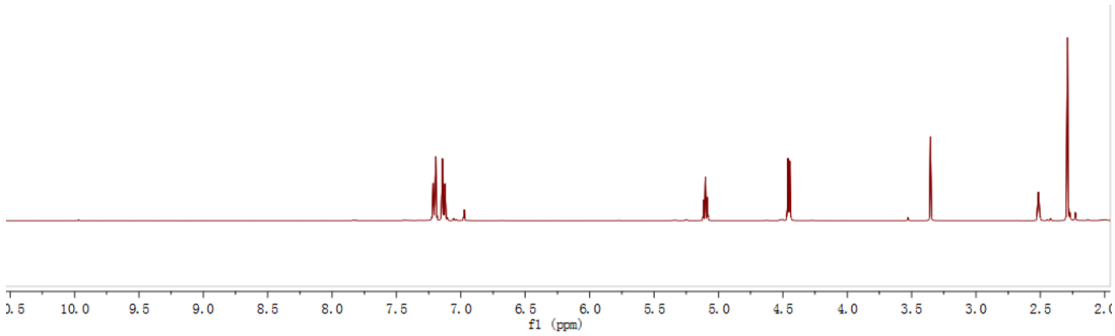

Fig. S5 ^{1}H NMR of photocatalytic reaction for 4-methylbenzyl alcoholby using acetonitrile as solvent.

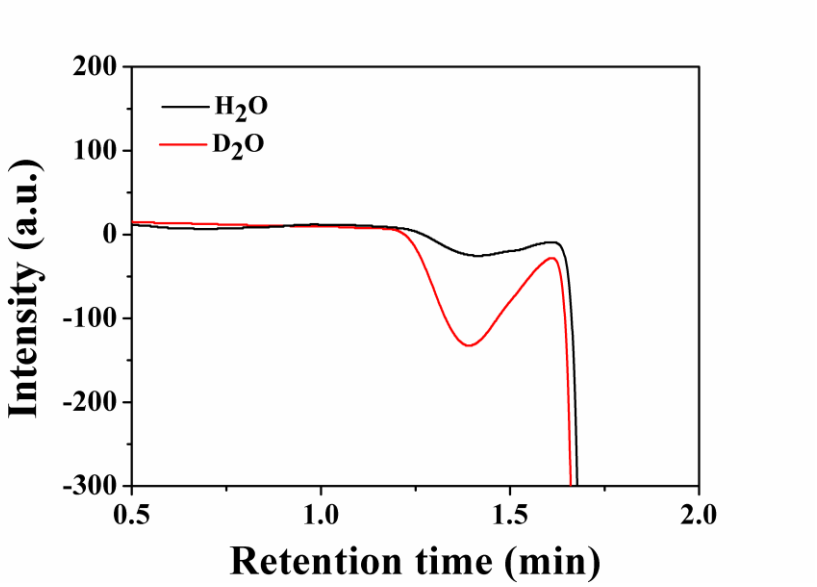

Fig. S6GC signals obtained with He as carrier gas.

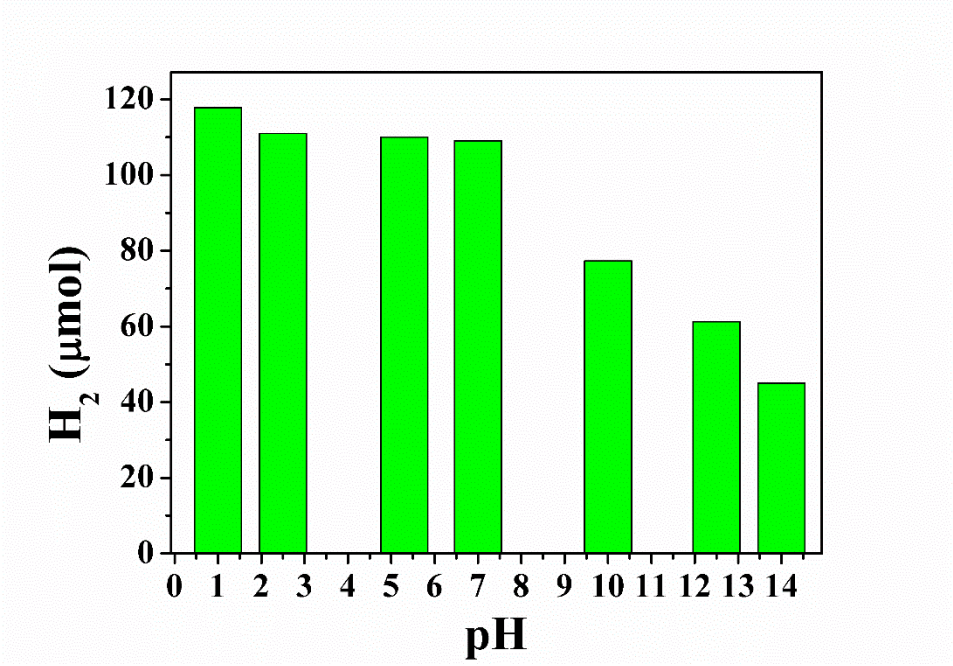

Fig. S7 The impact of pH on photocatalytic activity of hydrogen production.

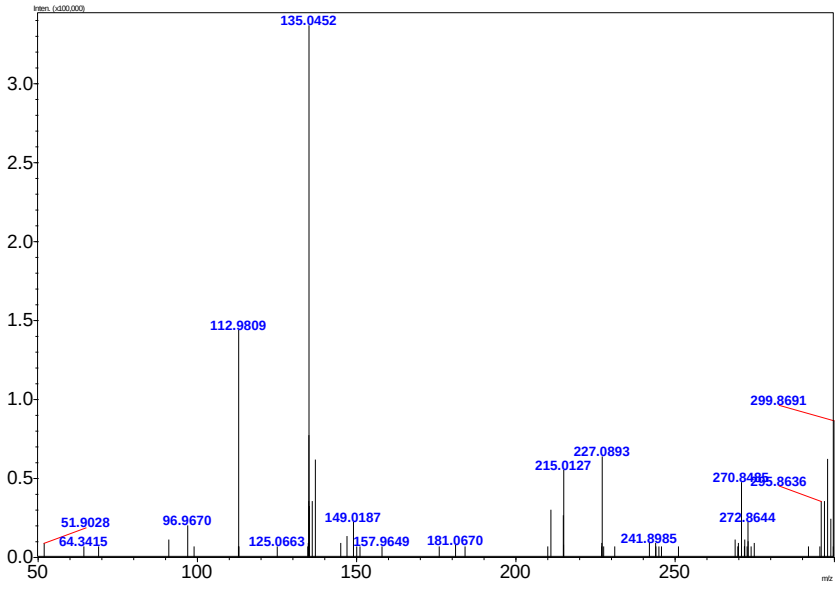

Fig. S8 Mass spectra of 4-methylbenzoic acid after 15 h irradiation.

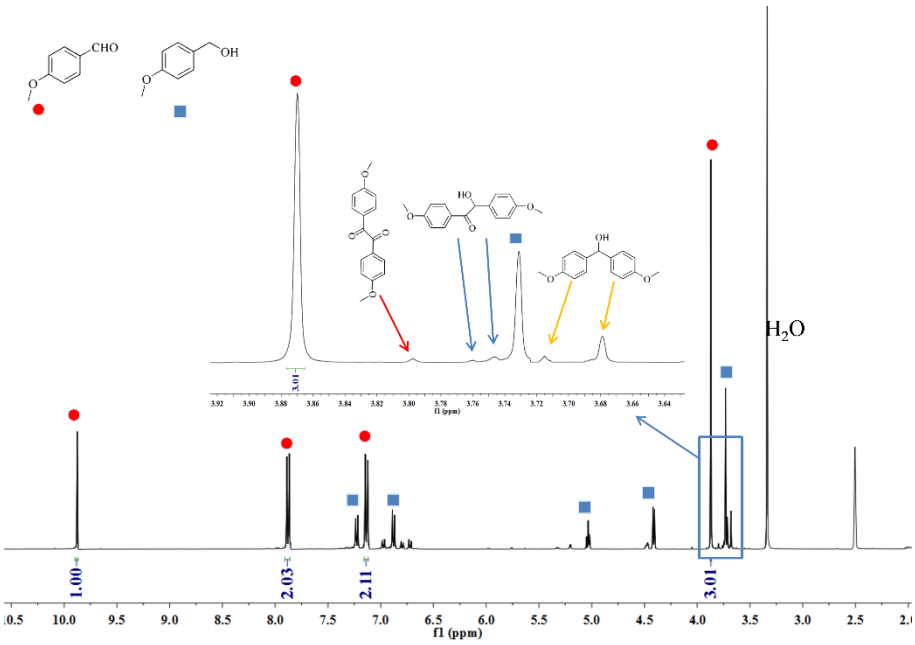

Fig. S9[1]H NMR spectrum of 4-methoxybenzyl alcohol after visible-light catalysisfor 5 h at room temperature.

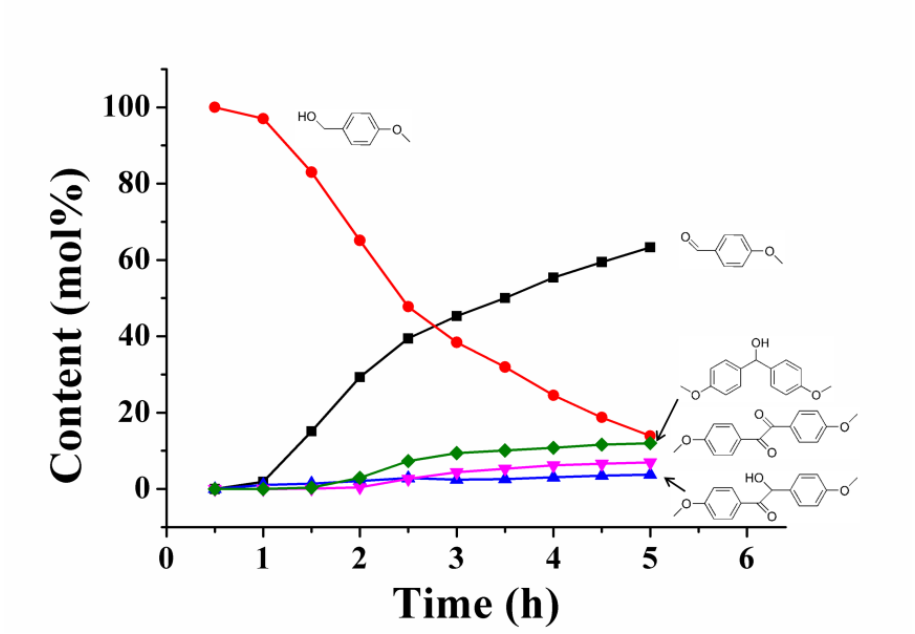

Fig. S10 The content of chemicals in the process of photocatalytic reaction.Reaction conditions: 2.5 mg catalyst, 5 mL of water, 4-methoxybenzyl alcohol (0.1 mmol), visible light irradiation for 5 h, at room temperature.

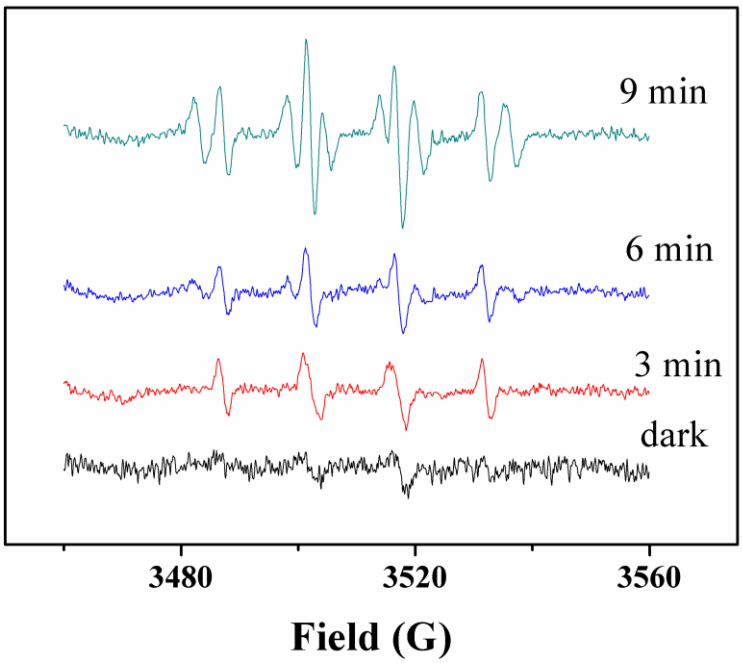

Fig. S11 Time-depended ESR experiment. Reaction conditions: 2.5 mg CoP/CdS (5 wt%), 5 mL water, 4-methylbenzyl alcohol (0.1 mmol), at room temperature.

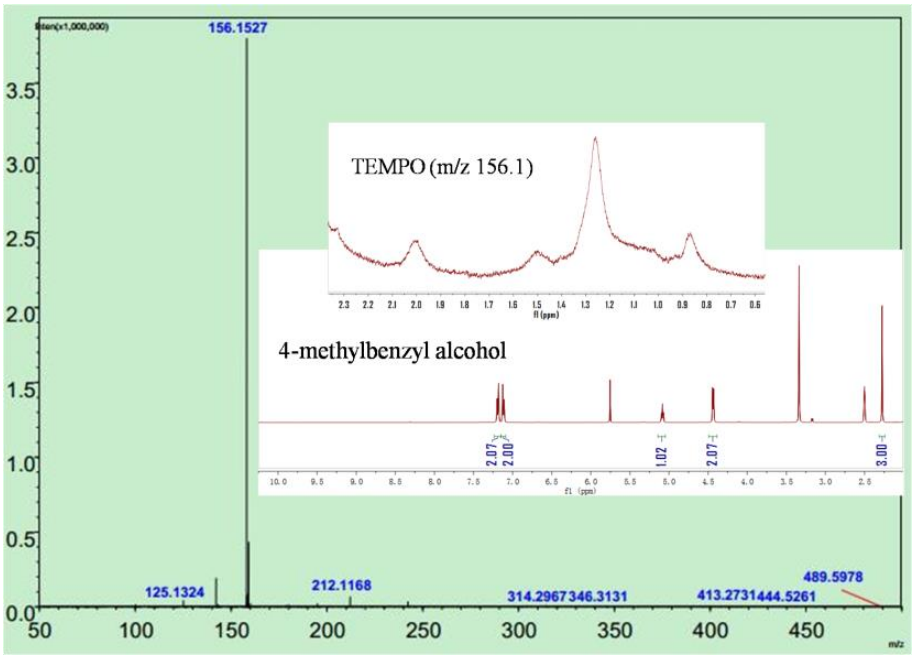

Fig. S12 The results of ^{1}H NMR and mass spectra by adding TEMPO as free radical quencher in photocatalytic system.Reaction conditions: 2.5 mg catalyst, 5 mL of water, 4-methylbenzyl alcohol (0.1 mmol), TEMPO (0.1 mmol), visible light irradiation for 5 h, at room temperature.

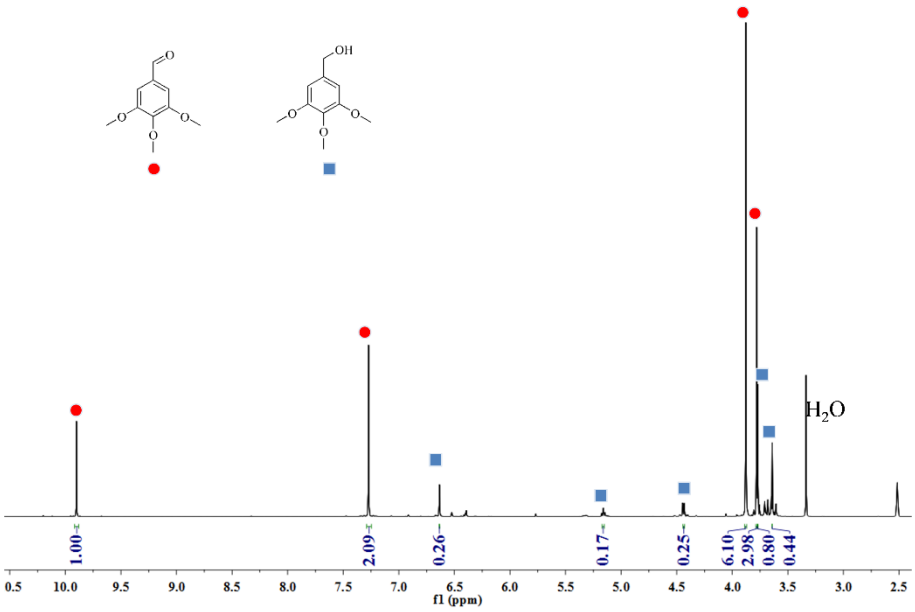

Fig. S13[1]H NMR spectrumof catalytic oxidation of substrate for entry 2 in Table 1.

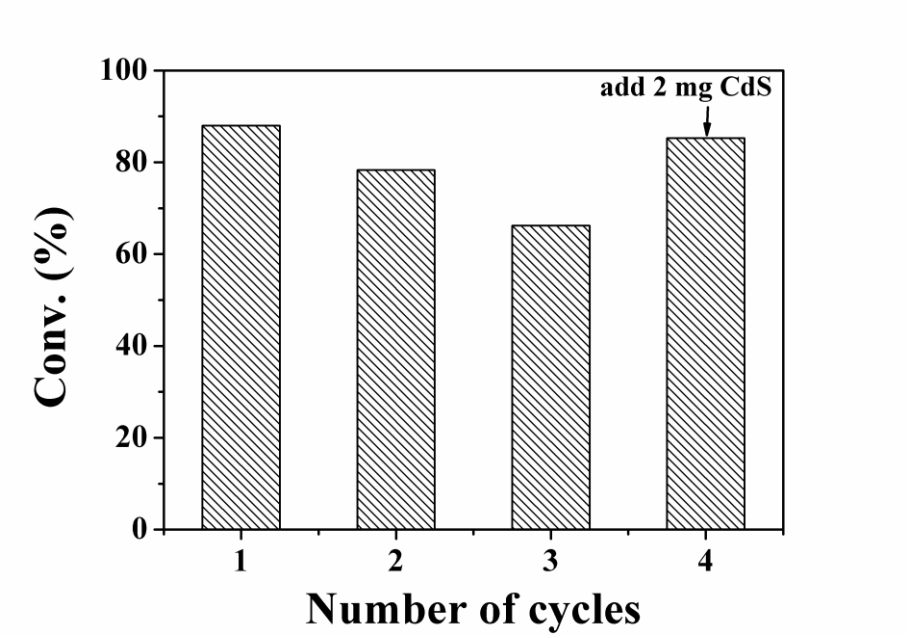

Fig.S14 Cycle experiment of CoP/CdS (5 wt%). Reaction conditions: 2.5 mg catalyst, 5 mL of water, 4-methylbenzyl alcohol (0.1 mmol), visible light irradiation for 5 h, at room temperature.

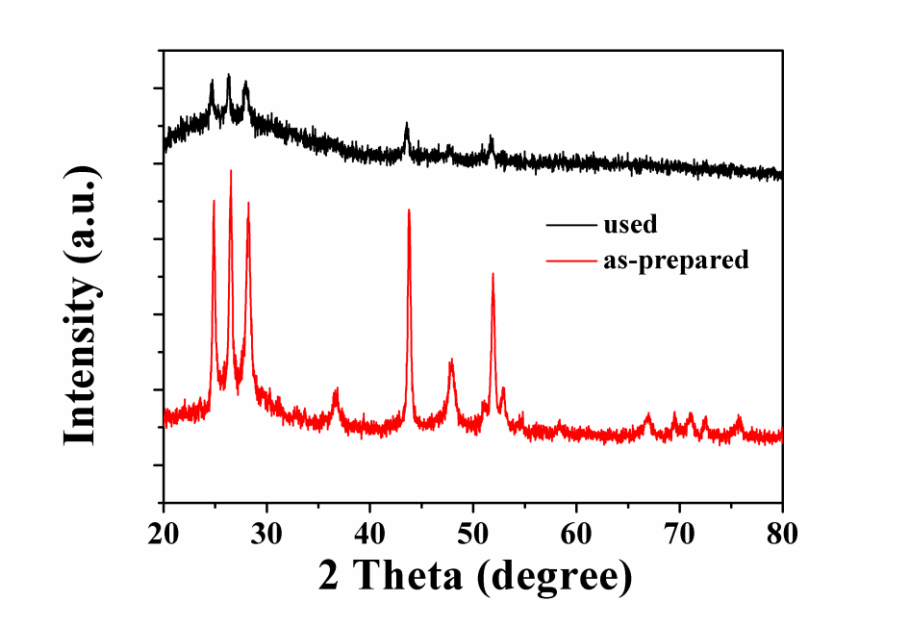

Fig. S15 XRD patterns of prepared and used CoP/CdS (5 wt%).

Table S1 Results of quenching experiment.

Entry	Quenching agent	Quenching group	Conv. (%)	Sel. (%)
1	—	—	88.0	75.8
2	EDTA-2Na	hole	20.3	99.1
3	tert-butyl alcohol	•OH	3.2	99.9

Reaction conditions: 2.5 mg catalyst, 5 mL water, 4-methylbenzyl alcohol (0.1 mmol), quenching agent(0.1 mmol), visible light irradiation for 5 h, at room temperature.