Supporting Information

Photocatalytic production of H_2O_2 from wastewater under visible light by chlorine and $ZnIn_2S_4$ co-decorated TpPa-1

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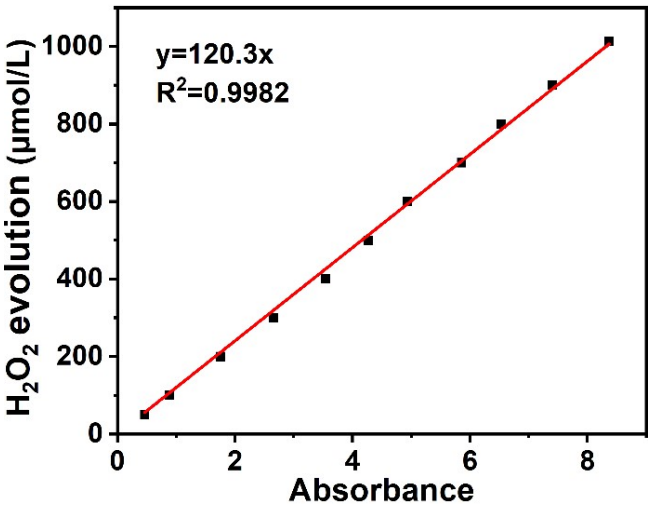

Fig. S1 The standard curve of H_2O_2 concentration based on the iodometry.

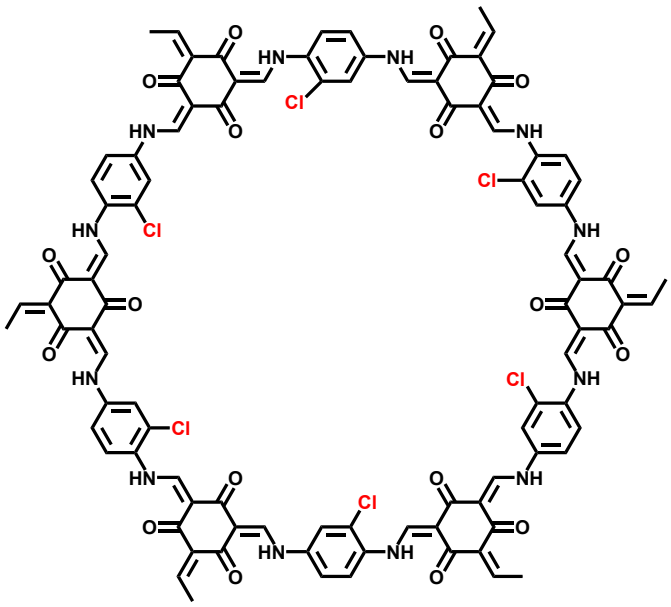

Fig. S2 Chemical structural formulas of TpPa-Cl.

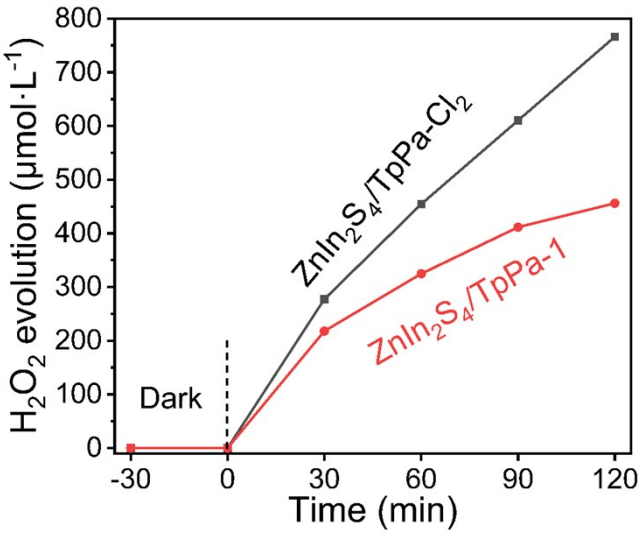

Fig. S3 Photocatalytic evolution of H_2O_2 over ZTC-40 and $ZnIn_2S_4$/TpPa-1 with the same $ZnIn_2S_4$ ratio of 40%.

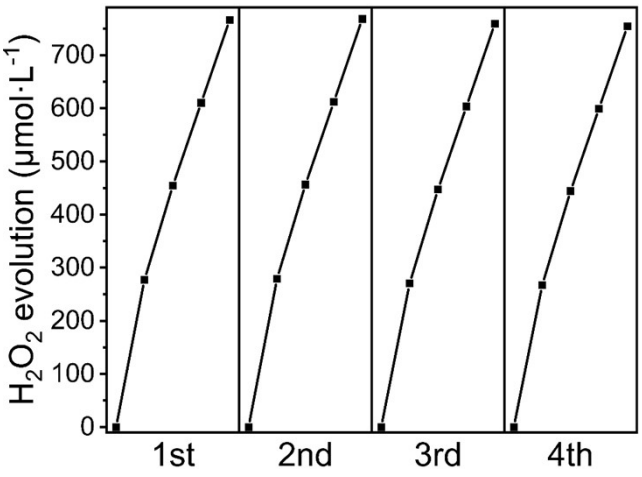

Fig. S4 Cycle tests of ZTC-40 for photocatalytic H_2O_2 evolution.

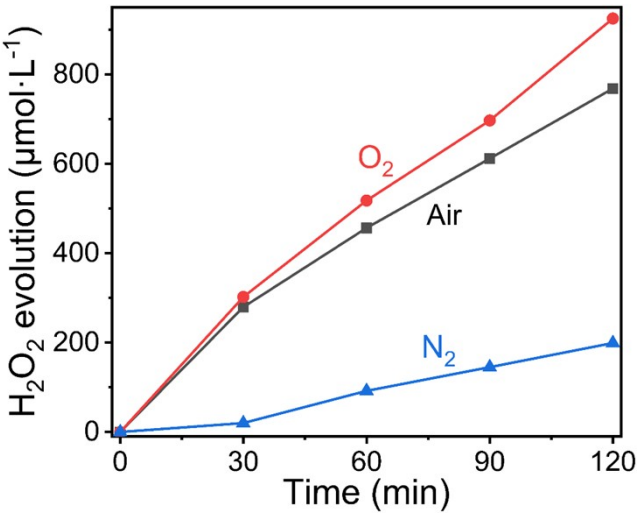

Fig. S5 Photocatalytic H_2O_2 evolution in ambient air, O_2 and N_2 over ZTC-40.

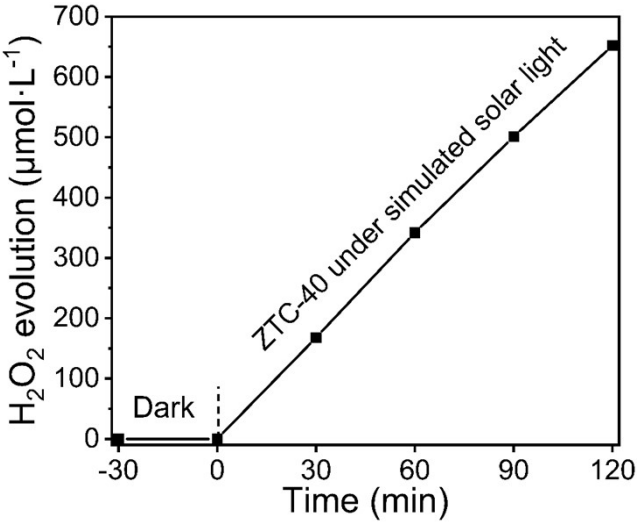

Fig. S6 Photocatalytic evolution of H_2O_2 over ZTC-40 under simulated solar light (light filter: AM1.5, light intensity: 100 mW·cm^{-1}).

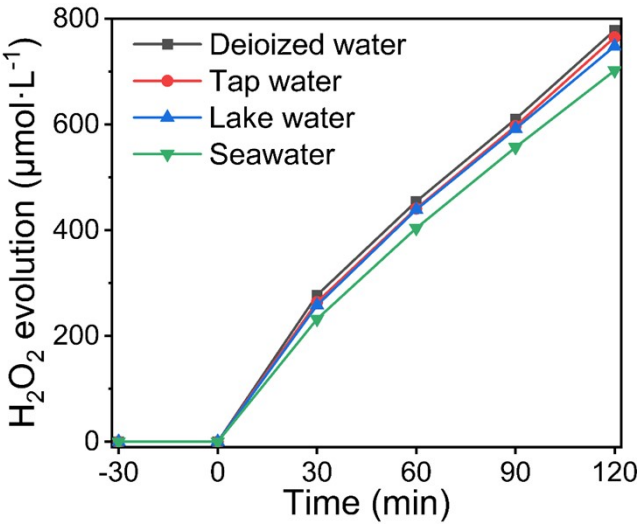

Fig. S7 Photocatalytic H_2O_2 evolution in different water over ZTC-40.

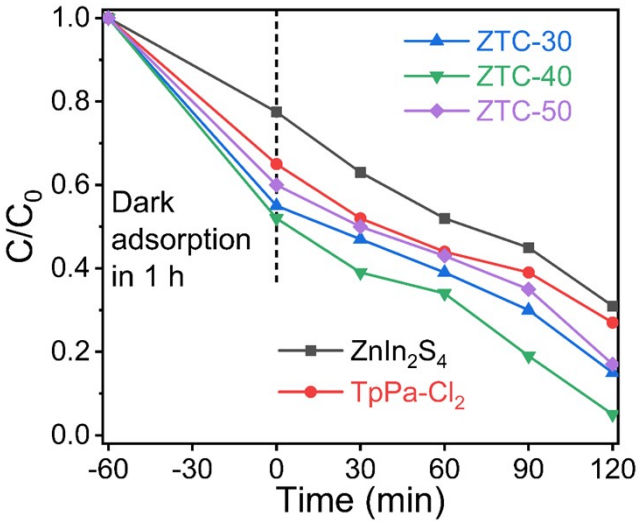

Fig. S8 Photocatalytic tetracycline degradation over TpPa-Cl_2, $ZnIn_2S_4$, ZTC-30, ZTC-40 and ZTC-50.

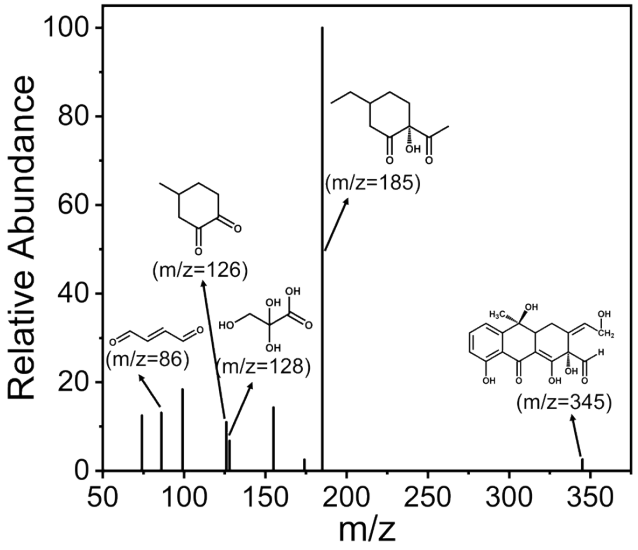

Fig. S9 Mass spectrum of tetracycline degradation products over ZTC-40.

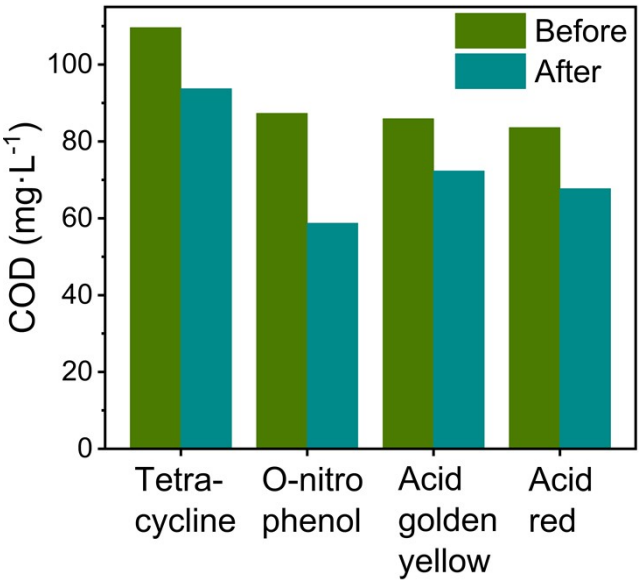

Fig. S10 COD of tetracycline, o-nitrophenol, acid golden yellow and acid red before and after photocatalysis over ZTC-40.

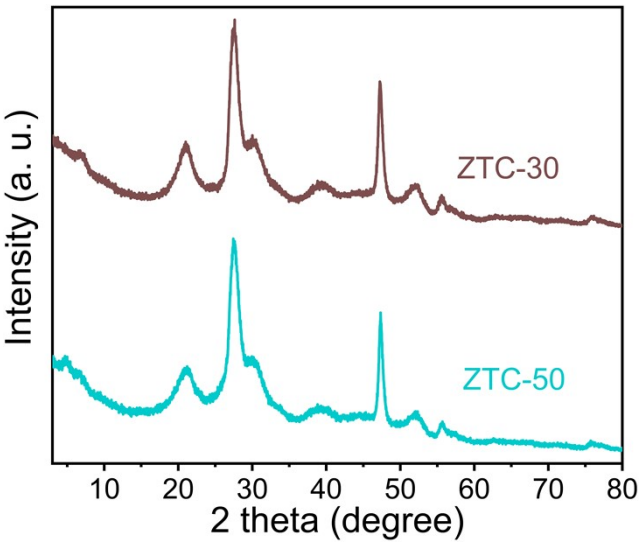

Fig. S11 XRD patterns of ZTC-30 and ZTC-50.

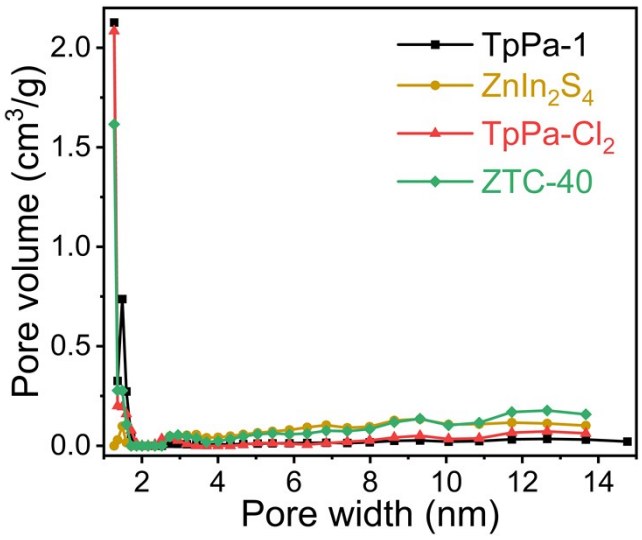

Fig. S12 Pore size distribution curves of TpPa-1, TpPa-Cl_2, $ZnIn_2S_4$ and ZTC-40.

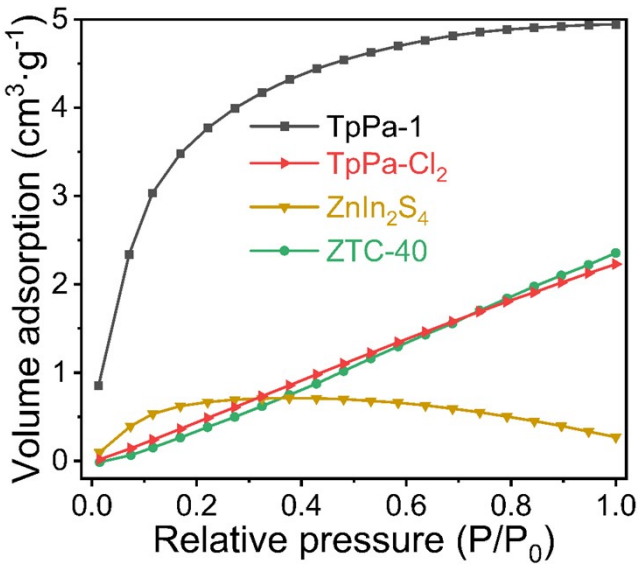

Fig. S13 O_2 adsorption isotherms of TpPa-1, TpPa-Cl_2, $ZnIn_2S_4$ and ZTC-40.

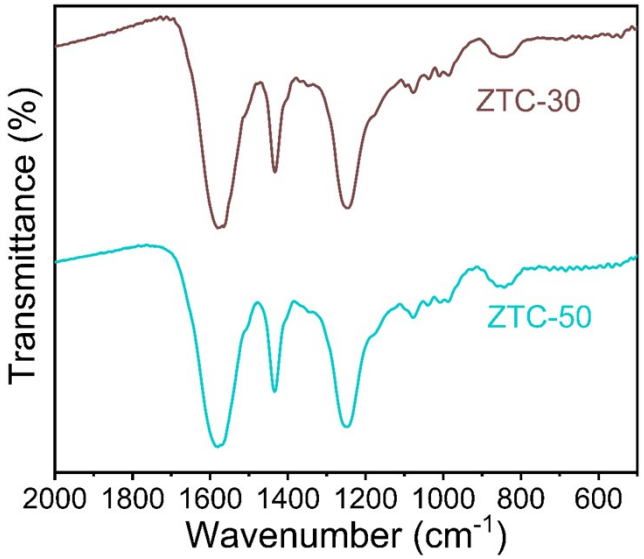

Fig. S14 FTIR spectra of ZTC-30 and ZTC-50.

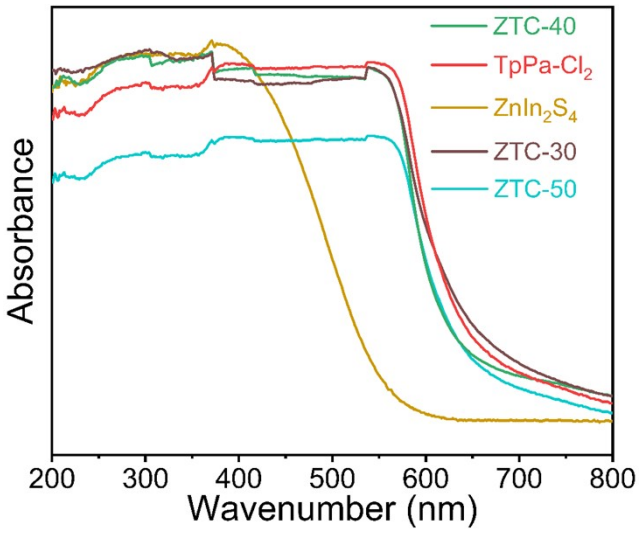

Fig. S15 UV-vis DRS of TpPa-Cl_2, $ZnIn_2S_4$, ZTC-30, ZTC-40 and ZTC-50.

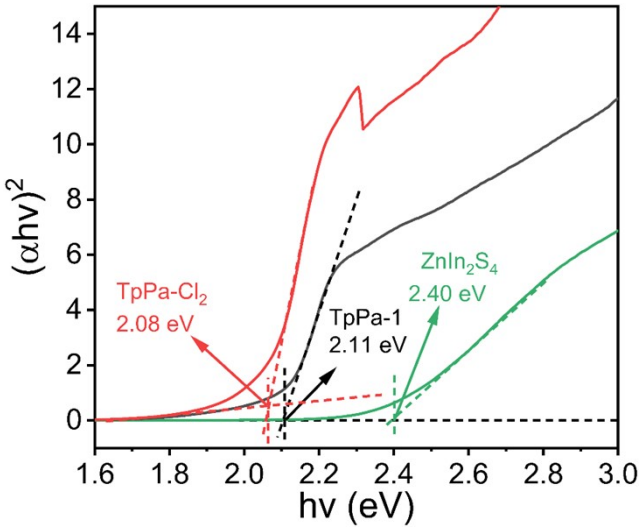

Fig. S16 $(\alpha h\nu)^2$ vs hν curves of $ZnIn_2S_4$, TpPa-1 and TpPa-Cl_2.

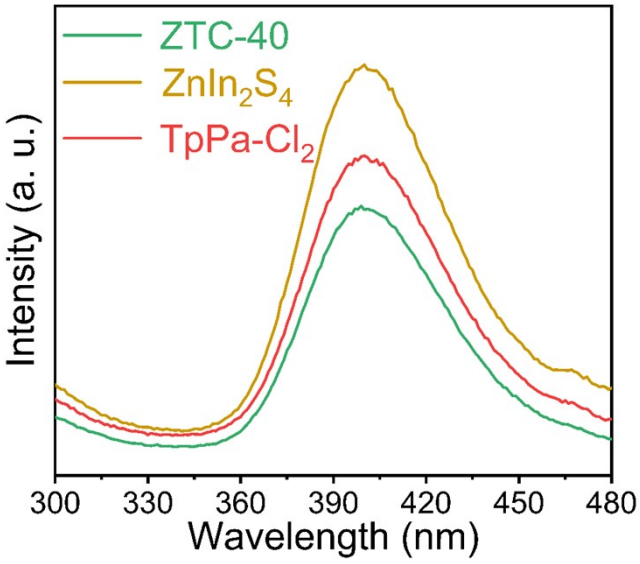

Fig. S17 PL spectra of TpPa-Cl_2, $ZnIn_2S_4$ and ZTC-40.

Table S1 Data comparison of photocatalytic H_2O_2 production with references.

Photocatalyst	Light	Sacrificial agent	Gas	Production rate ($\mu mol \cdot g^{-1} \cdot h^{-1}$)	Ref.
g-C_3N_4/PDI	Vis	No	O_2	700	S1
TiO_2	UV	Benzyl alcohol	O_2	500	S2
BTEA-COF	Vis	Ethanol	Air	780	S3
$ZnIn_2S_4/TiO_2$	Vis	Isopropanol	Air	1181	S4
MIL-88B-NH_2@$ZnIn_2S_4$	Vis	No	Air	209	S5
$ZnIn_2S_4$/TpPa-1	Vis	No	Air	450	Here
$ZnIn_2S_4$/TpPa-Cl_2	Vis	No	Air	766	Here

Reference

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S5 M. Liu, Z. Xing, H. Zhao, S. Song, Y. Wang, Z. Li and W. Zhou, *J. Hazard. Mater.*, 2022, **437**, 129436.