

## Electronic Supplementary Information (ESI)

### Fe(II) metal-organic framework as visible responsive photo-Fenton catalyst for the degradation of organophosphates

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## Experimental details

### Materials and methods

All used chemicals were obtained commercially and used as received without further purification. SEM images were taken with a JEOL JSM-7500F scanning electron microscope. A Rigaku D/Max-2500 diffractometer with Cu K $\alpha$  radiation ( $\lambda = 0.15406$  nm) was applied to get the powder X-ray diffraction (PXRD) patterns of samples at 40 kV and 100 mA. Fourier transform infrared (FT-IR) spectra were recorded with KBr pellet by a Nicolet Magna-IR 560 Fourier transform infrared spectrometer. The elemental compositions (C, H, and N) were measured by a Perkin-Elmer 240C analyzer. Thermogravimetric analysis (TGA) was performed with a Rigaku standard TG-DTA analyzer from ambient temperature to 700 °C with a heating rate of 10 °C min<sup>-1</sup> in the air, and an empty Al<sub>2</sub>O<sub>3</sub> crucible was used as the reference. X-ray photoelectron spectroscopy (XPS) measurements were carried out on an ESCALAB 250 VG Lited XPS using Al K $\alpha$  radiation ( $h\nu = 1486.6$  eV), and binding energies were referred to the C 1s at 285.0 eV. Absorption spectra of solid and solution samples were measured by USA Cary 5000 and Shimadzu UV-2450 spectrophotometers, respectively. The photocatalytic experiments were carried out under the irradiation from a CEL-HX F300/CEL-HX UV300 xenon lamp, and a 420 nm cut-off filter was applied to remove the UV component. The concentrations of substrate and intermediates formed during photocatalytic degradation were determined by HPLC method (Agilent LC 1200). The ions (PO<sub>4</sub><sup>3-</sup>, NO<sub>3</sub><sup>-</sup>) were quantified by an ion chromatography (Dionex ICS-900) equipped with an Ionpac ASII-HC column (4×250 mm, Dionex), an eluent generator (Dionex EGCIII KOH) and a conductivity detector. The total organic carbon (TOC) of the degraded solution was measured by Analytic jena multi N/C 2100 TOC analyzer. Electron spin resonance (ESR) spectra were obtained using a Bruker model EPR 300E spectrometer.

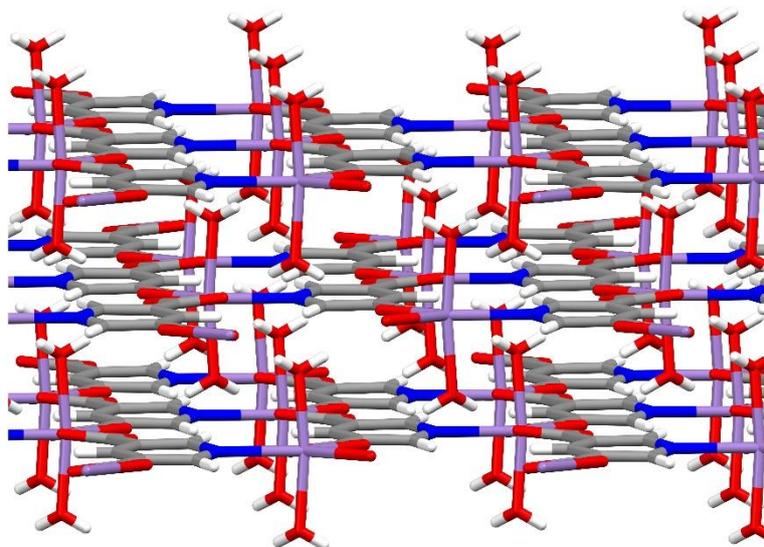
### Synthesis of Fe-pydc

FeSO<sub>4</sub> (0.2782 g, 1 mmol) and H<sub>2</sub>pydc (0.1672 g, 1 mmol) were dissolved respectively in 100 mL H<sub>2</sub>O and 100 mL DMF. These two solutions were well-mixed at room temperature in a 250 mL round-bottom flask and then heated at 130 °C for 4 h in oil bath. After cooling down to room temperature, the resulting orange precipitate was collected by centrifugation, washed with H<sub>2</sub>O, DMF and ethanol in sequence, and then dried at 60 °C in a vacuum drying oven.

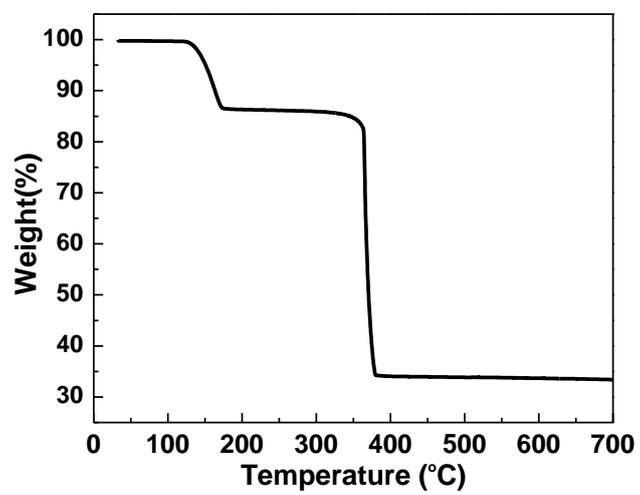
### Photocatalytic degradation experiments

In a typical procedure, 2 mg of Fe-pydc was ultrasonically dispersed in 200 mL aqueous solution

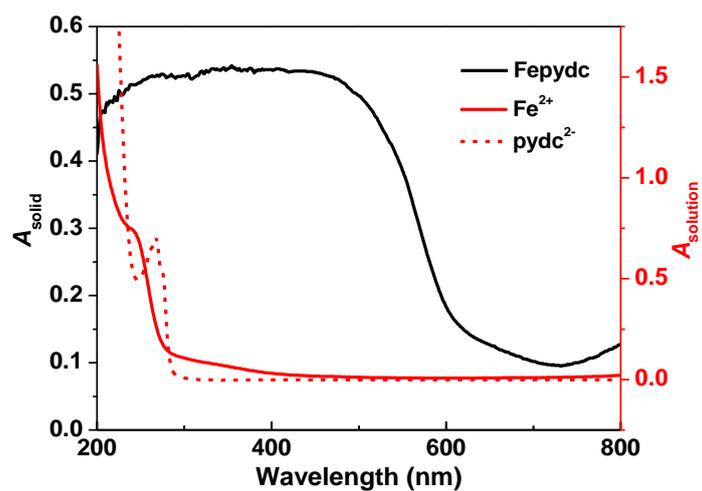
of organophosphate (0.05 mM) and placed in a 250 mL beaker. The suspension was stirred for 2 h before reaction to reach the adsorption-desorption equilibrium. The irradiation was started immediately after the addition of H<sub>2</sub>O<sub>2</sub> (1.25 mM). At the given reaction time intervals, samples (~5 mL) were taken out and filtered to remove the catalyst. The filtrates were subjected to HPLC, ion chromatography and TOC analysis.



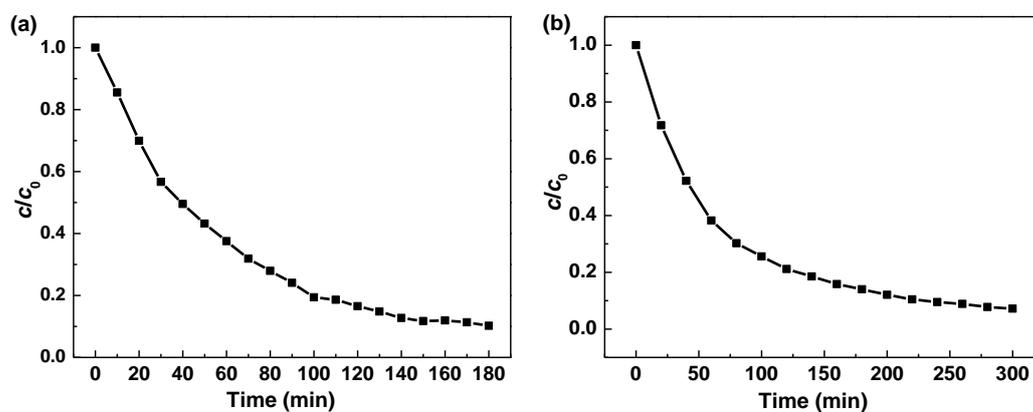
**Fig. S1** Framework structure of  $[\text{Mn}(\text{pydc})\cdot 2\text{H}_2\text{O}]$ .



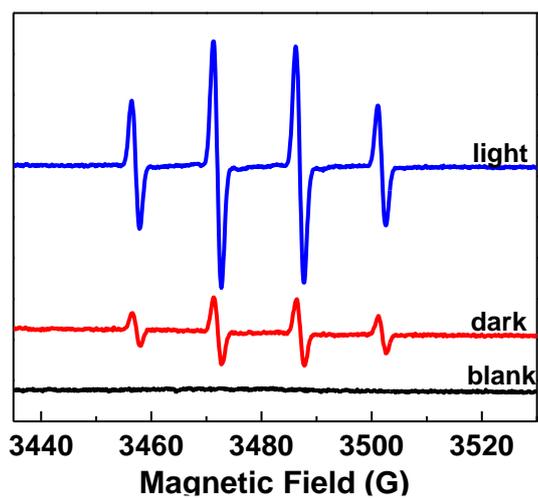
**Fig. S2** Thermogravimetric curve of as-synthesized Fe-pydc sample.



**Fig. S3** UV-vis diffuse reflectance spectrum of Fe-pydc. The absorption spectra of  $\text{Fe}^{2+}$  ion and  $\text{pydc}^{2-}$  ligand in solutions were provided for comparison.



**Fig. S4** Degradation kinetics of (a) DENP and (b) TNPP in the catalytic system of Fe-pydc.  $0.01 \text{ g L}^{-1}$  Fe-pydc,  $c_{\text{substrate}}^0 = 0.05 \text{ mM}$ ,  $c_{\text{H}_2\text{O}_2}^0 = 1.25 \text{ mM}$ ,  $200 \text{ mL H}_2\text{O}$ , irradiated by a  $300 \text{ W Xe}$  lamp cutoff below  $420 \text{ nm}$ .



**Fig. S5** ESR spectra of DMPO-radical adducts formed in Fe-pydc systems.  $0.01 \text{ g L}^{-1}$  Fe-pydc,  $c_{\text{BNPP}}^0 = 0.05 \text{ mM}$ ,  $c_{\text{H}_2\text{O}_2}^0 = 1.25 \text{ mM}$ .