Electronic Supplementary Information (ESI) for

Solvothermal synthesis of MIL-53(Fe) hybrid magnetic composite for photoelectrochemical water oxidation and organic pollutant photodegradation under visible light

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Fig. S1 TEM (a) and HRTEM (b) of the MHMCs
**Fig. S2** Linear-sweep voltammagrams of the Fe$_2$O$_3$ film electrode collected with a scan rate of 10 mV·s$^{-1}$ in dark and under visible light illumination in 0.5 M Na$_2$SO$_4$ aqueous solutions.

**Fig. S3** Time profiles of adsorption of RhB over the MHMCs and MIL-53(Fe) in the dark.
**Fig. S4** Degradation of PNP in different photocatalytic systems under visible light irradiation

(experimental conditions: PNP, 10 mg·L⁻¹; catalyst dosage, 0.4 g·L⁻¹; H₂O₂, 20 mM).

**Fig. S5** (a) Effect of initial pH on the degradation of RhB in MHMCs/H₂O₂ system under visible light irradiation. (b) The corresponding apparent reaction rate constants of the photodegradation of RhB at different initial pH.
**Fig. S6** Effect of catalyst dosage on the degradation of RhB in MHMCs/H$_2$O$_2$ system under visible light irradiation.

**Fig. S7** (a) Effect of H$_2$O$_2$ concentration on the degradation of RhB in MHMCs/H$_2$O$_2$ system under visible light irradiation. (b) The corresponding apparent reaction rate constants of the photodegradation of RhB at different H$_2$O$_2$ concentration.
Fig. S8 (a) Photodegradation of RhB over MHMCs-H$_2$O$_2$ system under visible light irradiation in the presence of trapping systems (scavenger amount: 12 mM). (b) Comparison of the depression efficiency of MHMCs-H$_2$O$_2$ system for the photodegradation of RhB.

Fig. S9 FTIR spectra of the MHMCs before (a) and after (b) photocatalytic reaction.
**Fig. S10** Magnetic response of the MHMCs before (a) and after (b) photocatalytic reaction to an external magnetic field.