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## Supplementary information for

## 3D micro-meso-structured iron-based hybrid for peroxymonosulfate activation: Performance, mechanism and comprehensive practical application potential evaluation

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**Fig. S1** (a) First-order kinetic constants in different catalytic systems. Effects of MIL-88A-CS concentration (b), PMS concentration (c) and pH (d) on the TC-HCl degradation in MIL-88A-CS/PMS system. Experimental parameters: (a) [MIL-88A-CS] = 1.0 g/L, [PMS] = 0.2 mM, [TC-HCl] = 30 mg/L, and pH = 7; (b) [PMS] = 0.2 mM, [TC-HCl] = 30 mg/L, and pH = 7; (c) [MIL-88A-CS] = 1.0 g/L, [TC-HCl] = 30 mg/L, and pH = 7; (d) [MIL-88A-CS] = 1.0 g/L, [TC-HCl] = 30 mg/L, and pH = 7; (d) [MIL-88A-CS] = 1.0 g/L, [TC-HCl] = 30 mg/L, and [PMS] = 0.2 mM. All reactions were conducted at room temperature.



Fig. S2 (a) Leached Fe ions during the degradation process of TC-HCl. (b) The removal efficiency of TC-HCl in different catalytic systems (Experimental conditions: [Leached Fe ions]<sub>0</sub> = 0.3 mg/L, [PMS]<sub>0</sub> = 0.2 mM, [TC-HCl] = 30 mg/L, and pH = 7).



Fig. S3 The removal efficiency of TC-HCl with different initial pH values by PMS alone (Experimental conditions:  $[PMS]_0 = 0.2 \text{ mM}$ , [TC-HCl] = 30 mg/L).



Fig. S4 LC-MS chromatogram for the TC-HCl degradation in the MIL-88A-CS/PMS system.

Catalyst	Dosage		Leached Fe ions concentration	n D-f
	(mg/L)	рн	(mg/L)	Kei.
MIL-53(Fe)	600	6.0	0.37	1
MIL-88B(Fe)	600	6.5	4.00	2
MIL-101(Fe)	500	3.0	0.46	3
MIL-88A-CS	1000	7.0	0.30	This work

**Table S1** Comparison of the leached Fe ions of some reported Fe-based MOFscatalysts in SR-AOPs.

	pН	TOC (mg/L)	NH4 <sup>+</sup> -N (mg/L)	DO (mg/L)
Tap water	7.3	4.6	0.03	4.47
Lake water	7.3	150.3	0.67	6.46
River water	7.2	274.1	1.25	7.32

 Table S2 The parameters of different water matrixes.

Develation contains	Polltant	k <sub>obs</sub>	EE/O	Def
Degradation system	(concentration)	(min <sup>-1</sup> )	(kWh/m <sup>3</sup> )	Kel.
$Fe^{2+} + MoS_2 + PMS$	Rhodamine B (10 mg/L)	0.029	27.0	4
US1000kHz + PMS	Ibuprofen (5 mg/L)	0.017	314.4	5
$g-C_3N_4 + 400-LED + PMS$	Acid Orange 7 (10 mg/L)	0.094	24.5	6
MIL-88A-CS + PMS	Tetracycline (1 g/L)	0.054	20.3	This work

 Table S3 Comparison of EE/O values in various degradation systems.

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