Supporting Information

Facile preparation of Fe$_3$O$_4$@SiO$_2$ derived from iron-rich sludge as magnetic catalyst for the degradation of organic contaminants by peroxymonosulfate activation

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Text S1. The calculation of adsorption capacity

$$q_e = \frac{(C_0 - C_t) \times V}{m} \tag{S1}$$

Where q_e (mg/g) is the adsorption capacity for CIP, C_0 represents the initial CIP concentration (10mg/L), and C_t (mg/L) reflects the concentration of CIP at the time of reaction. V and m are the volume of solution (50mL) and the quality of iron sludge in the reaction system (g), respectively.

Table. S1 Characteristics of the iron-rich sludge used in this study

Composition	Value (mg/g)	Composition	Value (mg/g)
Fe	188.6±3.50	Cu	0.43±0.02
Ca	5.89±0.15	Ni	0.09±0.01
Mg	0.87±0.05	Pb	0.11±0.03
Al	3.73±0.22	P	1.62±0.35
Mn	0.08±0.01	S	2.08±0.64
Co	0.04±0.00		

Table. S2 Elemental Composition of iron sludge by EDS.

Element	C	O	Fe	Si	N	Al	Ca	Mg
At%	28.72	34.49	6.26	6.92	18.33	1.88	3.08	0.32
Wt%	18.25	29.20	18.50	10.91	13.59	2.68	6.54	0.41

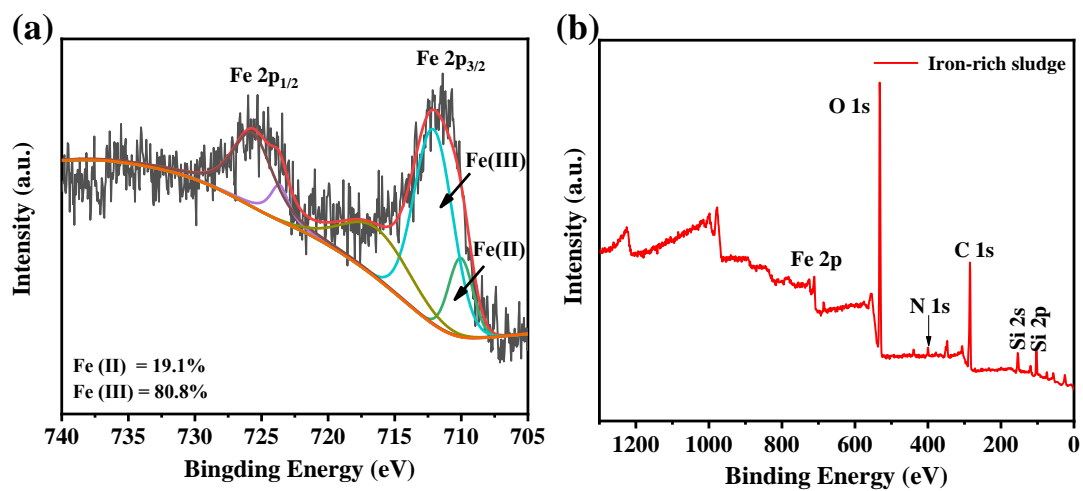**Figure S1** XPS survey and spectra of Fe 2p peaks for iron-rich sludge

Figure S2 The EDS mapping images of C, O, Fe, Si, and Ca.