Supporting information

Magnetic Fe_3O_4@CoFe-LDH nanocomposite heterogeneously activated peroxymonosulfate for degradation of azo-dye AO7

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Text S1 Synthesis of $CoFe_2O_4$

Firstly, 0.1 mol $CoCl_2 \cdot 6H_2O$ and 0.2 mol $FeCl_3 \cdot 6H_2O$ were dissolved in 100 mL DI water and stirred for 30 min to obtain the homogeneous solution. Then, adding the 5M NaOH solution into the above solution until the pH reached 12. The mixed solution was heated at 363 K for 1h. In the end, the concentrated solution was added to the Teflon-lined stainless-steel autoclave and heated at 473 K for 20 h. The obtained black magnetic $CoFe_2O_4$ particles were collected by external magnetic field, washed with deionized water and ethanol and dried overnight in oven at 333 K.

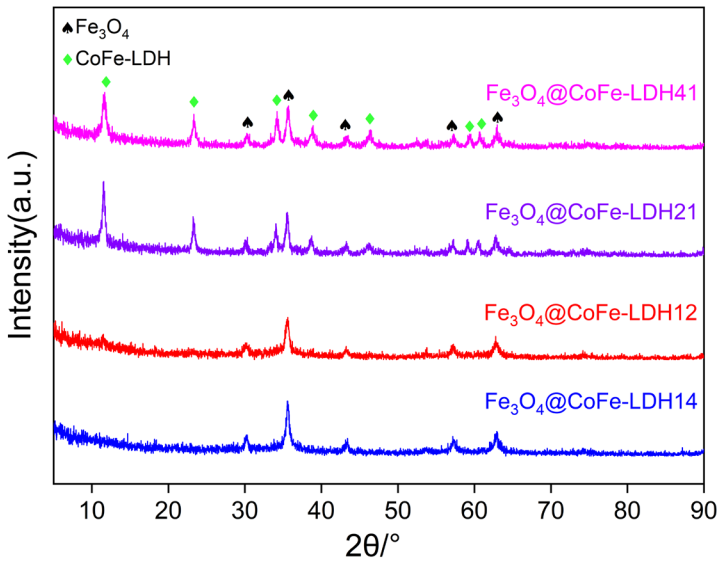

Figure S1 XRD patterns of Fe_3O_4@CoFe-LDH with different Co to Fe ratio

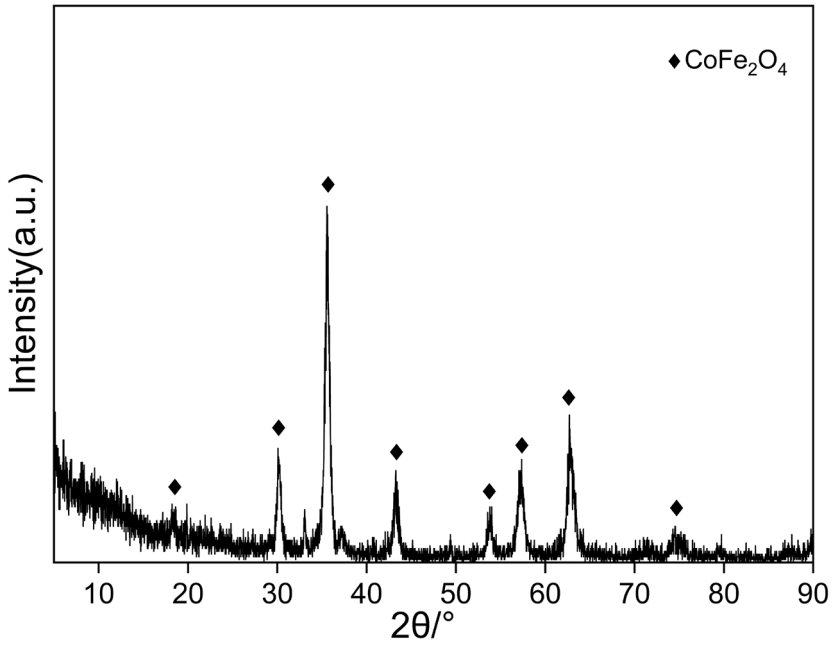

Figure S2 XRD pattern of $CoFe_2O_4$

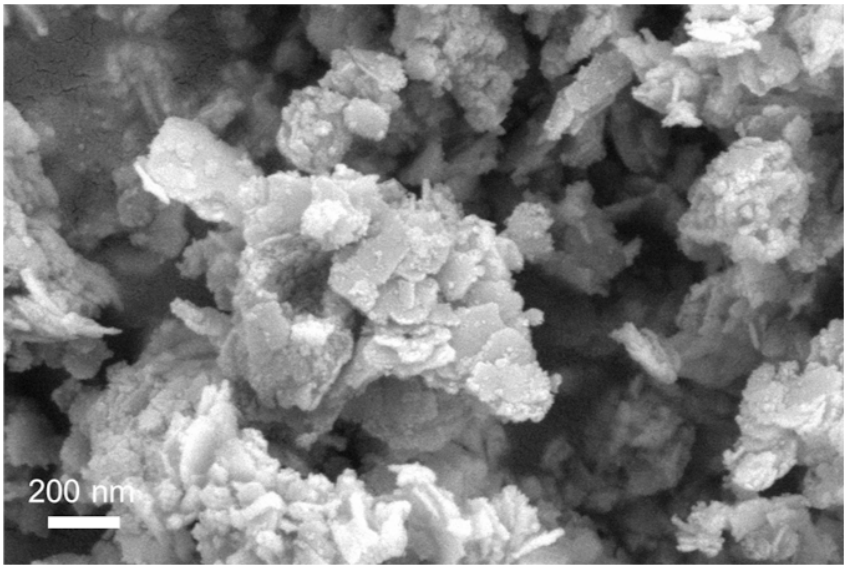

Figure S3 SEM image of bare CoFe-LDH11

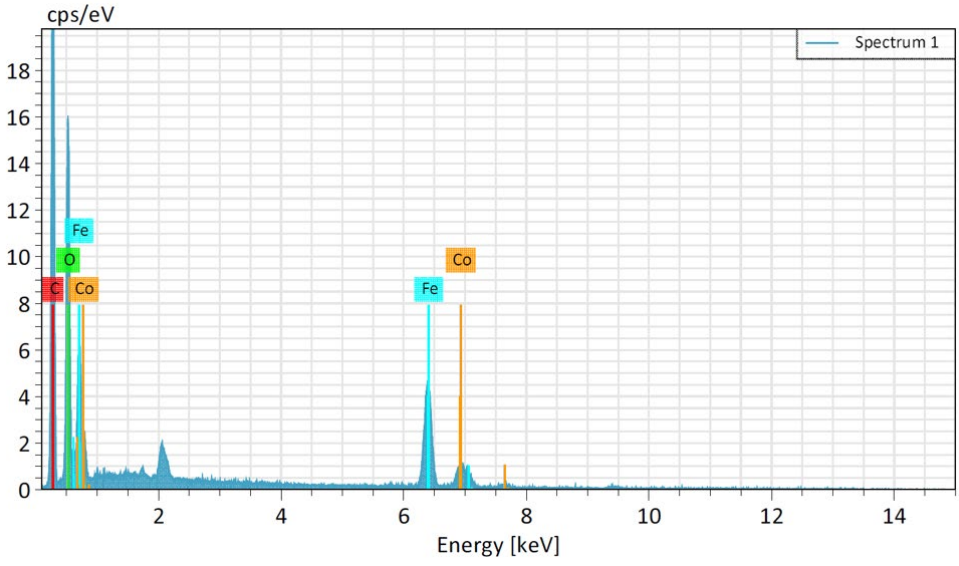

Figure S4 EDS of Fe_3O_4@CoFe-LDH

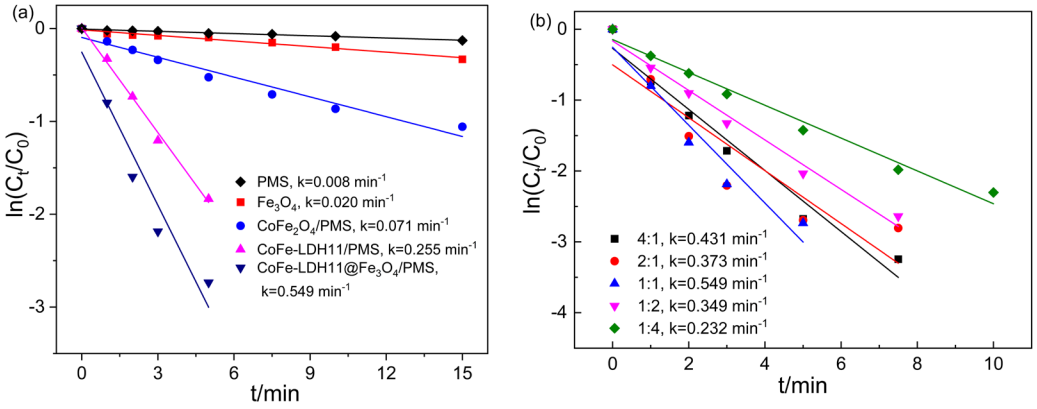

Figure S5 Degradation kinetics of AO7 in different systems (**a**) and different Co to Fe molar ratio (**b**)

Experiment conditions: pH=6, T=298 K, V=0.1 L, [AO7] =40 mg/L, [catalyst] =50 mg/L, [PMS] =0.12 mM

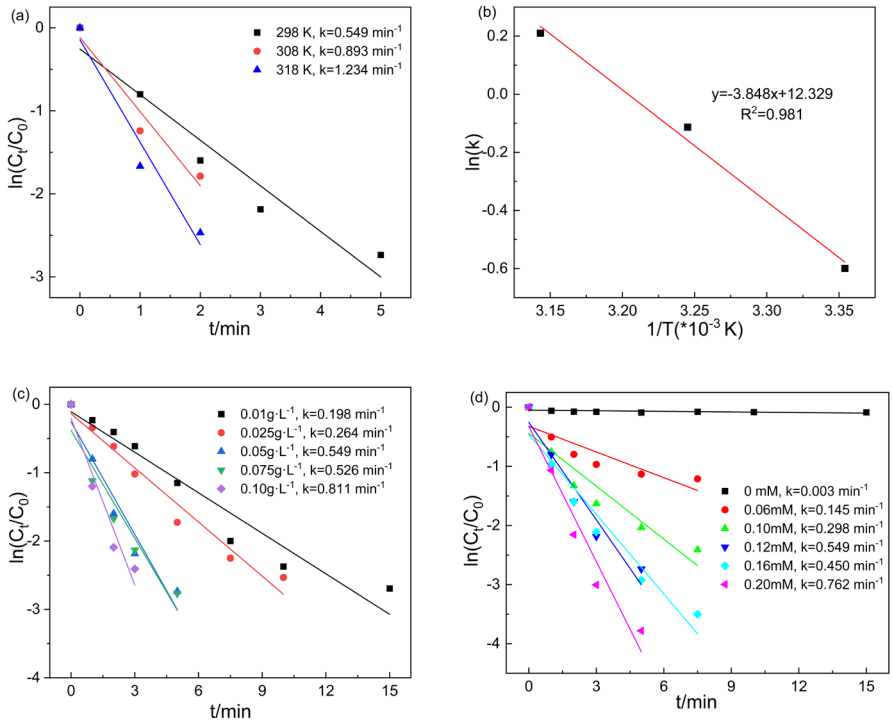

Figure S6 Degradation kinetics of different temperature (**a**), different catalyst concentration (**c**) and different PMS dosage (**d**). The Arrhenius plot for AO7 decolorization (**b**)

Experiment conditions: pH=6 T=298 K (except a), V=0.1 L, [AO7] =40 mg/L, [catalyst] =50 mg/L (except c), [PMS]=0.12 mM (except d)

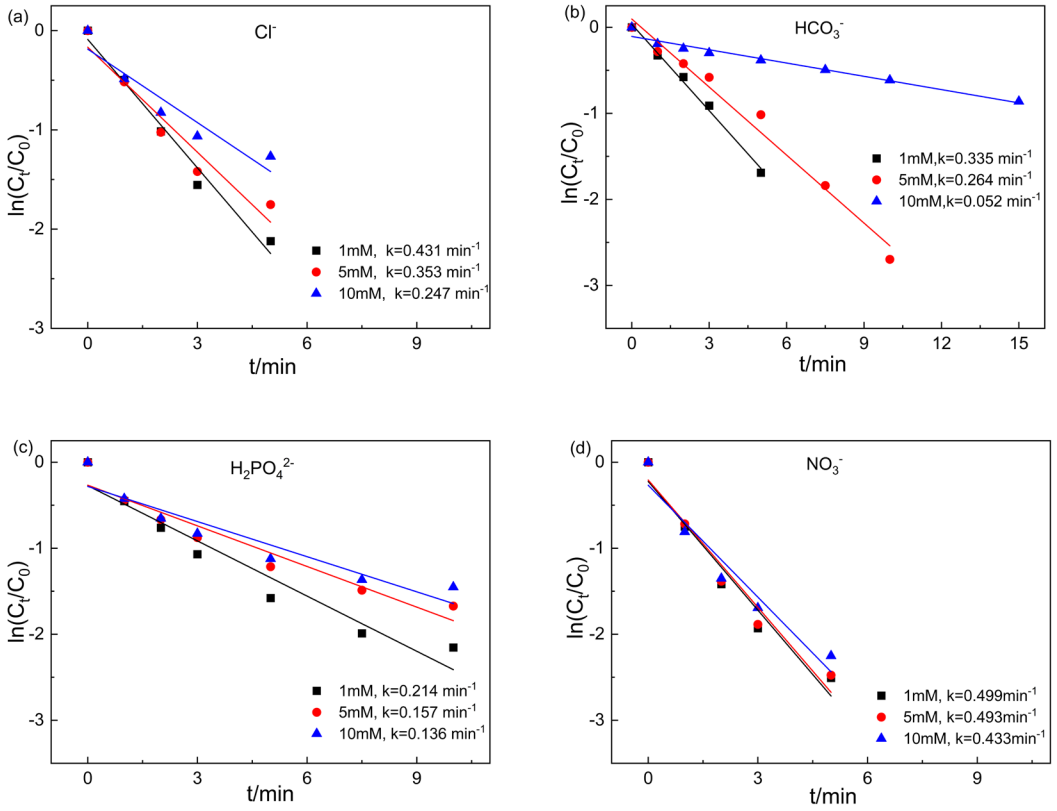

Figure S7 Degradation kinetics of inorganic anions on AO7 removal. (**a**) Cl^-, (**b**) HCO_3^-, (**c**) $H_2PO_4^-$, (**d**) NO_3^-

Experiment conditions: pH=6, T=298 K, V=0.1 L, [AO7] =40 mg/L, [catalyst] =50 mg/L, [PMS]=0.12 mM

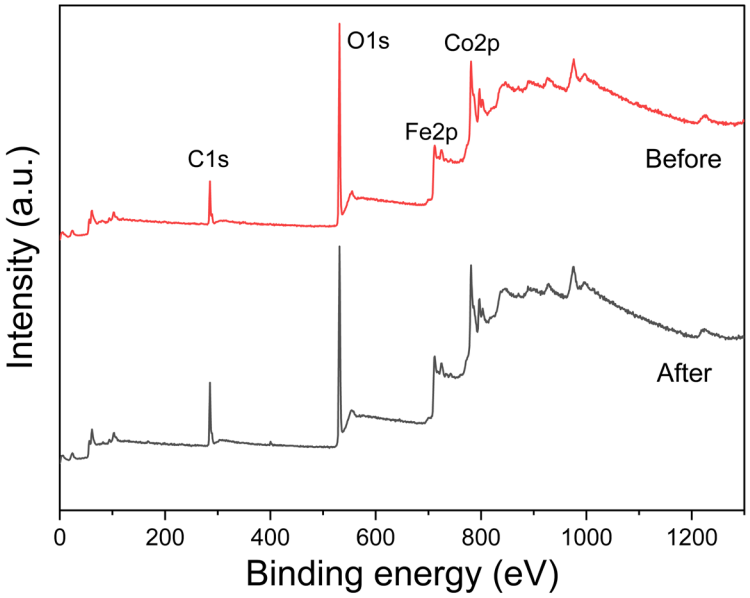

Figure S8 XPS spectra of fresh and used Fe_3O_4@CoFe-LDH