Supplementary Material

Insight into adsorption mechanisms of aqueous hexavalent chromium by EDTA intercalated layered double hydroxides: XRD, FTIR, XPS, and zeta potential studies

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List of supplementary materials:

Formulas used in this work

Adsorption kinetic equation

$$\lg(q_e - q_t) = \lg q_e - \frac{k_1 t}{2.303} \quad \text{Eq. S1}$$

$$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{t}{q_e} \quad \text{Eq. S2}$$

q_t: adsorbate amount of Cr(VI) at time t (min), mg/g;

q_e: adsorbate amount of Cr(VI) at equilibrium state, mg/g;

k_1: rate constant of the pseudo-first-order equation, 1/min;

k_2: rate constant of the pseudo-second-order equation, g/(mg·min).

Adsorption isotherm model

$$\frac{c_e}{q_e} = \frac{c_e}{q_m} + \frac{1}{bq_m} \quad \text{Eq. S3}$$

$$\ln q_e = \ln k_f + \frac{1}{n} \ln c_e \quad \text{Eq. S4}$$

c_e: equilibrium concentration of Cr(VI) in aqueous solution, mg/L;

q_e: equilibrium adsorption capacity of adsorbents, mg/g;

q_m: theoretical saturated adsorption capacity of adsorbents, mg/g;

b: Langmuir isotherm model constant, L/mg;

k_f: constant of the Freundlich isotherm model, no dimension;

n: constant of the Freundlich isotherm model, no dimension.

$$R_L = \frac{1}{1 + bc_0} \quad \text{Eq. S5}$$

b: Langmuir isotherm model constant, L/mg;

c_0: initial Cr(VI) concentration, mg/L.

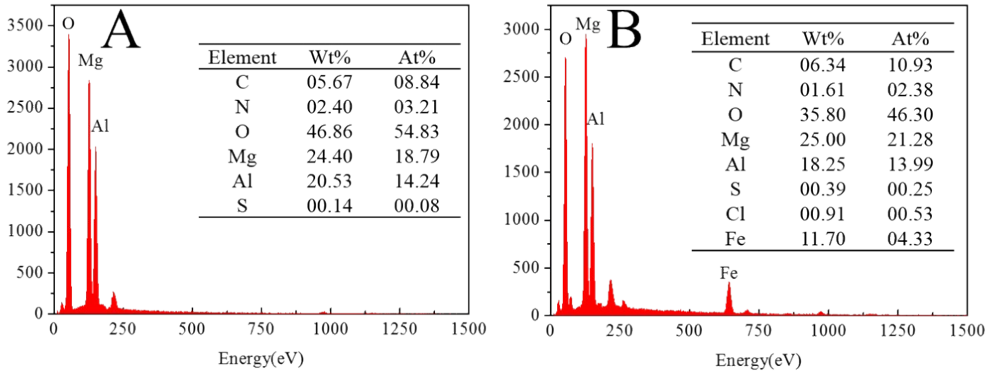

Fig. S1. EDS element composition of LDH-EDTA (A) and Mag-LDH-EDTA (B).

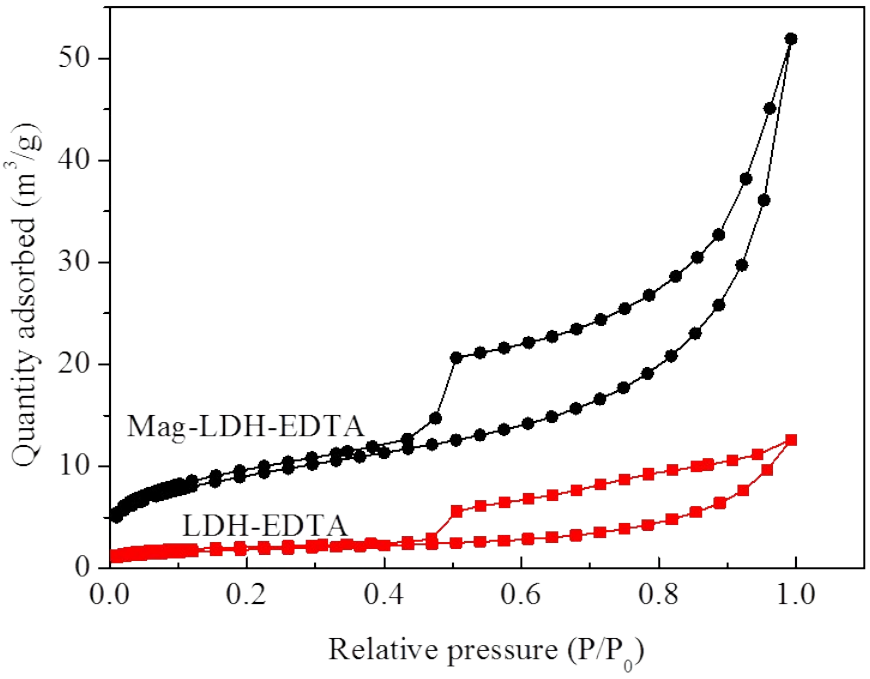

Fig. S2. N_2 adsorption–desorption isotherms of LDH-EDTA and Mag-LDH-EDTA.

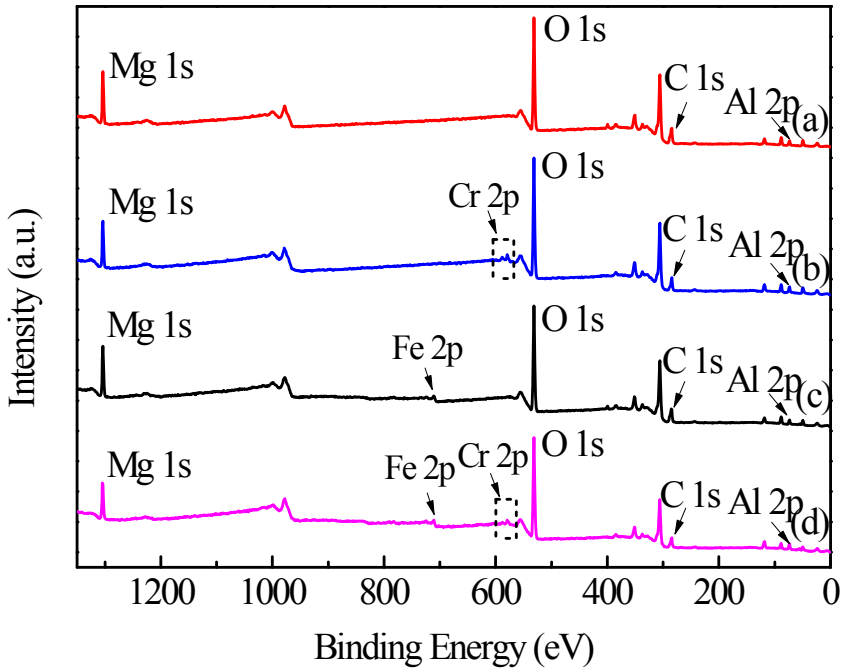

Fig. S3. XPS survey of LDH-EDTA (a, b) and Mag-LDH-EDTA (c, d) before adsorption (a, c) and after Cr(VI) adsorption (b, d).

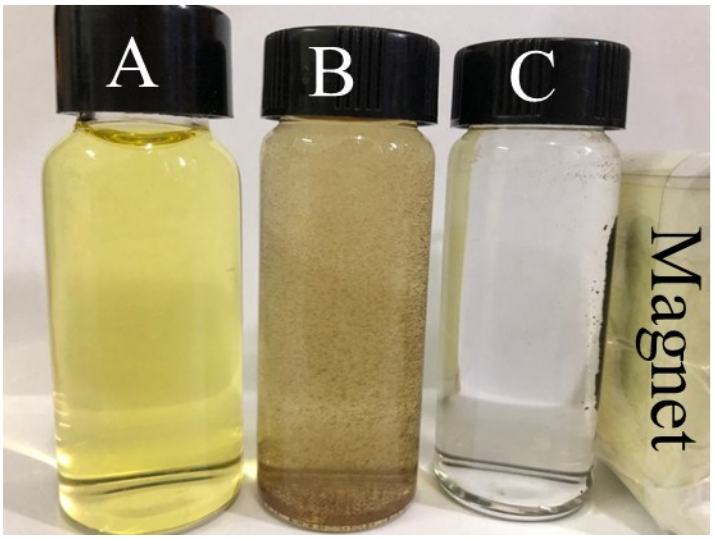

Fig. S4. Images of Cr(VI) solution (A), adsorption of Cr(VI) by Mag-LDH-EDTA (B), and magnetic separation of Mag-LDH-EDTA after adsorption (C).