



Supplementary Materials

Table S1. Comparison of structural parameters of different modified LDHs

Materials	S_t (m^2/g)	V_{pore} (cm^3/g)	Da(nm)
LDHs-M	125	0.278	10.97
LDHs-W	31	0.055	11.98
LDHs-A	196	0.550	12.25
LDHs-E	409	1.530	17.33

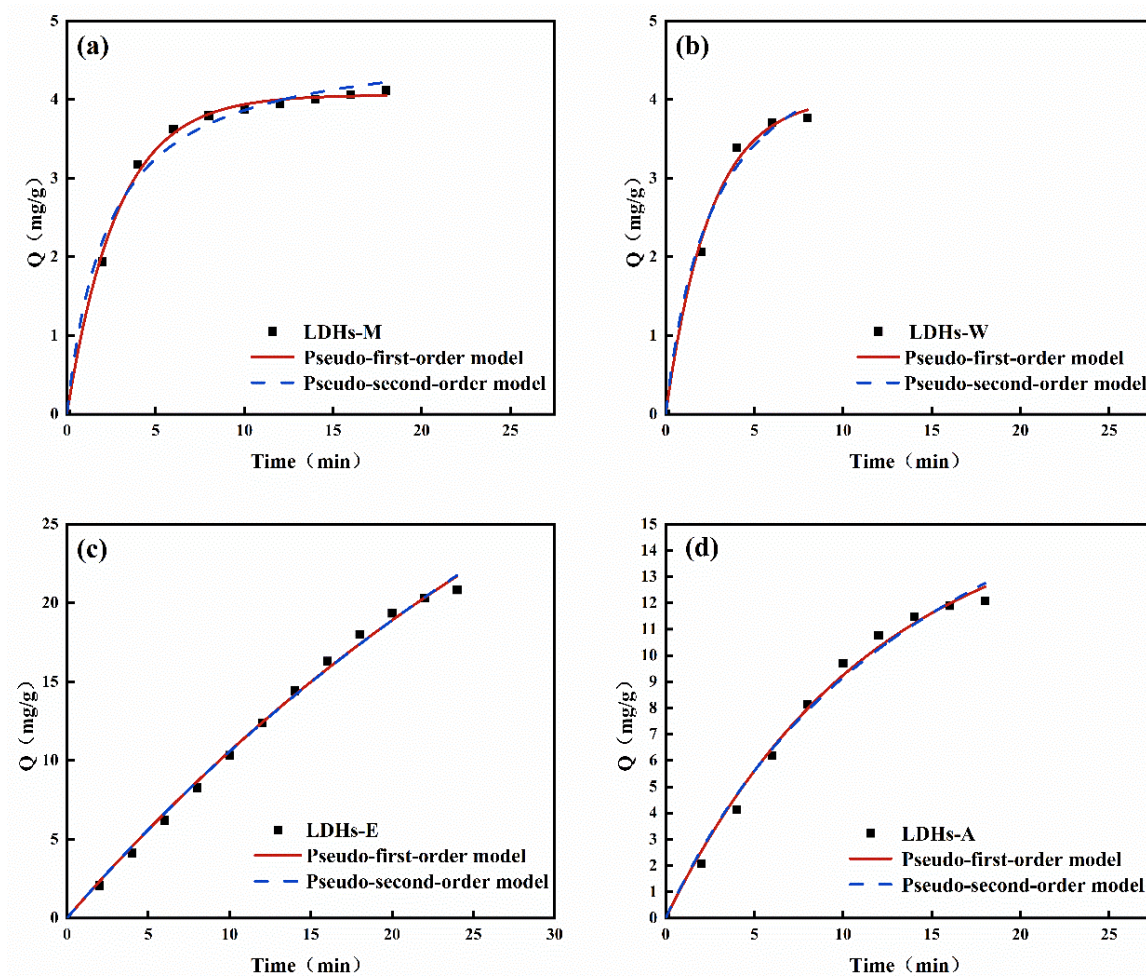


Fig. S1. Nonlinear fits of pseudo-first-order, pseudo-second-order kinetics model for toluene adsorption by samples (a) LDHs-M, (b) LDHs-W, (c) LDHs-E and (d) LDHs-A.

Table S2. The fitting parameters of two kinds of dynamic equations of samples

Adsorbents	Pseudo-first-order model			Pseudo-second-order model		
	q_e (mg g ⁻¹)	k_1 (min ⁻¹)	R^2	q_e (mg g ⁻¹)	k_2 (min ⁻¹)	R^2
LDHs-M	4.1	0.352	0.997	4.8	0.0894	0.986
LDHs-W	4.0	0.3975	0.992	5.2	0.0718	0.984
LDHs-E	49.6	0.024	0.996	89.7	0.0001	0.995
LDHs-A	16.0	0.0862	0.991	25.0	0.0023	0.988

Table S3. Comparison of structural parameters of LDHs with different Mg/Al ratios

Materials	S_t (m ² /g)	V_{pore} (cm ³ /g)	D_a (nm)
LDHs-2:1	409	1.530	17.33
LDHs-3:1	435	1.467	15.97

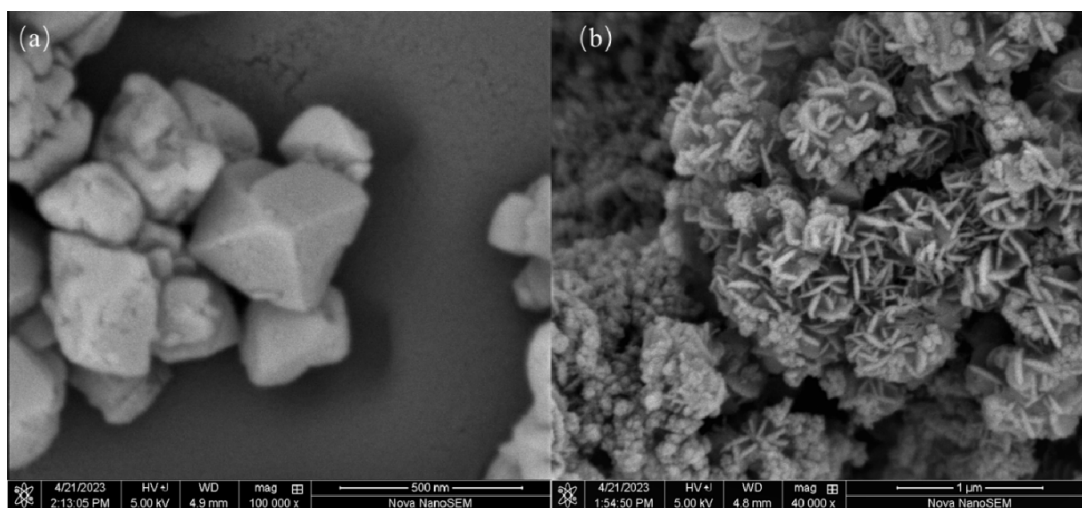


Fig. S2. SEM micrographs of (a)NaY zeolite and (b)NaY@LDH composite.

Table S4. Comparison of structural parameters of NaY zeolite and NaY@LDHs

Materials	S_t (m ² /g)	S_{micro} (m ² /g)	S_{meso} (m ² /g)	V_{pore} (cm ³ /g)	V_{micro} (cm ³ /g)	V_{meso} (cm ³ /g)	D_a (nm)
NaY	744	733	11	0.325	0.278	0.047	1.75
NaY@LDHs	612	322	290	0.906	0.129	0.777	5.92

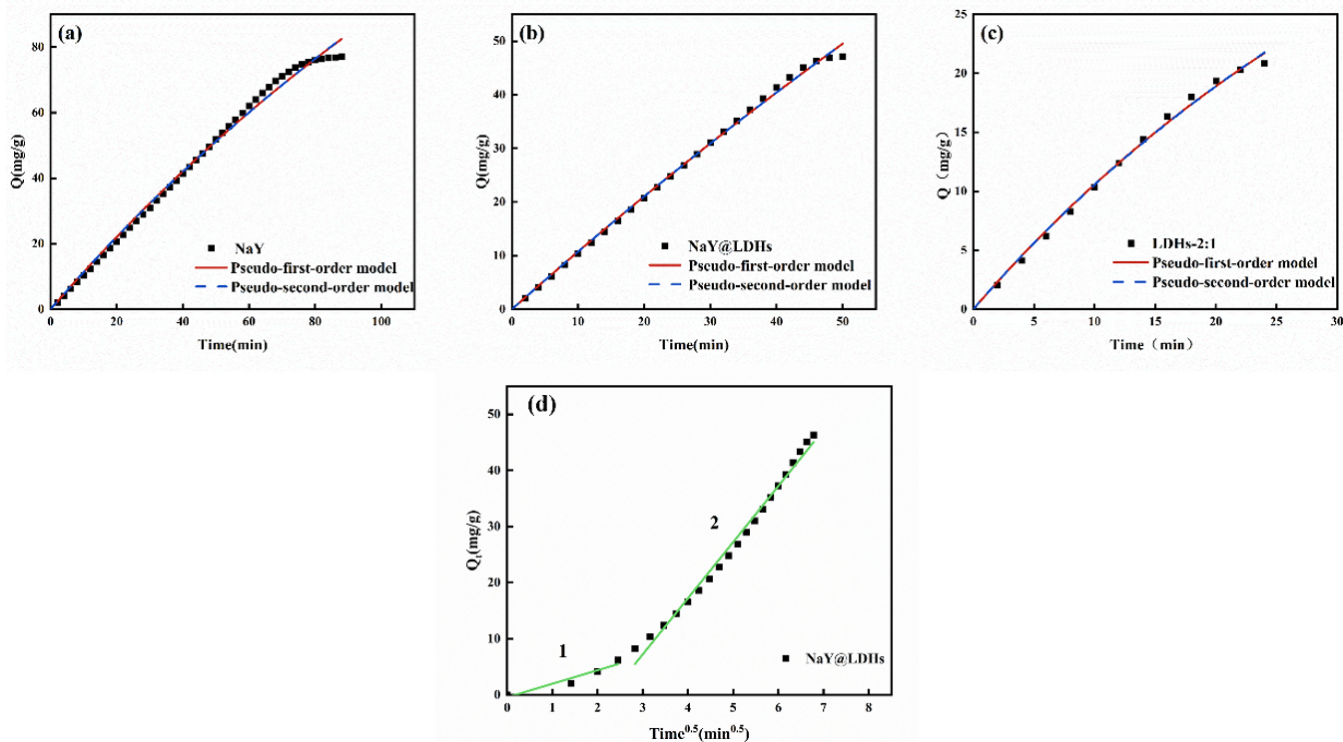


Fig. S3. Nonlinear fits of pseudo-first-order, pseudo-second-order kinetics model for toluene adsorption by samples (a) NaY, (b) NaY@LDHs, (c) LDHs-2:1; Weber-Morris model of (d) NaY@LDHs.

Table S5. The fitting parameters of two kinds of dynamic equations of samples

Adsorbents	Pseudo-first-order model			Pseudo-second-order model		
	q_e (mg g ⁻¹)	k_1 (min ⁻¹)	R ²	q_e (mg g ⁻¹)	k_2 (min ⁻¹)	R ²
NaY	229.1	0.005	0.995	426.3	0	0.994
NaY@LDHs	264.6	0.004	0.998	512.2	0	0.997
LDHs-2:1	49.6	0.024	0.996	89.7	0.0001	0.995

Table S6. Weber-Morris model parameters of NaY@LDHs

	K (mg/g·min ^{-0.5})	C (mg/g·min ^{-0.5})	R ²
1 (External surface adsorption)	2.4105	-0.4309	0.887
2 (Intra-particle diffusion)	9.9984	-22.7794	0.989

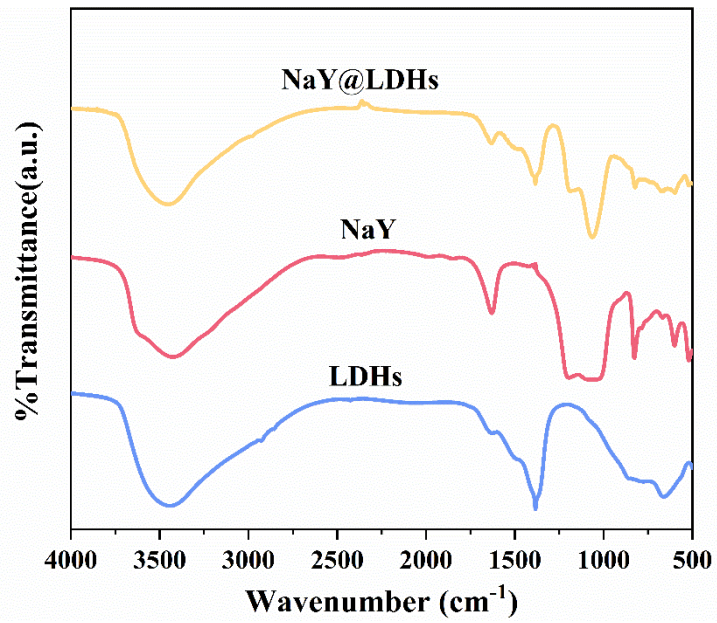


Fig. S4. FT-IR spectra of LDHs, NaY zeolite and NaY@LDHs.

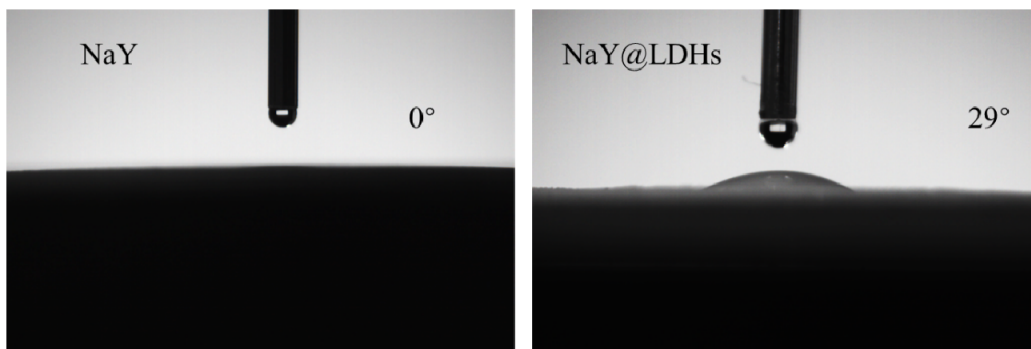


Fig S5. Water contact angles measurement of NaY and NaY@LDHs.