

**Removal efficiency of arsenate and phosphate from aqueous solution using  
layered double hydroxide materials: Intercalation vs. Precipitation**

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**Table S1** Fitting kinetic parameters of P adsorption over Ca<sub>2</sub>Al-Cl-LDH.

Condition		C <sub>0</sub> =50 mg/L			C <sub>0</sub> =155 mg/L		
		pH 5	pH 7	pH 9	pH 5	pH 7	pH 9
Lagergren first-order	q <sub>e</sub> (mg/g)	49.12	47.31	49.17	132.83	111.46	83.65
	k <sub>1</sub>	31.90	9.92	7.83	0.95	0.40	0.30
	R <sup>2</sup>	0.9748	0.9120	0.9933	0.9445	0.8066	0.8709
Pseudo-second-order	q <sub>e</sub> (mg/g)	51.53	52.16	54.38	141.44	119.90	90.73
	k <sub>2</sub>	1.04	0.27	0.21	0.0096	0.0051	0.0051
	R <sup>2</sup>	0.9937	0.9545	0.9874	0.9641	0.8866	0.9343

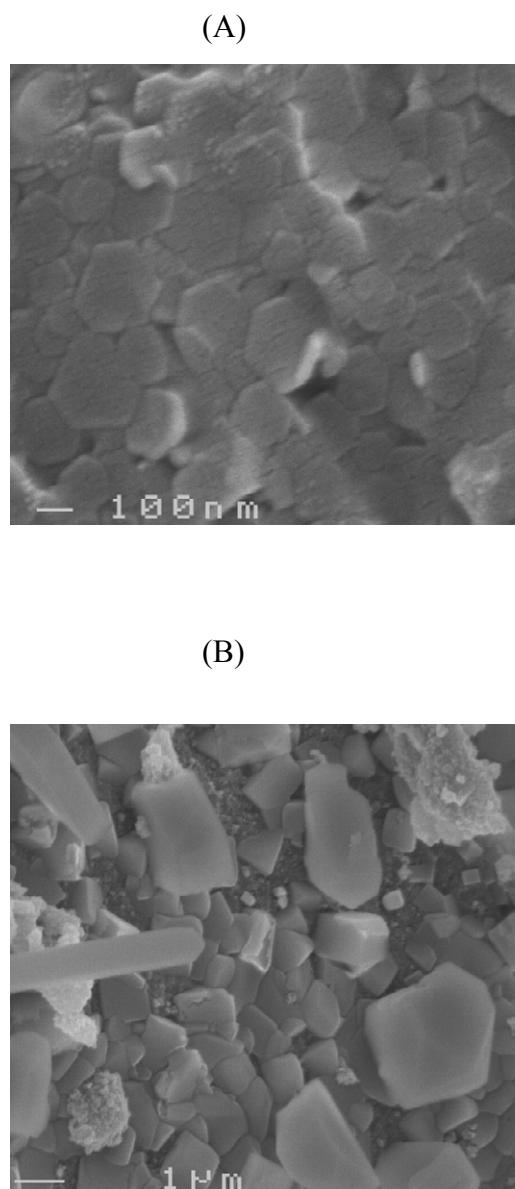
Lagergren first-order Eq.:  $q_t = q_e(1 - \exp(-k_1 t))$

Pseudo-second-order Eq.:  $q_t = k_2 q_e^2 t / (1 + k_2 q_e t)$

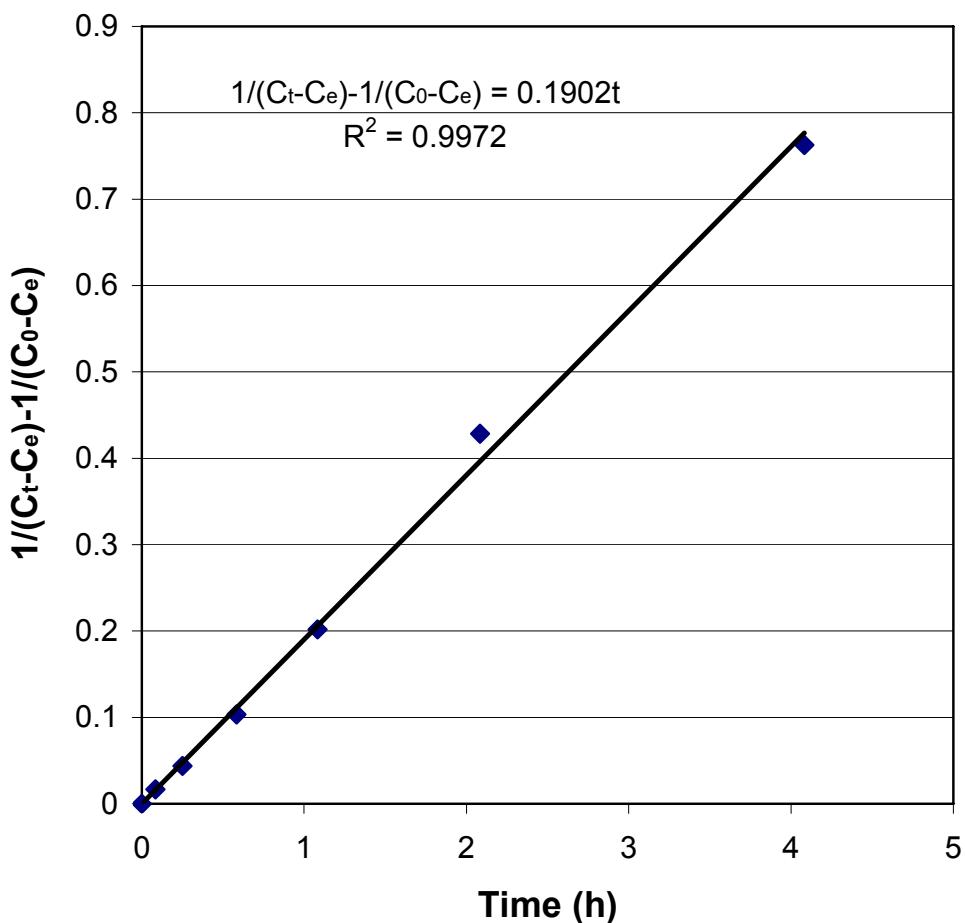
**Table S2** Fitting parameters for P adsorption isotherm over Ca<sub>2</sub>Al-Cl-LDH.

	pH 5	pH 7	pH 9
Langmuir			
Q <sub>m</sub> (mg/g)	133.33	131.58	104.17
b	14.42	44.71	4.17
R <sup>2</sup>	0.9999	0.9999	0.9991
Freundlich			
K <sub>f</sub>	111.05	109.95	78.26
1/n	0.084	0.099	0.080
R <sup>2</sup>	0.7283	0.4079	0.4250

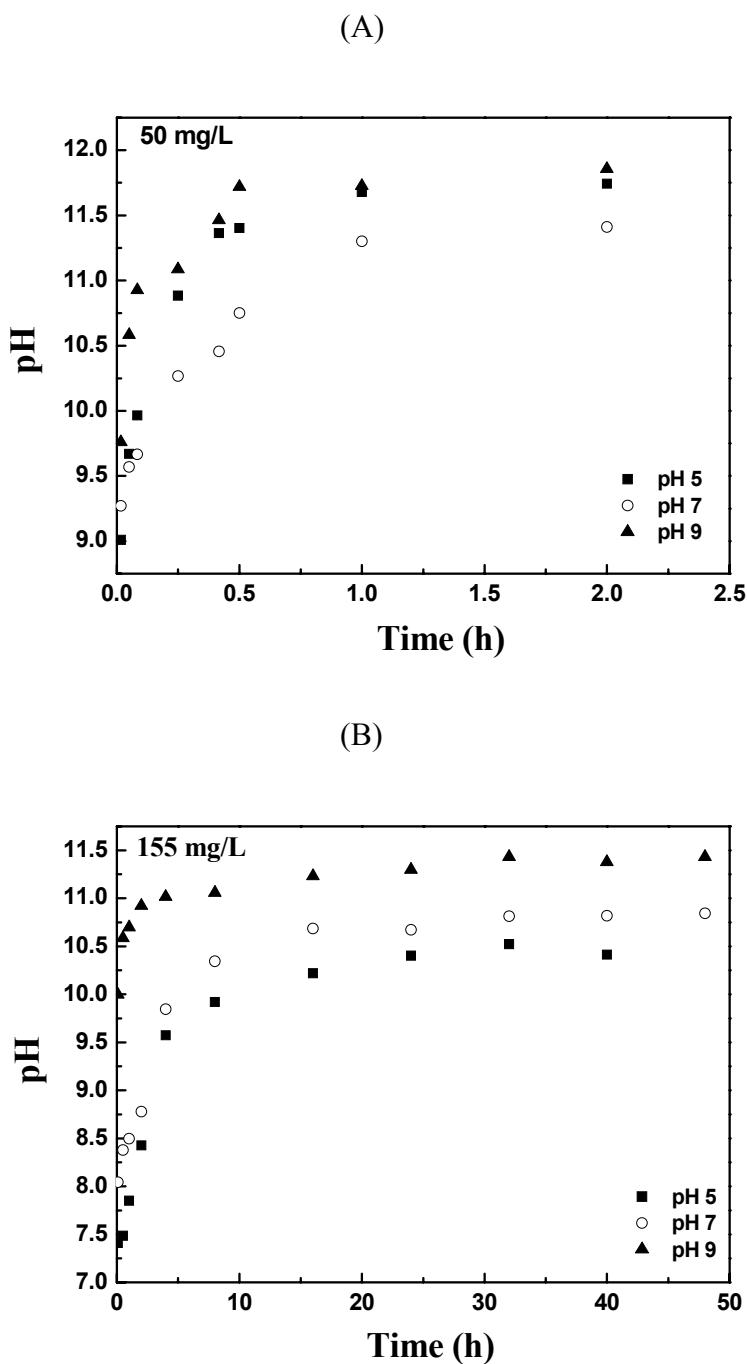
Langmuir Eq.  $Q_e = Q_m b C_e / (1 + b C_e)$   
Freundlich Eq.  $Q_e = K_f C_e^{1/n}$



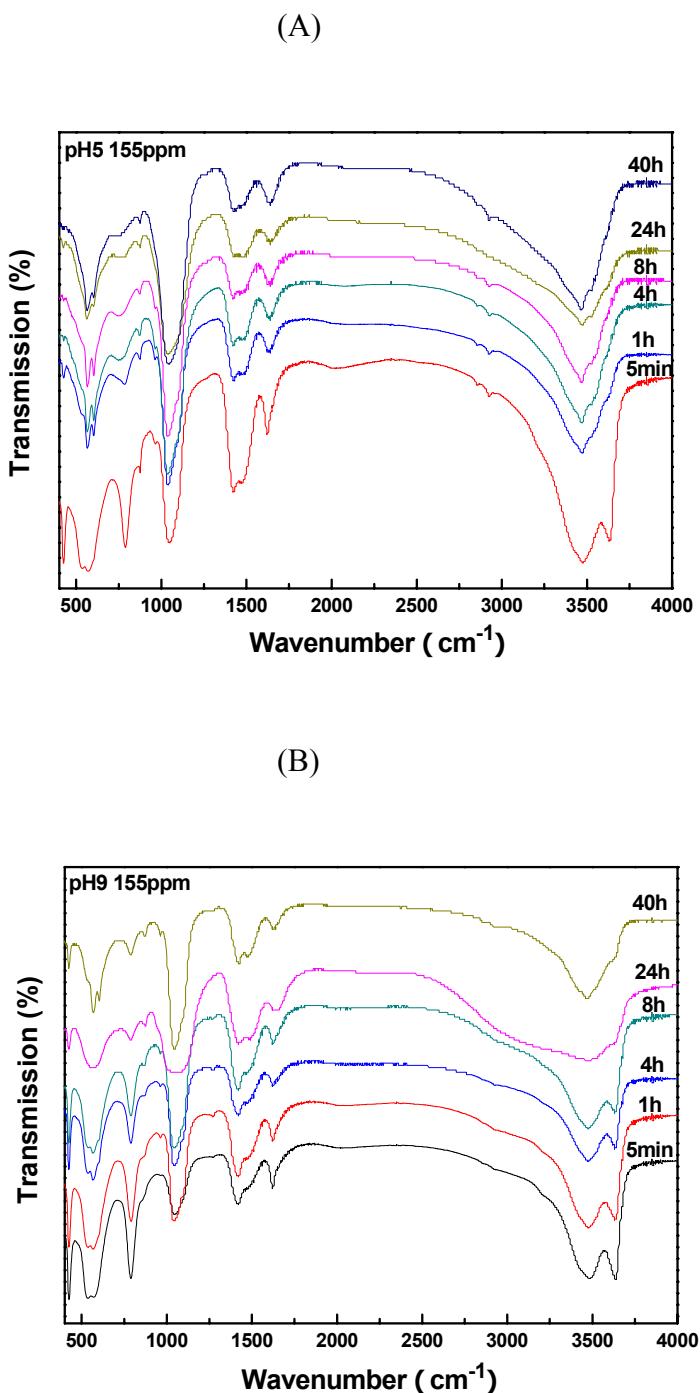
**Fig. S1** SEM images of (A) Mg<sub>2</sub>Al-LDH, and (B) Mg<sub>2</sub>Al-LDO



**Fig. S2** Arsenate adsorption kinetics well fitted with the pseudo-second-order model.



**Fig. 3S** pH changes with the adsorption time during P adsorption with initial P concentration of 50 mg/L (A) and 155 mg/L (B) with initial pH 5, 7, or 9.



**Fig. 4S** FTIR spectral change of  $\text{Ca}_2\text{Al}\text{-Cl-LDH}$  during the adsorption of phosphate at the initial P of 155 mg/L with the initial pH 5 (A) and 9 (B). Peaks at around  $3500 \text{ cm}^{-1}$ : O-H stretching vibrations; Peaks at around  $1600 \text{ cm}^{-1}$ :  $\text{H}_2\text{O}$  bending vibration; Peaks at around  $1400 \text{ cm}^{-1}$ : C-O stretching vibration (carbonate); Peaks at around  $1000\text{-}1100 \text{ cm}^{-1}$ : P-O stretching vibration (phosphate); Peaks at  $780$  and  $550 \text{ cm}^{-1}$ :  $(\text{Ca},\text{Al})\text{-O}$  stretching vibration.