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Supporting information

**Comparative study on synchronous adsorption of arsenate and fluoride in aqueous solution onto MgAlFe-LDHs
with different intercalation anions**

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Supporting information

Table S1 Fitting curve parameters of arsenic adsorption isothermal equation

Isotherm	Constants	MgAlFe-CLDH	MgAlFe-Cl-LDH	MgAlFe-NO ₃ -LDH
Langmuir	Q_m (mg·g ⁻¹)	158.2	79.69	179.9
	K_L (L·mg ⁻¹)	0.0311	2.532	0.1819
	R^2	0.9420	0.9797	0.9579
Freundlich	K_f (mg·g ⁻¹)(L·mg ⁻¹) ^{-1/n}	9.016	40.11	60.10
	n	1.622	4.039	3.896
	R^2	0.9694	0.9600	0.9932
Sips	Q_m (mg·g ⁻¹)	200	94.30	1027
	K_s (L·mg ⁻¹) ^m	0.0379	1.078	0.0623
	m	0.8124	0.6258	0.2842
	R^2	0.9554	0.9968	0.9936

Table S2 Fitting curve parameters of arsenic adsorption kinetic equation

Materials	Pseudo first-order kinetic model			Pseudo second-order kinetic model		
	Q_e (mg·g ⁻¹)	K_1 (min ⁻¹)	R^2	Q_e (mg·g ⁻¹)	K_2 g·(mg·min) ⁻¹	R^2
MgAlFe-CLDH	48.22	0.0257	0.8752	50.76	0.0008827	0.9954
MgAlFe-Cl-LDH	39.74	0.0153	0.7647	43.29	0.0005218	0.9839
MgAlFe-NO ₃ -LDH	40.45	0.0149	0.7730	43.93	0.0004858	0.9799

Table S3 Fitting curve parameters of fluoride adsorption isothermal equation

Isotherm	Constants	MgAlFe-CLDH	MgAlFe-Cl-LDH	MgAlFe-NO ₃ -LDH
Langmuir	Q_m (mg·g ⁻¹)	29.78	10.27	18.62
	K_L (L·mg ⁻¹)	0.08618	0.1229	0.1015
	R^2	0.9460	0.9586	0.9598
Freundlich	K_f (mg·g ⁻¹)(L·mg ⁻¹) ^{-1/n}	3.899	1.532	2.742
	n	1.922	2.021	2.016
	R^2	0.9698	0.9049	0.9658
Sips	Q_m (mg·g ⁻¹)	-	8.384	54.83
	K_s (L·mg ⁻¹) ^m	-	0.05914	0.04937
	m	-	1.705	0.5856
	R^2	-	0.9713	0.9665

1 **Table S4** Fitting curve parameters of fluoride adsorption kinetic equation

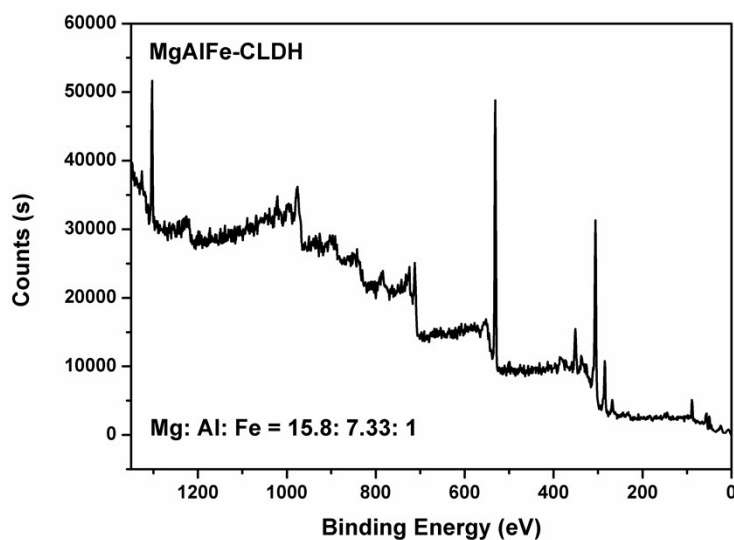
Materials	Pseudo first-order kinetic model			Pseudo second-order kinetic model		
	Q_e ($\text{mg}\cdot\text{g}^{-1}$)	K_1 (min^{-1})	R^2	Q_e ($\text{mg}\cdot\text{g}^{-1}$)	K_2 ($\text{g}\cdot\text{mg}^{-1}\cdot\text{min}^{-1}$)	R^2
MgAlFe-CLDH	9.166	0.0151	0.8488	9.922	0.00235	0.9888
MgAlFe-Cl-LDH	7.843	0.0157	0.7964	8.469	0.00286	0.9902
MgAlFe-NO ₃ -LDH	8.245	0.0493	0.9233	8.577	0.00951	0.9923

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3 **Table S5** Fitting curve parameters of adsorption isothermal equation of binary system

		As(V)	F ⁻
MgAlFe-CLDH (Freundlich)	$K_f (\text{mg}\cdot\text{g}^{-1})(\text{L}\cdot\text{mg}^{-1})^{-1/n}$	5.975	0.9692
	n	2.376	1.902
	R^2	0.8906	0.9437
MgAlFe-Cl-LDH (Sips)	$Q_m(\text{mg}\cdot\text{g}^{-1})$	45.51	15.71
	$K_s(\text{L}\cdot\text{mg}^{-1})^m$	0.5986	0.0560
	m	1.305	1.025
MgAlFe-NO ₃ -LDH (Sips)	R^2	0.9484	0.9988
	$Q_m(\text{mg}\cdot\text{g}^{-1})$	39.43	42596
	$K_s(\text{L}\cdot\text{mg}^{-1})^m$	11.64	0.00002769
	m	1.557	0.64
	R^2	0.9790	0.9888

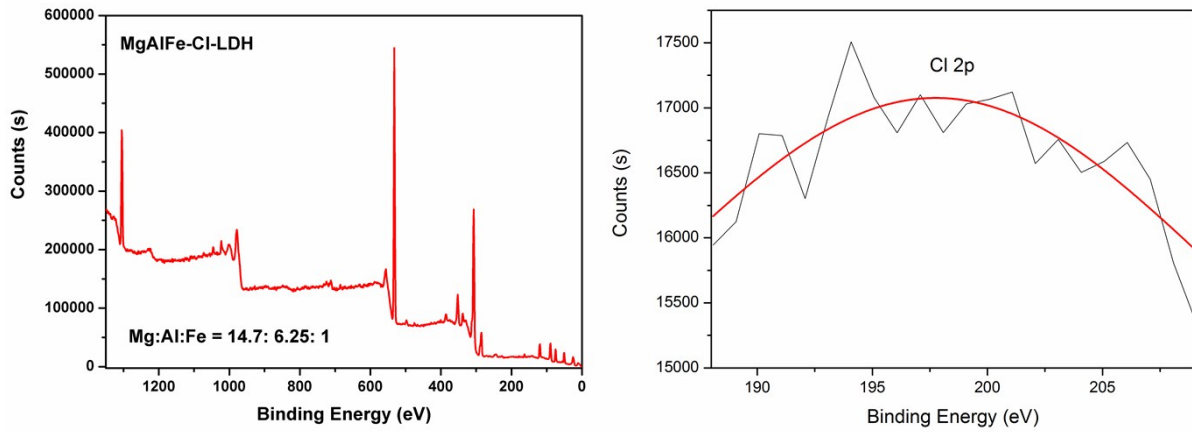
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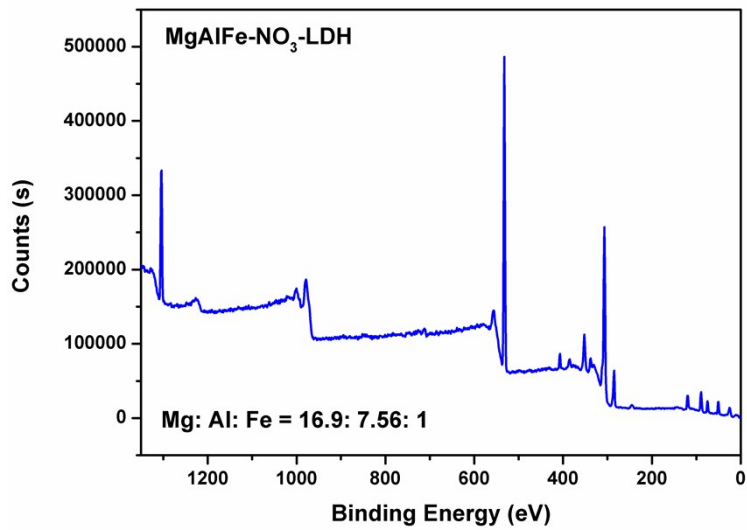
6 **Fig. S1** The full-range XPS spectra of MgAlFe-CLDH

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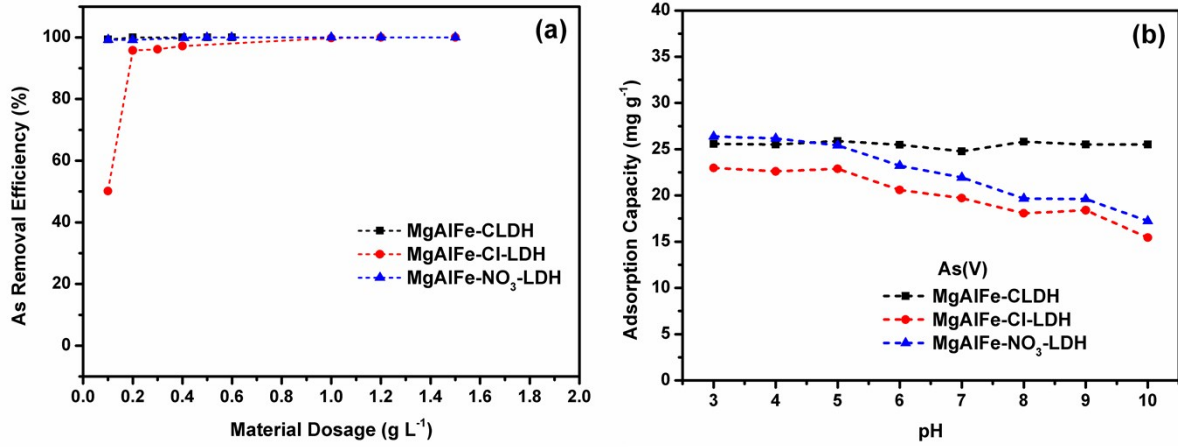
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Fig. S2 The full-range XPS spectra of MgAlFe-Cl-LDH and Peak of Cl 2p

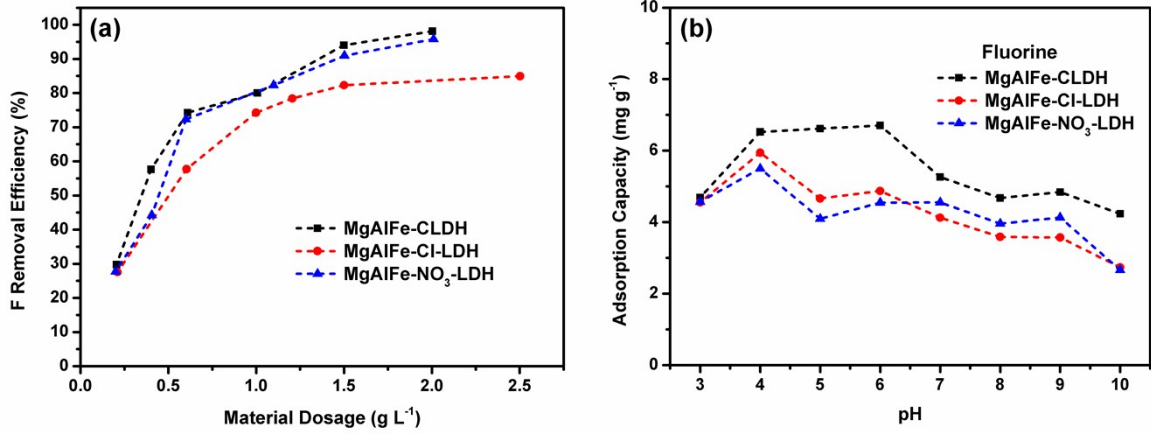


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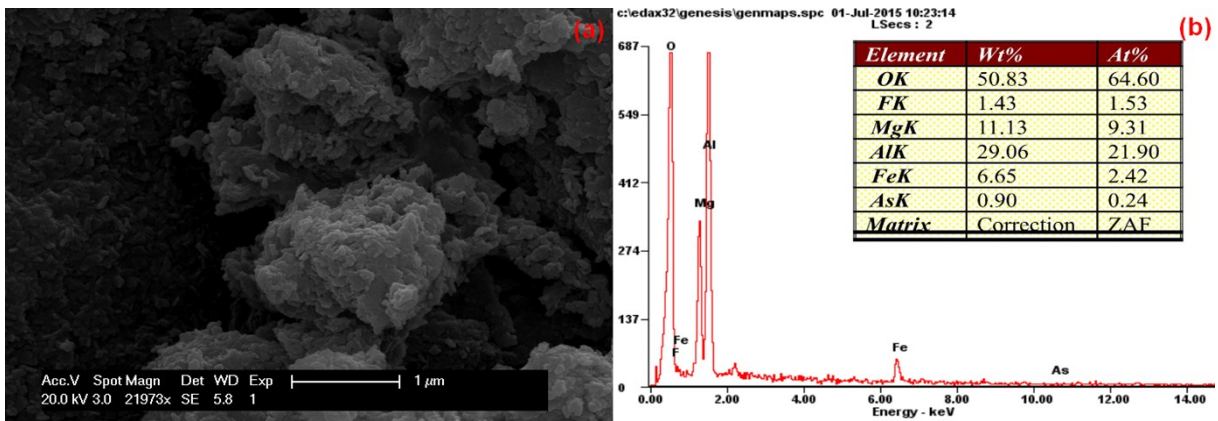
Fig. S3 The full-range XPS spectra of MgAlFe-NO₃-LDH



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2 **Fig. S4 (a)** Effect of dosage on arsenic adsorption; **(b)** Effect of pH on arsenic adsorption



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6 **Fig. S5 (a)** Effect of dosage on fluoride adsorption; **(b)** Effect of pH on fluoride adsorption



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9 **Fig. S6 (a)** SEM image and **(b)** EDS figure of MgAlFe-NO₃-LDH after adsorption of arsenic and fluoride