Electronic Supplementary Information

Novel biomolecule-assisted interlayer anion-controlled layered double hydroxide as an efficient sorbent for arsenate removal

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**Fig. S1.** Change in the degree of crystallinity of MgAl-LDHs with synthesis temperature.

The degree of crystallinity was calculated by the addition of 20 wt.% SiO\textsubscript{2} by the internal standard method. The phase fraction of each component was calculated from the PXRD patterns highest intensity peak area of SiO\textsubscript{2} and LDH phases as shown in the following equation:\textsuperscript{1}

\[
\text{Phase fraction of LDH (} F_{LDH} \text{)} = \frac{\text{Area of LDH}_{(100\%\text{ intensity peak})}}{\text{Area of LDH}_{(100\%\text{ intensity peak})} + \text{Area of standard}_{(100\%\text{ intensity peak})}}
\]

(i)

The degree of crystallinity of the samples were calculated by the following equation:\textsuperscript{2}

\[
\text{Degree of Crystallinity (\%)} = F_{LDH} X \frac{F_{S\ (actual)}}{F_{S}} \left(\frac{1}{1 - F_{S\ (actual)}}\right) \times 100
\]

(ii)

Where, \(F_{LDH}\) and \(F_{s}\) are the phase fraction of LDH and standard respectively, and \(F_{s\ (actual)}\) is the originally added fraction of internal standard.

**References**


**Fig. S2** LC-MS spectra of supernatants obtained after LDH synthesis at different temperatures.

**Scheme S1.** Thermal decomposition of amino acid during hydrothermal treatment at higher temperatures.\(^1\)

**Reference**

(a) 90 °C  
(b) 100 °C  
(c) 105 °C  
(d) 110 °C  
(e) 115 °C  
(f) 120 °C  
(g) 150 °C  
(h)
**Fig. S3** PXRD peak fitting of MgAl LDHs synthesized at various temperatures (a-g) and (h) all of the LDHs.

![PXRD peak fitting](image)

**Fig. S4** FT-IR spectra of MgAl-LDHs synthesized at various temperatures.

![FT-IR spectra](image)

**Fig. S5** SEM images of MgAl-LDHs synthesized at various temperatures (scale bar = 2 µm).

![SEM images](image)
**Fig. S6** Nitrogen adsorption-desorption isotherms of MgAl-LDHs synthesized at various temperatures.

**Fig. S7** Kinetic linear fittings of Ho’s pseudo-second order model.
Fig. S8 (a) PXRD patterns of (a) MgAl-LDH-100 and (b) MgAl-LDH-100 (2:1) after sorption of arsenate at different concentrations.

Fig. S9 The \( d_{003} \)-spacing of MgAl-LDH-100 and MgAl-LDH-100 (2:1) after sorption of arsenate at different concentrations.
Fig. S10 (a) FT-IR spectra of MgAl-LDH-100 (2:1) after sorption of arsenate at different concentrations (b) and their expanded regions.

Fig. S11 XPS survey spectra of MgAl-LDH-90 before and after adsorption of 2.0 mM arsenate.