**Supplementary material**

**Table S1** Selected properties of unmodified biochar and Mg/Fe-LDH-biochar

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Adsorbent | Elemental composition (%) |  | pH |  | EC\* |  | CEC\*\* |  | Surface area |
| C | H | N | Mg | Fe |  |  | dS m-1 |  | Cmolc kg-1 |  | m2 g-1 |
| Unmodified biochar  | 69 | 2.7 | 0.75 | 0.9 | 0.04 |  | 9.5 |  | 0.12 |  | 25 |  | 266 |
| Mg/Fe-LDH-biochar | 48 | 2.5 | 0.48 | 6.2 | 7.8 |  | 8.5 |  | 0.53 |  | 6.5 |  | 50 |

\* Electrical conductivity

\*\* Cation exchange capacity

**Figure S1** Point of zero charge for unmodified biochar and Mg/Fe-LDH-biochar.

**Figure S2** Arsenate speciation as a function of pH simulated by Visual MINTEQ, (ionic strength = 0.01 M, arsenate concentration = 10 mg L-1, temperature = 19ºC)

**Figure S3** Main effect of background solution ionic strength on arsenate adsorption the Mg/Fe-LDH-biochar (pH = 7, arsenate concentration = 10 mg L-1, adsorbent weight = 30 mg, solution volume = 40 mL, contact time = 16 h), bars denote ± standard errors of the means.



**Figure S4** Interaction of ionic strength (IS) and pH on arsenate adsorption on the Mg/Fe-LDH-biochar (adsorbent weight = 30 mg, solution volume = 40 mL, contact time = 16 h).

**Figure S5** Removal efficiency of arsenate by Mg/Fe-LDH-biochar over successive adsorption-desorption cycles (pH = 7, adsorbent weight = 30 mg, solution volume = 40 mL, contact time = 16 h), bars denote ± standard errors of the means