# SUPPORTING INFORMATION

# Highly efficient removal of humic acid from aqueous solutions by Mg/Al layered double hydroxides-$Fe_3O_4$ nanocomposites

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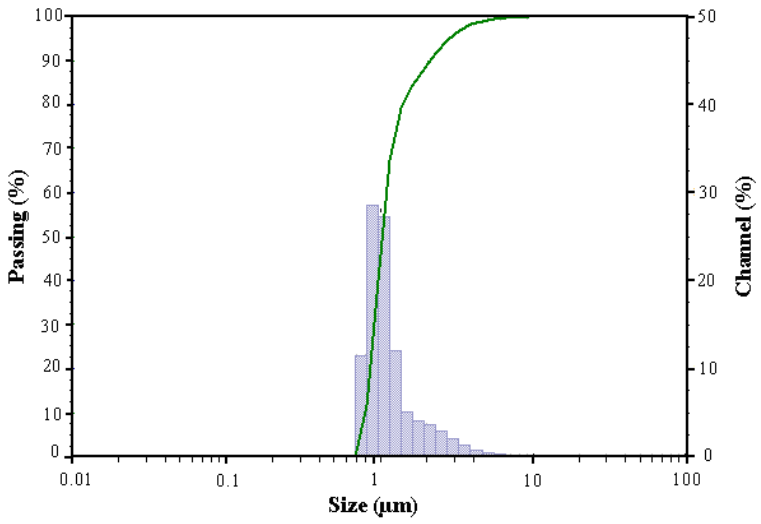


**Fig. S1.** Size distribution of LDHs–$Fe_3O_4$ nanocomposites.

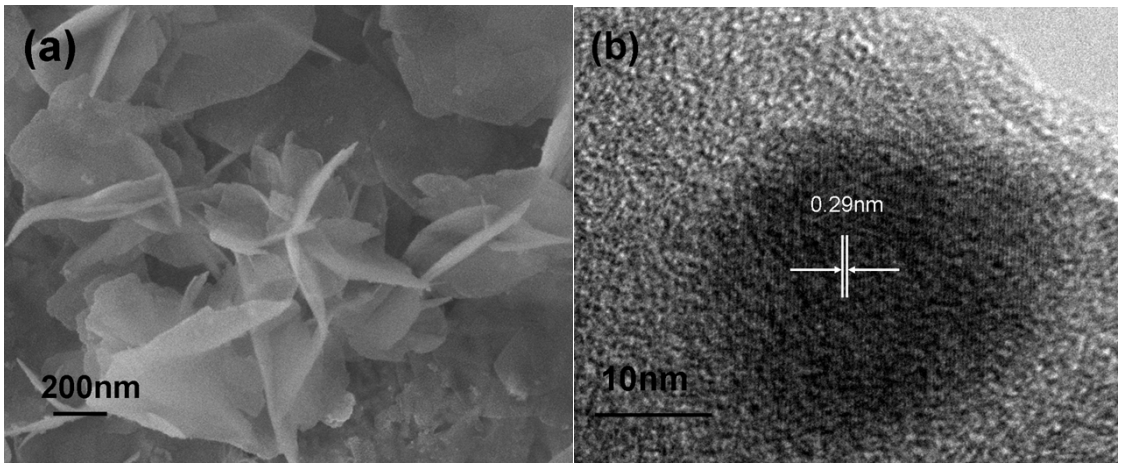


**Fig. S2** SEM image of (a) LDHs–$Fe_3O_4$ and HR-TEM image of (b) $Fe_3O_4$.

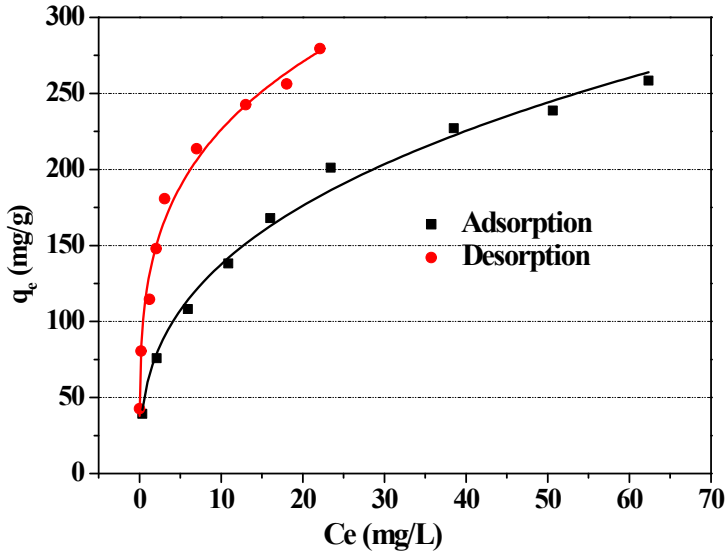


**Fig. S3.** Adsorption and desorption isotherms of HA adsorption on LDHs–$Fe_3O_4$. pH = 5.0 ± 0.1, m/V = 0.5 g/L, and I = 0.01 M $NaNO_3$.

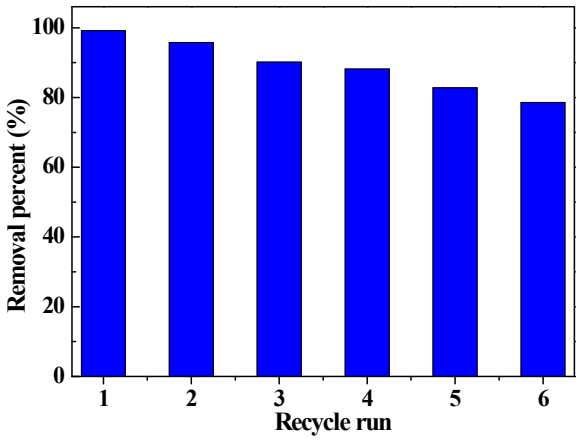


**Fig. S4.** Recycling of LDHs–$Fe_3O_4$ in the removal of HA. pH = 5.0 ± 0.1, m/V = 0.5 g/L, and I = 0.01 M $NaNO_3$.

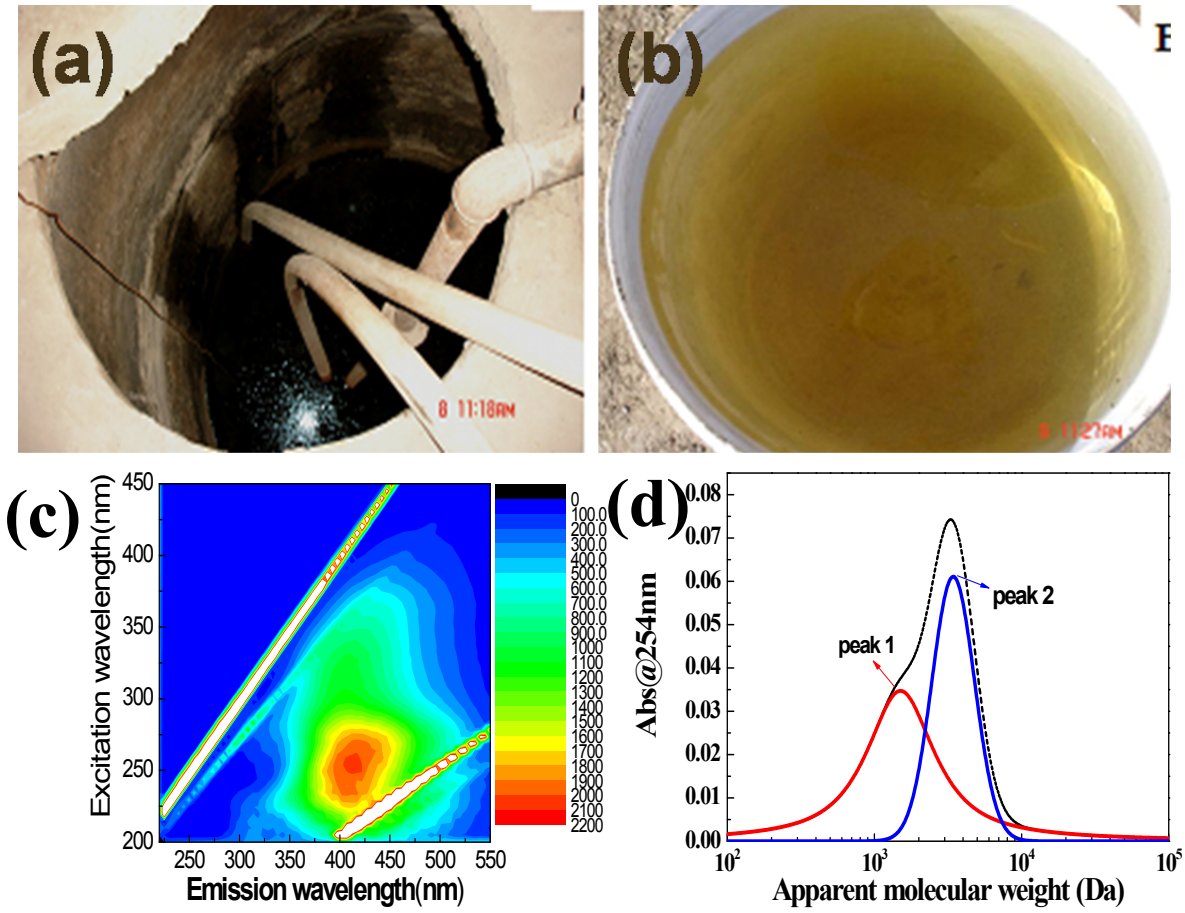


**Fig. S5.** Digital pictures of (a) the natural groundwater well and (b) the color of the groundwater sample, (c) the excitation emission matrix fluorescence spectroscopy of natural groundwater sample, and (d) high performance size exclusion chromatography.

**Table S1** Theoretical and Calculated $q_e$ Values, Pseudo-Second-Order Rate Constants, $k_2$, and

Correlation Coefficient Values ($R^2$). The dosage of the assembly of LDHs–$Fe_3O_4$ adsorbent was 0.5 g/L

| Initial concentration of HA (mg/L) | Theoretical $q_e$ (mg/g) | Calculated $q_e$ (mg/g) | $k_2$ (g/mg/h) | $R^2$ |
|---|---|---|---|---|
| 40 | 80.91 | 81.23 | 0.1471 | 0.9997 |
| 60 | 109.5 | 109.89 | 0.1999 | 0.9998 |
| 80 | 139.02 | 140.25 | 0.0736 | 0.9996 |

**Table S2** Comparison of the maximum adsorption capacity of HA on LDHs–$Fe_3O_4$ with other different adsorbents.

| Adsorbents | Adsorption capacity (mg/g) | Reference |
|---|---|---|
| coal fly ash | 16.6 | 12 |
| alumina-pillared clays, Al-PILCs | 23.4 | 44 |
| fly ash | 72 | 2 |
| activated carbon | 2.51 | 1 |
| aminopropyl functionalized SBA-15 | 117 | 45 |
| LDHs | 225.60 | this study |
| LDHs–$Fe_3O_4$ | 353.82 | this study |