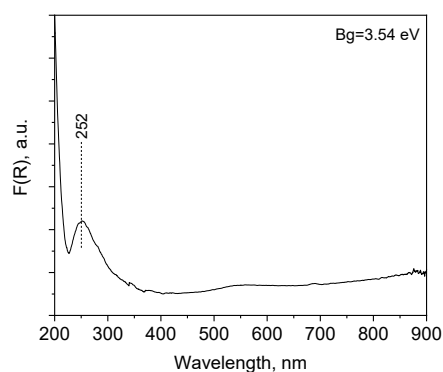


## Supplementary information

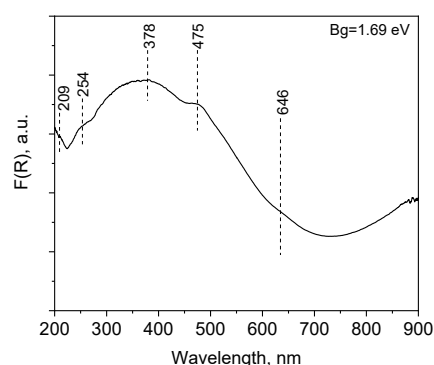
# Layered Double Hydroxide-Based Composites for Concerted Decontamination of Water

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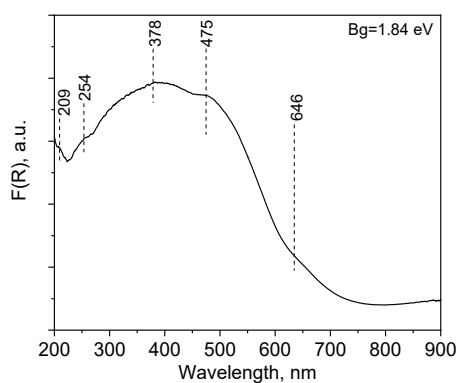
### 1. DR-UV-Vis spectra of starting LDHs



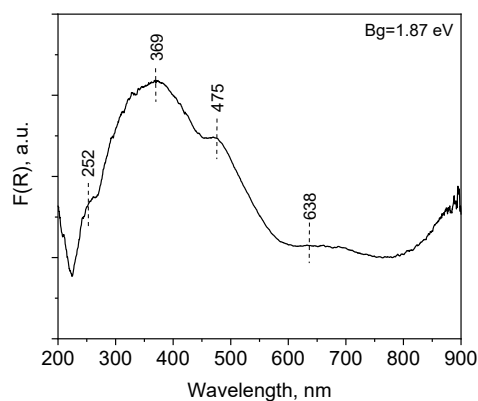
(a)



(b)



(c)



(d)

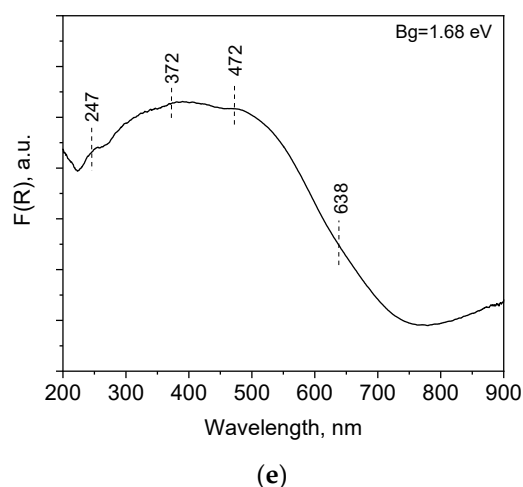


Figure S1. DR-UV-Vis spectra of as prepared (a) LDH1; (b) LDH2; (c) LDH3; (d) LDH4; (e) LDH5. Band-gap was calculated using the Tauc method.

- Raman spectra were collected in the 150 to 4000  $\text{cm}^{-1}$  spectral domain using a Horiba JobinYvon–Labram (Kyoto, Japan) HR UV–Vis–NIR Raman Microscope Spectrophotometer, and a laser with a wavelength of 488 nm as excitation source.

Characterization by Raman spectroscopy of (A)LDH4 and (B)LDH5 showed that iron oxides are present in the parent LDH samples, as confirmed by the other characterization techniques. Bands characteristic to hematite ( $\text{Fe}_2\text{O}_3$ ) can be observed ( $E_{1g}$  200–247  $\text{cm}^{-1}$ ;  $E_{1g}$  291–293  $\text{cm}^{-1}$ ;  $E_{1g}$  315–336  $\text{cm}^{-1}$ ;  $E_{1g}$  403–408  $\text{cm}^{-1}$ ;  $A_{1g}$  483–488  $\text{cm}^{-1}$ ;  $E_{1g}$  605–612  $\text{cm}^{-1}$ ) [40,41]. A weak band (shoulder) at around 656–663  $\text{cm}^{-1}$ , corresponding to FeO (Wustite), can be observed also for the calcined or rehydrated samples [42].

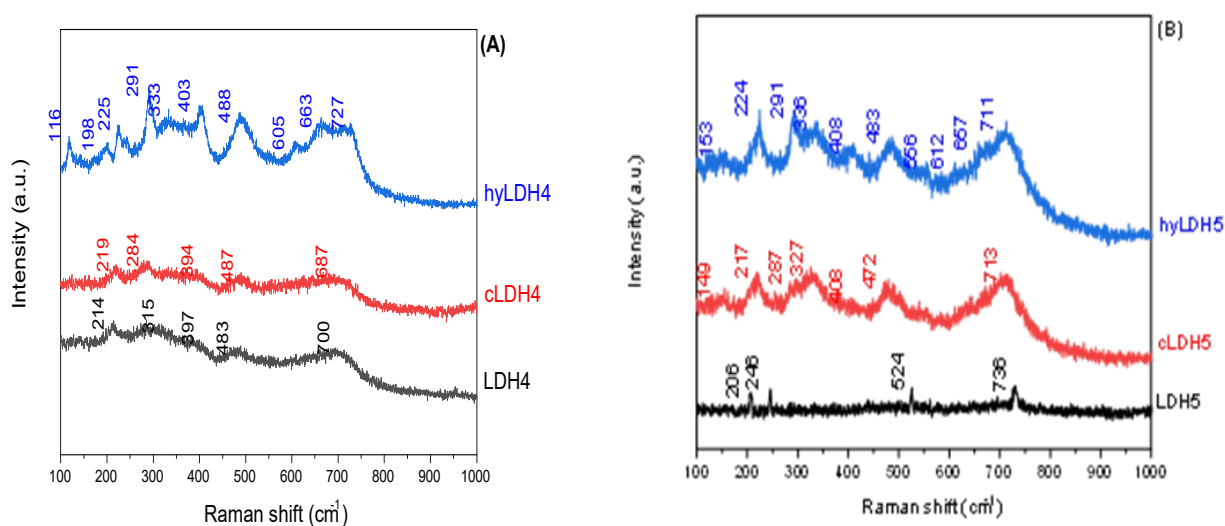
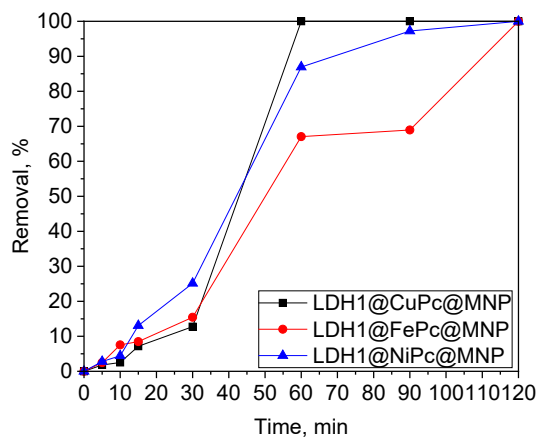
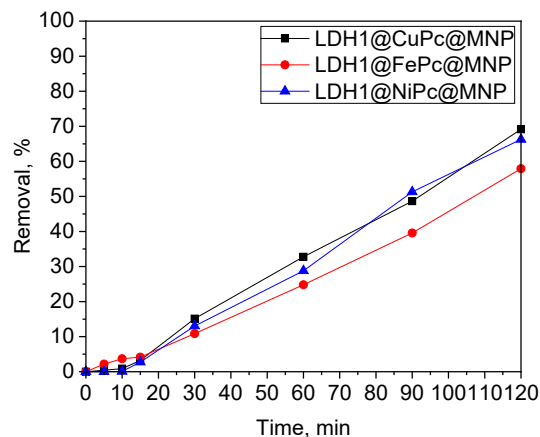


Figure S2. Raman spectroscopy of (A) LDH4 and (B) LDH5 (c-calcined/mixed oxides; h – rehydrated).

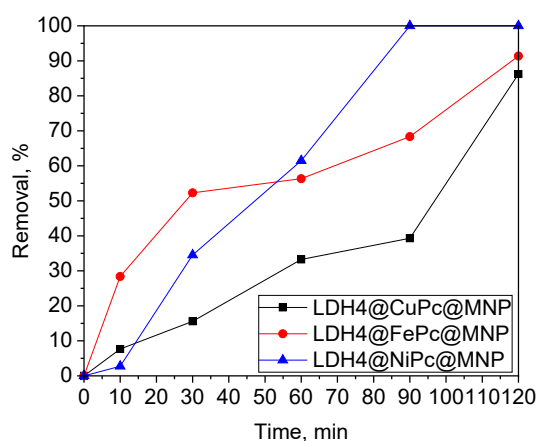
3. To evaluate the photocatalytic contribution to the removal of antibiotics, the amount of antibiotic after the adsorption step was considered as the initial concentration



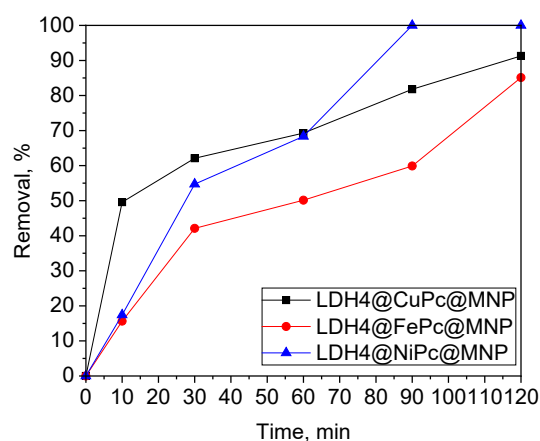
(a)



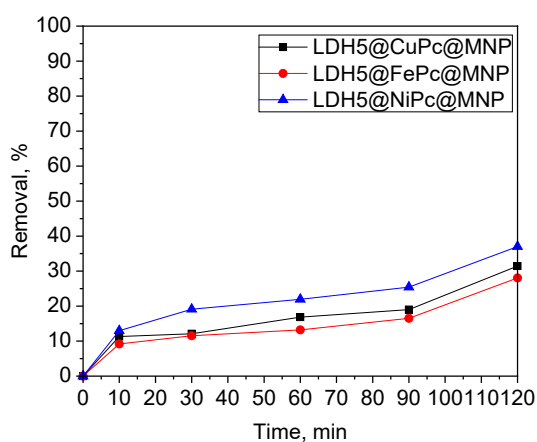
(b)



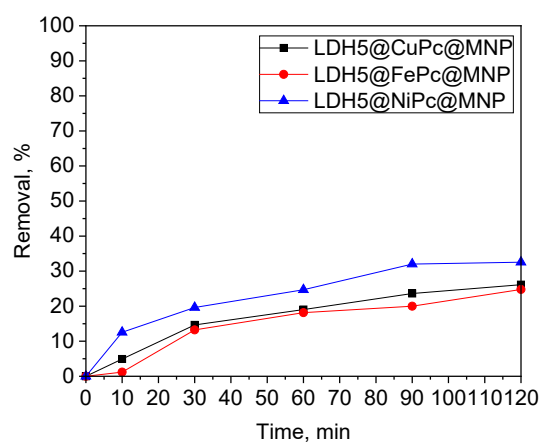
(c)



(d)



(e)



(f)

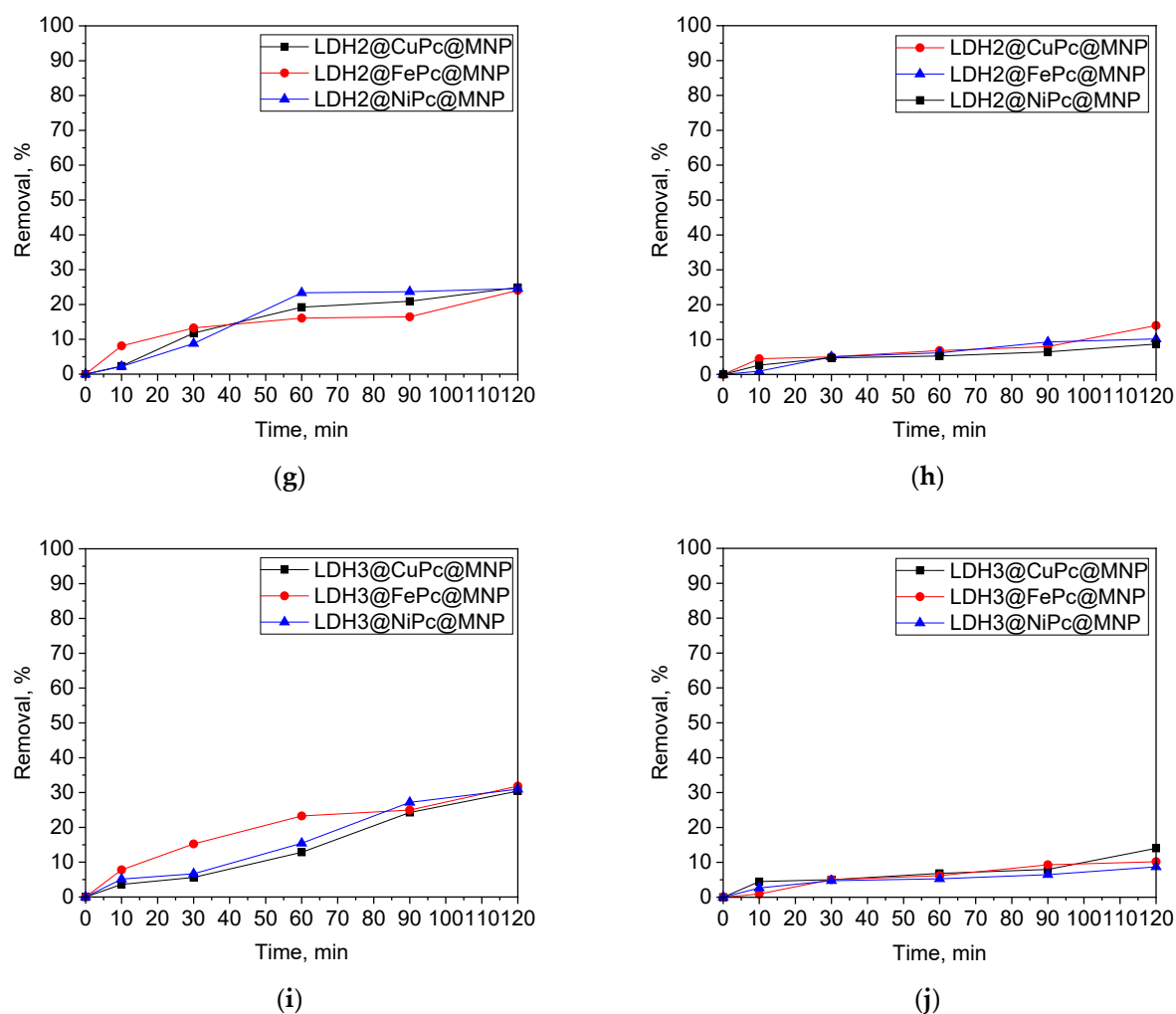


Figure S3. Photocatalytic contribution to the removal % of amoxicillin using (a) LDH1; (c) LDH4; (e) LDH5; (g) LDH2; (i) LDH3 and ampicillin using (b) LDH1; (d) LDH4; (f) LDH5; (h) LDH2; (j) LDH3– based composites .

4. Spectra were recorded with a Perkin-Elmer Spectrum Two spectrometer fitted with an Attenuated Total Reflection Fourier (ATR) cell with diamond crystal. The final spectra are an average of 20 scans with a  $4\text{ cm}^{-1}$  resolution.

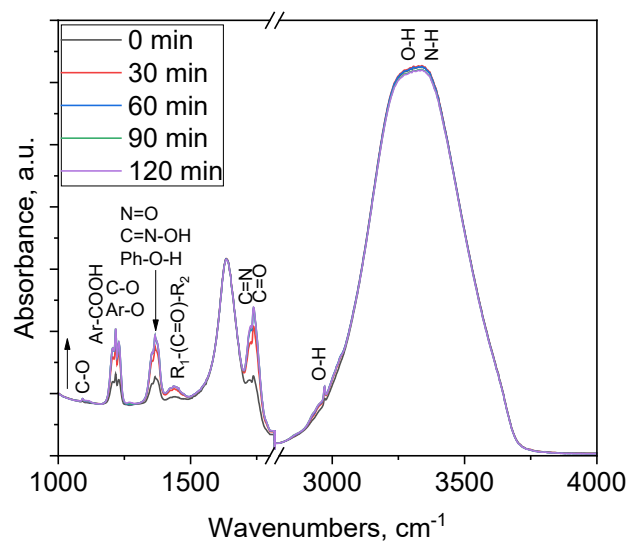


Figure S4. FTIR-ATR spectra of amoxicillin solutions at selected reaction times.