Supporting Information

Magnesium hydroxide nanoplates/graphene oxide composites as efficient adsorbents for organic dyes

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The calculation of the adsorption capacity.

20 mg of the Mg(OH)$_2$/GO composites were added on the 20 ML of MB solution (10 mg/L) and stirred. During the stirring, 1.5 mL of the resulting solution is sampled and measured its Uv-vis spectrum. After finishing the uv-vis measurement, the sampled solution is re-added in the mixture solution. The sampling-measurement is repeated at regular intervals until the uv-vis spectrum doesn't show any MB absorbance.

The adsorption capacity of the Mg(OH)$_2$/GO composites were calculated on the basis of the absorbance ratio of the MB at 664 nm and the molar absorption coefficient of MB by using Beer-Lambert's law.
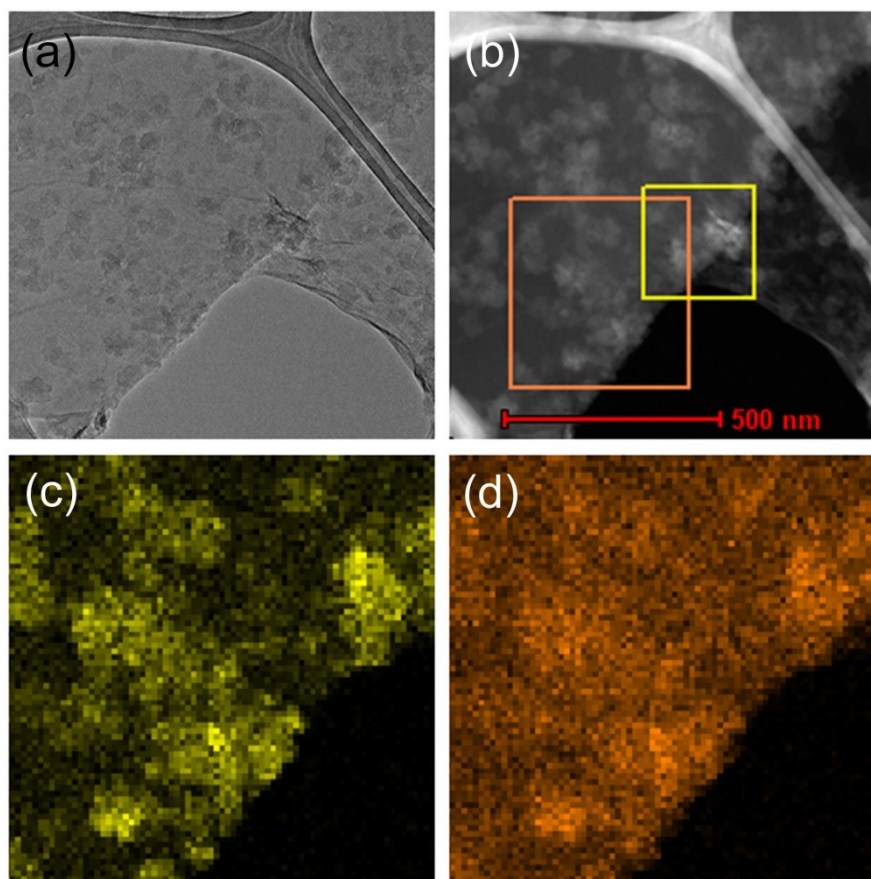
Fig.S1. Elemental mapping image of the Mg(OH)$_2$/GO; (a) bright field mode TEM, (b) dark field mode STEM, (c) the elemental distribution of Mg from the selected area of (b), (d) the elemental distribution of O from the selected area of (b).
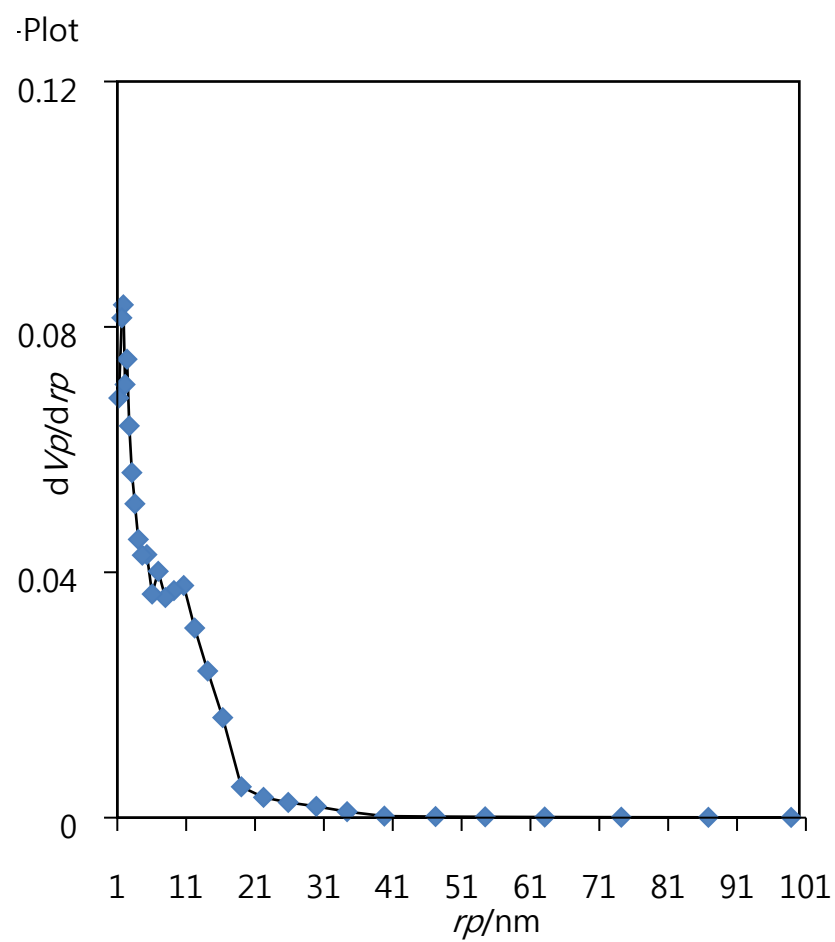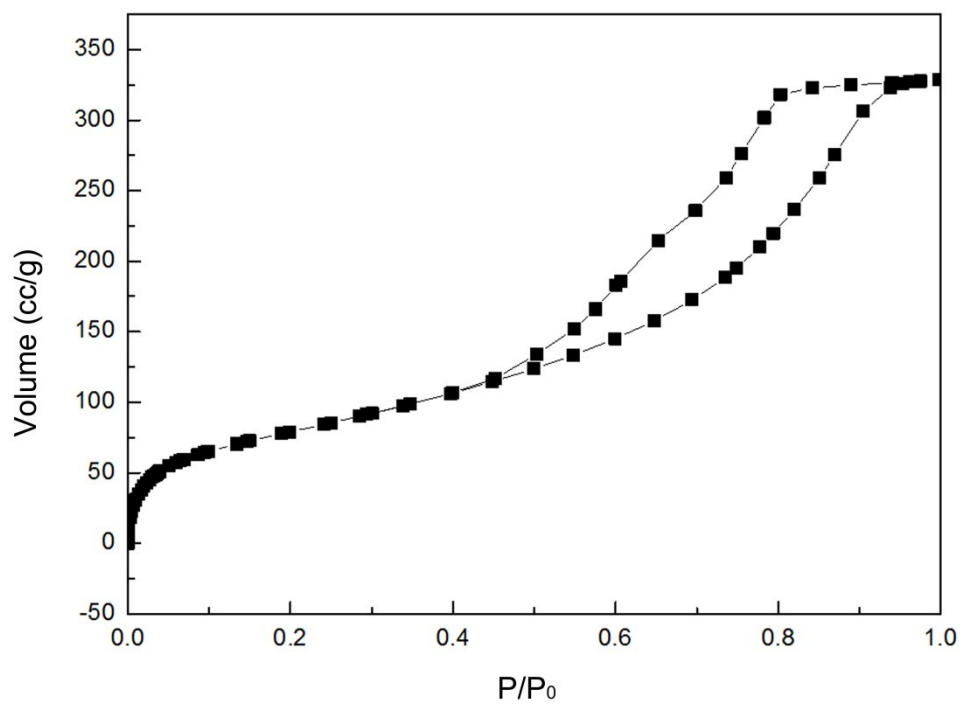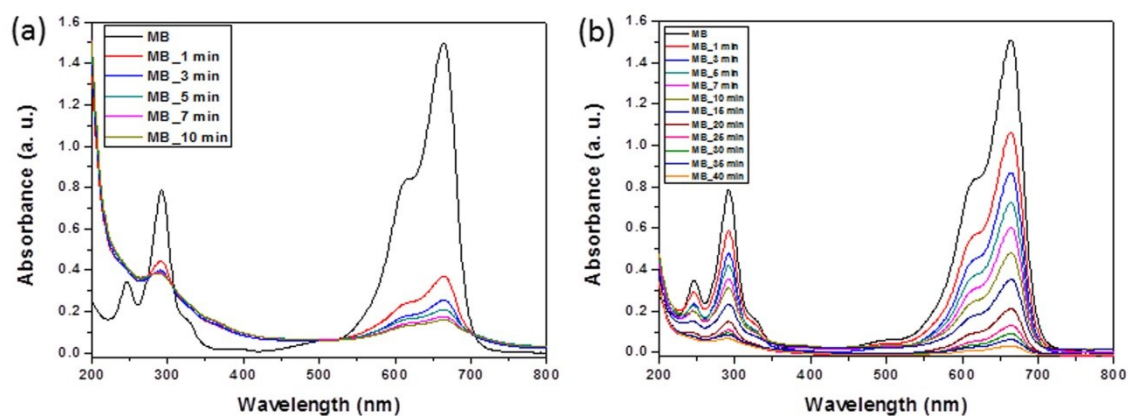
Fig.S2. Pore size distribution curve for Fig.4(a), showing average pore diameter of 9.9 nm.

BET plot			
Vm			66.764 $[\text{cm}^3(\text{STP})\ \text{g}^{-1}]$
$a_{s,BET}$			290.59 $[\text{m}^2\ \text{g}^{-1}]$
C			68.243
Total pore volume(p/p$_0$=0.990)			0.5078 $[\text{cm}^3\ \text{g}^{-1}]$
Average pore diameter			6.99 [nm]

Fig.S3. N$_2$ adsorption-desorption curve for Mg(OH)$_2$ and the BET surface area of the Mg(OH)$_2$.

Amount of magnesium nitrate precursor (mL)	$\Sigma (A_0-A_e)$	C_{total} (mol/L)	V_{MB} (mL)	adsorption capacity (mg/g)
5 mL	1.333565	1.4×10^{-5}	0.02 mL	5.25
20 mL	11.55074	1.21×10^{-4}	0.16 mL	363.69
100 mL	16.50113	1.74×10^{-4}	0.24 mL	779.34

Fig.S4. Uv-vis absorption spectra for MB solution before and after treatment with Mg(OH)$_2$/GO composites prepared by using magnesium nitrate precursor of (a) 5 mL, (b) 20 mL. The following table shows difference in the adsorption capacity of the Mg(OH)$_2$/GO composites showing tunability according to the amount of precursor.

MB adsorption	A_0	A_e	A_0-A_e
1cycle	1.496741	0.431044	1.065697

- $C_{total} = 1.12 \times 10^{-5}$ mol/L
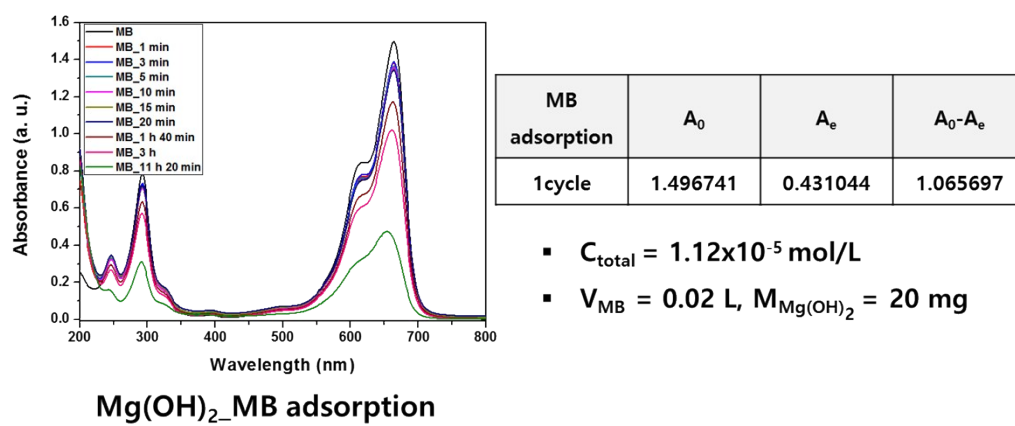- $V_{MB} = 0.02$ L, $M_{Mg(OH)_2} = 20$ mg

Fig.S5. Uv-vis absorption spectra for MB solution upon treatment with pristine $Mg(OH)_2$. The adsorption capacity is calculated as 4.19 mg/g.

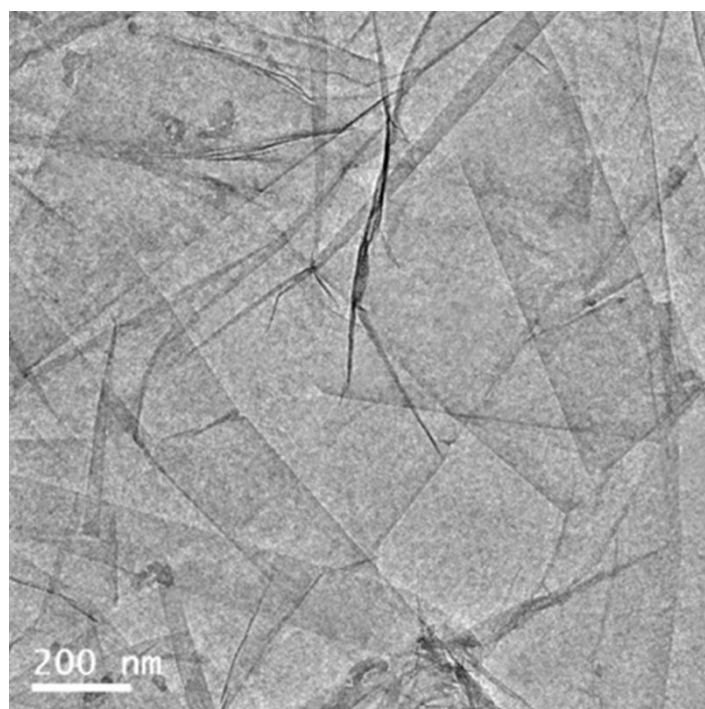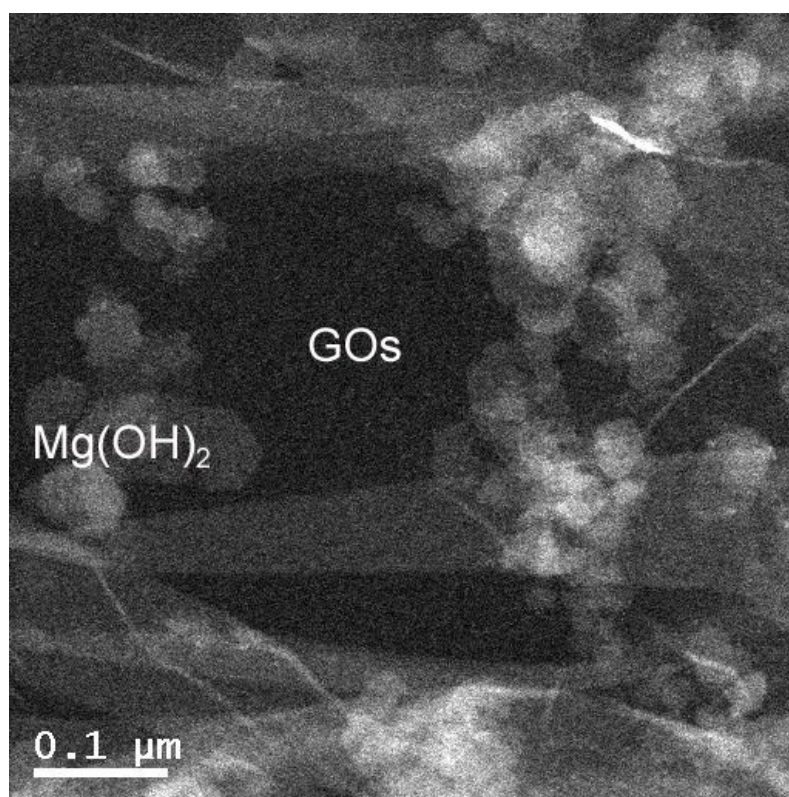**Fig.S6**. TEM image of the GOs used in this work.

Fig.S7. Dark-field STEM image of the $Mg(OH)_2$/GO composite showing $Mg(OH)_2$

nanoplates distributed in the GO microsheets.