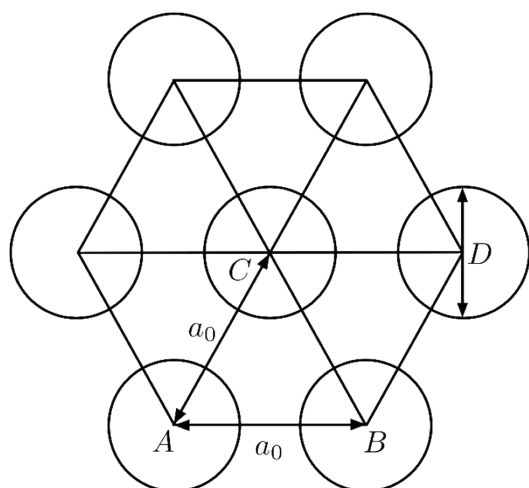


Supporting Information

Grafting and stabilization of ordered mesoporous silica COK-12 with graphene oxide for enhanced removal of methylene blue

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$$\text{Area of ABC equilateral triangle} = \frac{a_0^2 \sqrt{3}}{4}$$

$$\text{Wall area in ABC triangle} = \frac{a_0^2 \sqrt{3}}{4} - \frac{\pi D^2}{8}$$

Figure S1. Schematic drawing of the hexagonal pore structure of COK-12 and the corresponding calculation for the wall area.

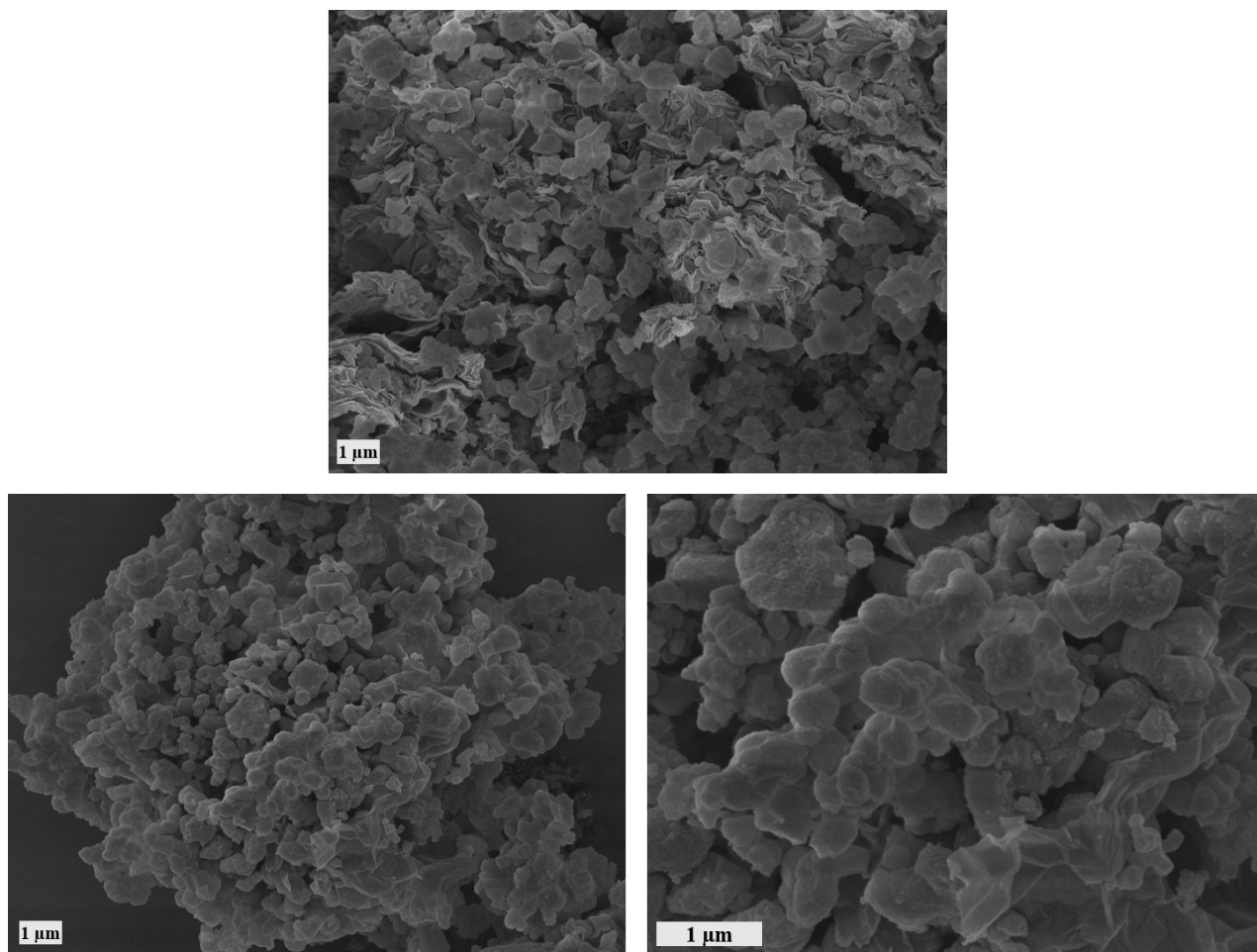


Figure S2. SEM images of GO-grafted COK-12-GO-2*.

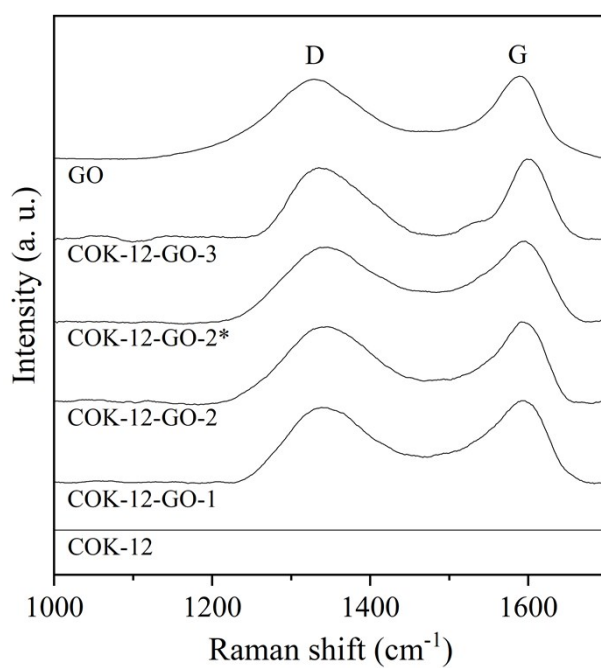


Figure S3. Raman spectra of GO, pure COK-12, and GO grafted COK-12-GO with low (-1), medium (-2) and high (-3) GO concentration. The asterisk (*) represents the upscaling.

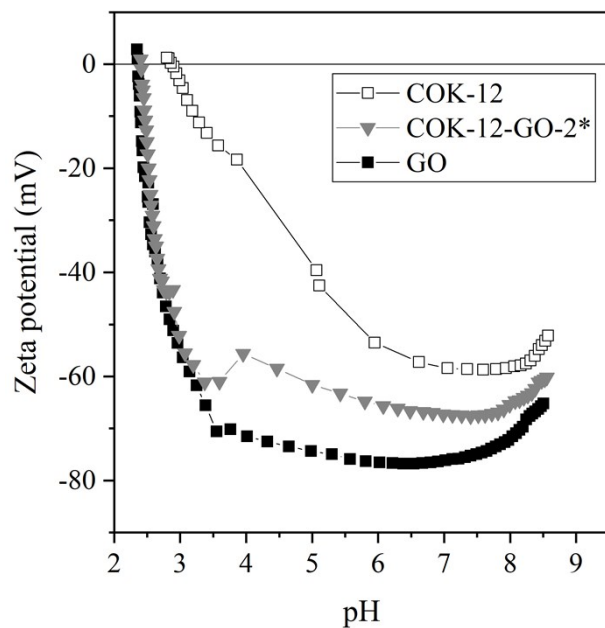


Figure S4. Zeta potentials of GO, pure COK-12, and GO grafted COK-12-GO-2*.

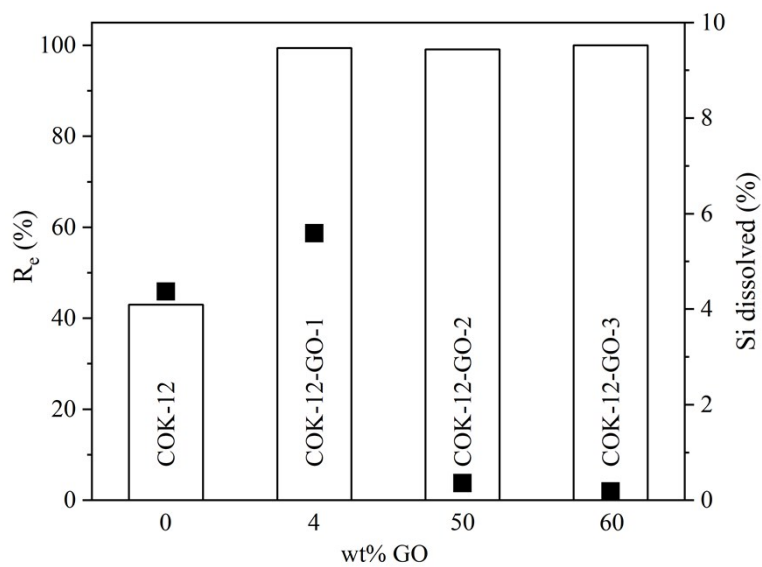


Figure S5. Removal efficiency (bar) and Si content (black square) of the supernatant after adsorption of MB on pure COK-12 and grafted COK-12-GO samples with 4 wt% (-1), 50 wt% (-2), and 60 wt% (-3) GO. Adsorption conditions were 2 g l⁻¹, 100 mg l⁻¹ MB, pH 5.65, 180 min.

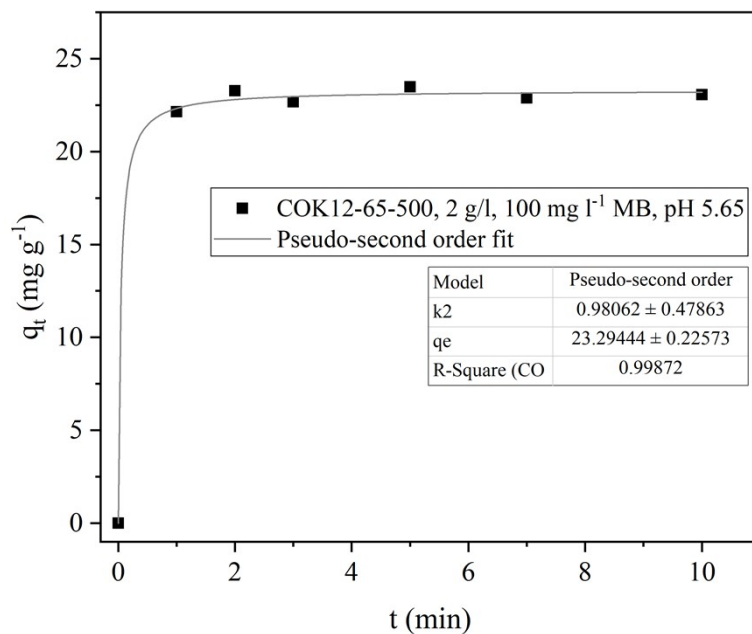


Figure S6. Nonlinear pseudo-second order kinetics fitting for the adsorption of MB on COK12-65-500, which is COK-12 but aged at 65 °C. Adsorption conditions were pH = 5.65, dosage = 2 g l⁻¹, and C_i MB = 100 mg l⁻¹.

Table S1. Parameters of the isotherm studies according to the Langmuir and Freundlich models depicted in Figure 10 for pure COK-12 and the GO grafted COK-12-GO-2*.

Model	Parameter	COK-12	COK-12-GO-2*
Langmuir	q _m (mg g ⁻¹)	20.2	197.5
	K _L (l mg ⁻¹)	2.97	2.09
	R ²	0.988	0.990
Freundlich	n (mg g ⁻¹)	9.30	8.35
	K _F (mg g ⁻¹ (l mg ⁻¹) ^{1/n})	11.30	102.52
	R ²	0.961	0.970

Table S2. Parameters of the kinetic studies according to the pseudo-first order, pseudo-second order, and Elovich model depicted in Figure 11 for pure COK-12 and GO grafted COK-12-GO-2*.

Model	Parameter	COK-12	COK-12-GO-2*
Pseudo-first order	q_e (mg g ⁻¹)	15.4	158.6
	K_1 (min ⁻¹)	6.35	0.16
	R ²	0.9976	0.9510
Pseudo-second order	q_e (mg g ⁻¹)	15.4	168.2
	K_2 (g mg ⁻¹ min ⁻¹)	1.22	1.54×10^{-3}
	R ²	0.9981	0.9889
Elovich	α	1.25×10^{17}	2449
	β	2.93	0.06
	R ²	0.9960	0.9855