Supporting Information

Liquid-Phase Exfoliation of Kaolinite by High-Shear Mixer with Graphite Oxide as an Amphiphilic Dispersant

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Preparation of Graphite oxide

Graphite oxide was prepared according to the modified Hummers method. Graphite powder (5.0 g) and NaNO$_3$ (2.5 g) were mixed with 120 mL cold 98% H$_2$SO$_4$ into a 1000 mL beaker and stirred for a while in an ice bath. KMnO$_4$ (15 g) was slowly added into the beaker (within 10 min) and stirred for 2 h in an ice bath. Subsequently, the reaction system was transferred into a ~35℃ water bath for 2 h, followed by the slow addition of 200 mL deionized water in an ice water bath. Afterward, the reaction continued for 1.5 h at 98℃. After the reaction was completed, add deionized water to 1000 mL and removal of residual MnO$_4^-$ by adding 30 mL H$_2$O$_2$. Then, the fresh-keeping film was sealed and kept for one night. The resultant brilliant yellow mixture was filtered and rinsed with 1 mol/L HCl to remove residual metal ions. The solid phase was washed repeatedly with deionized water until a neutral pH was observed. Finally, the solid was freeze dried to obtain Graphite oxide.

The linear standard curve was A=0.07173C (R^2 = 0.99935), where A is the absorbance of MB, C (mg/L) is the concentration of MB solution.
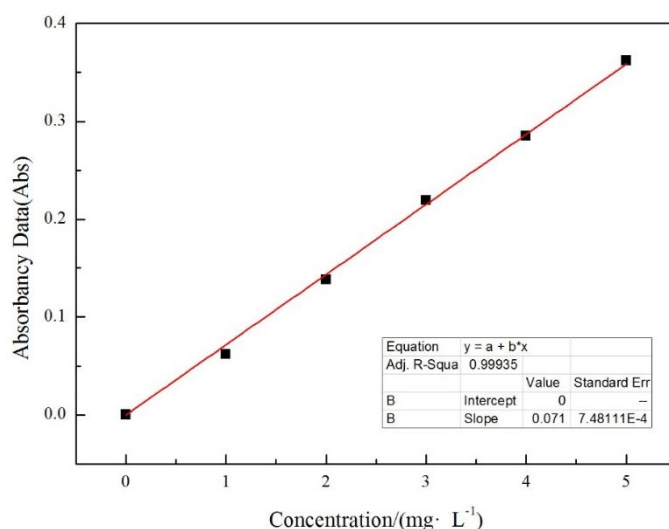

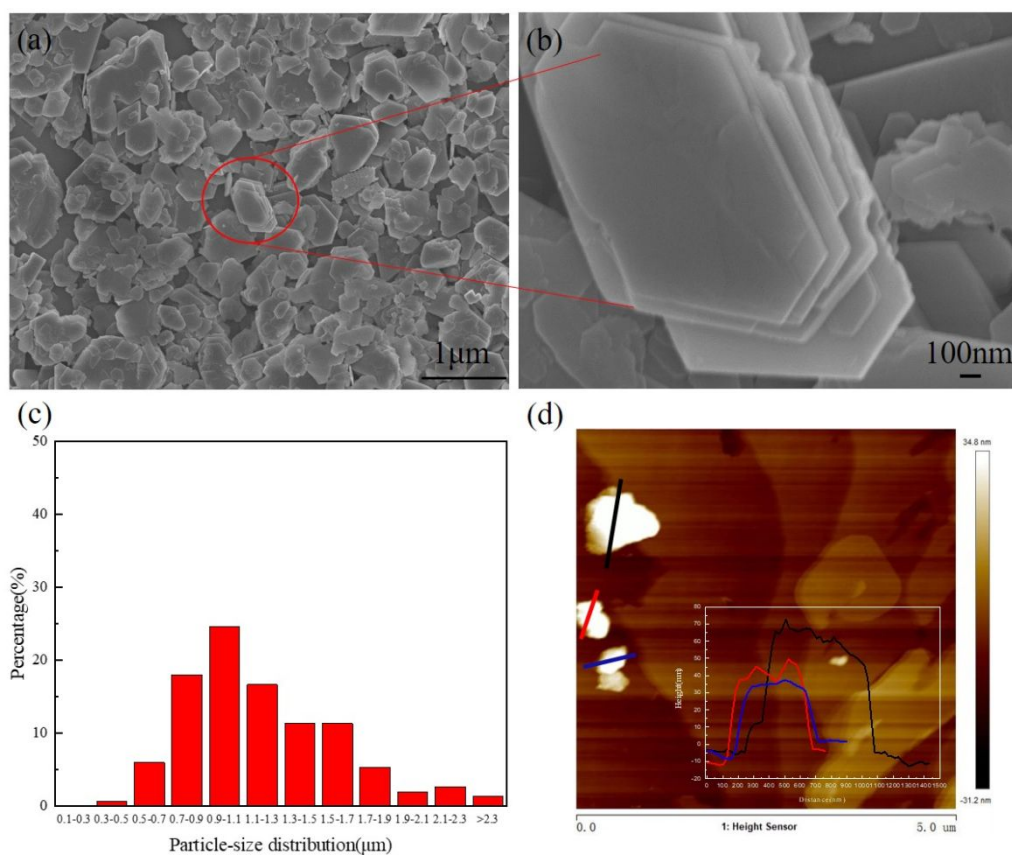**Figure S1.** The standard curve of the methylene blue solution.

Figure S2. SEM images: (a) raw kaolinite with low magnification, (b) raw kaolinite with high magnification, (c) the histogram of statistical size; (d) AFM images of raw kaolinite.
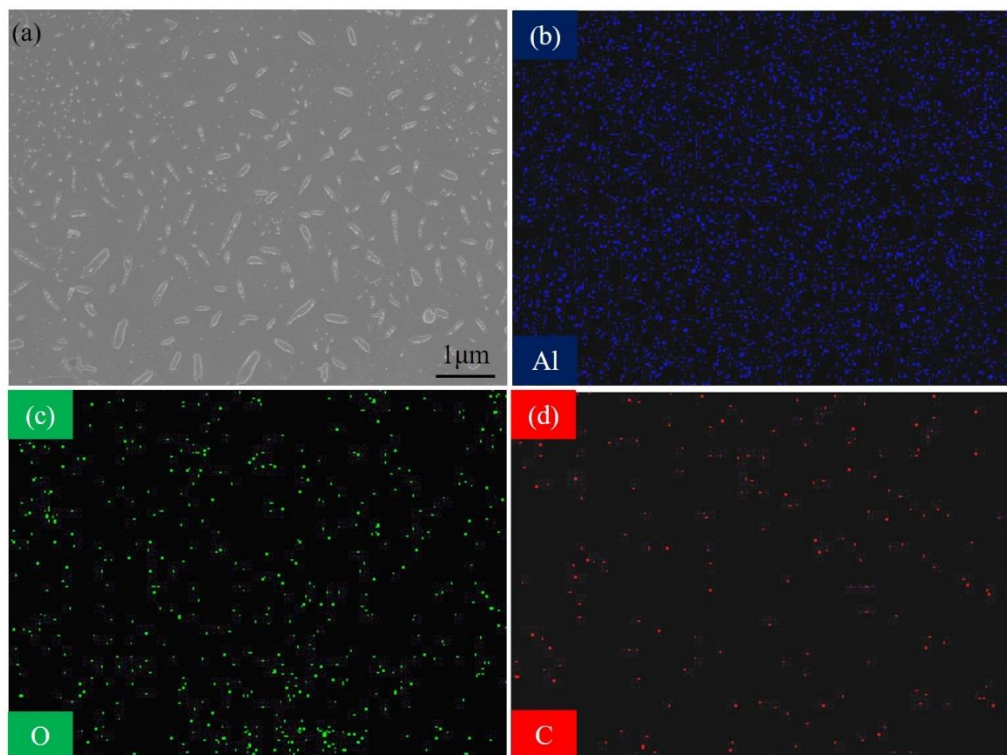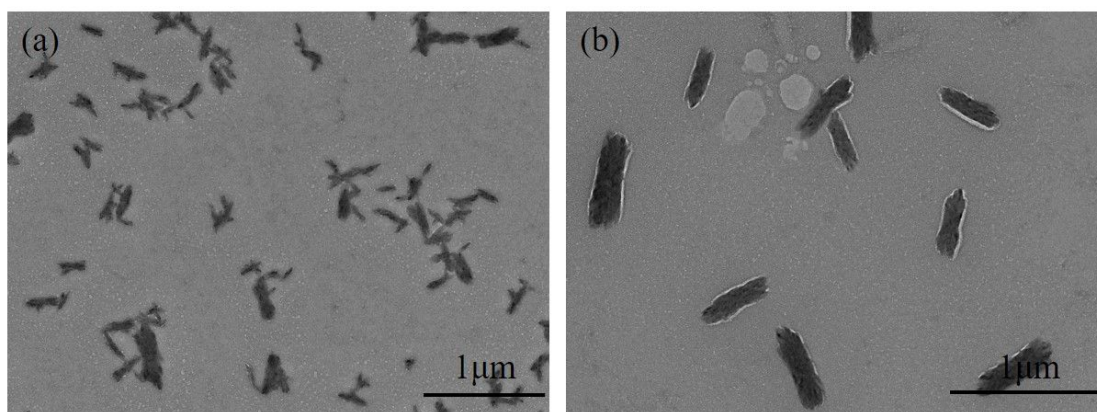

Figure S3. EDS elemental mapping of 5-G/K/S.

Figure S4. The TEM of 5-G/K/S.

The absorption peak of GO located at 232 nm is assigned to the π−π* transition of C=C bond. It has proved that the successful exfoliation of graphite oxide of 5-G/K.
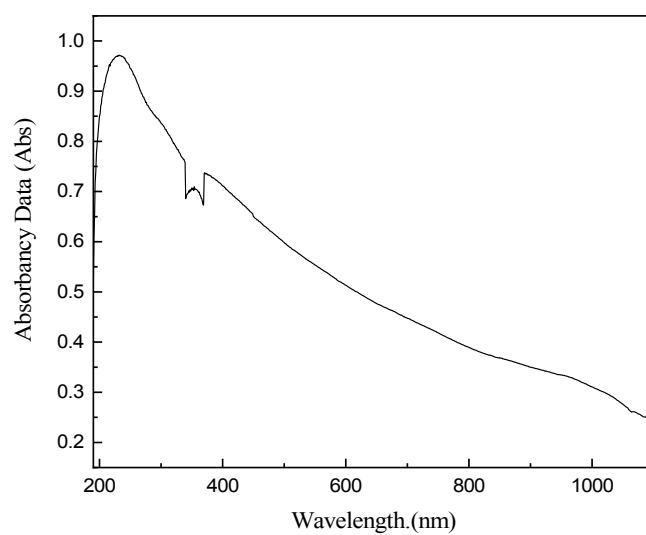

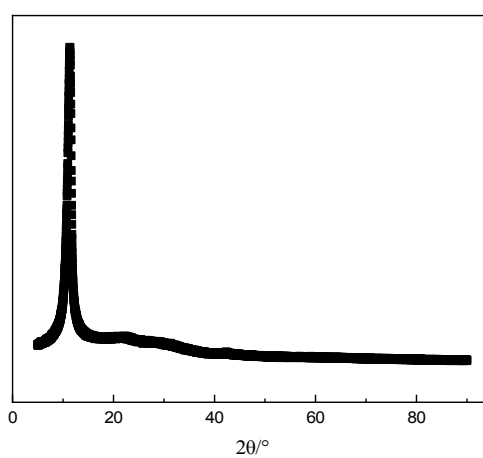**Figure S5.** UV−vis spectra of 5-G/K.
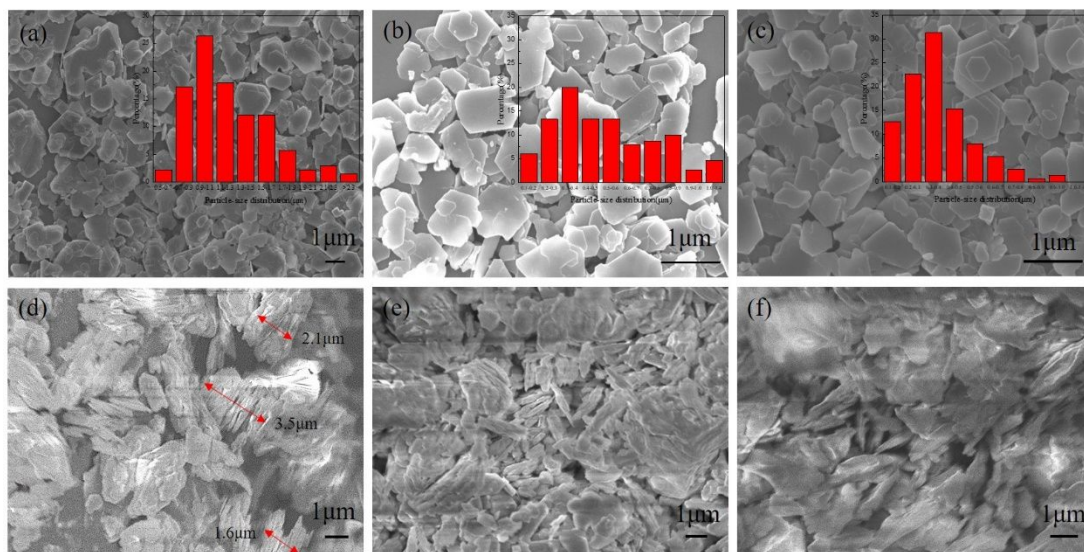

Figure S6. The XRD of GO.

Figure S7. SEM images：Kaol (a, basal surface; d, lateral surface); 0-G/K/P (b, basal surface; e, lateral surface); 5-G/K/P (c, basal surface; f, lateral surface).
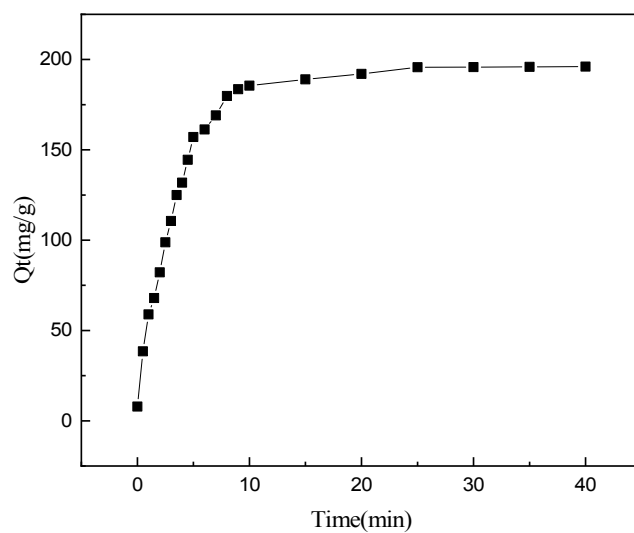

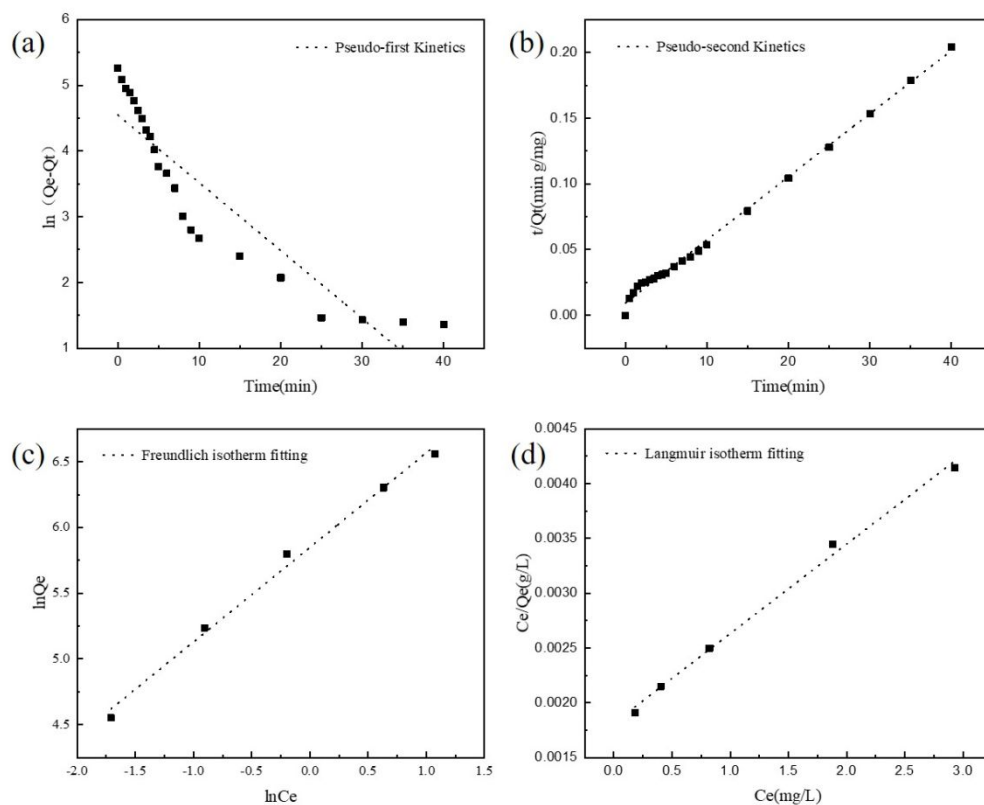**Figure S8.** MB adsorption of GO at different times.

Figure S9. Adsorption kinetic of GO: (a) Pseudo-first-order kinetics model, (b) Pseudo-second kinetics model; Adsorption isotherms of GO: (c) Freundlich isotherm model, (d) Langmuir isotherm model.

Table S1. Adsorption kinetic parameters of MB onto 0-G/K/P, 5-G/K/P and GO.

Models	Pseudo-first-order			Pseudo-second-order		
Parameters	Q_e (cal) (mg/g)	k_1 (min^{-1})	R^2	Q_e (cal) (mg/g)	$k_2 \times 10^{-3}$ (g/mg min)	R^2
0-G/K	9.85	0.028	0.9361	62.5	6.50	0.9999
5-G/K	58.73	0.020	0.8469	90.91	0.83	0.9978
GO	94.25	0.103	0.8355	208.77	2.41	0.9962

Table S2. Isotherm parameters for the adsorption of MB by 0-G/K/P, 5-G/K/P and GO.

Isotherms	Freundlich			Langmuir		
Parameters	$K_F [(mg/g)(L/mg)^{1/n}]$	1/n	R^2	Q_m (mg/g)	K_L (L/mg)	R^2
0-G/K	15.92	0.423	0.960	111	0.066	0.998
5-G/K	26.31	0.268	0.980	250	0.078	0.995
GO	346.54	0.719	0.993	1224	0.451	0.995