

## Supplementary Information

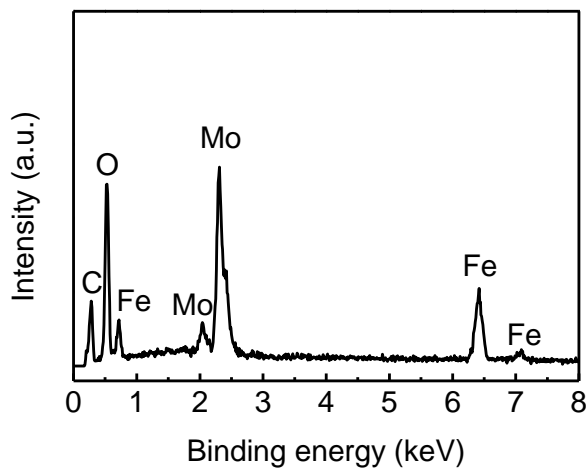
### Self-assembly of hybrid Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>/reduced graphene oxide nanosheets with enhanced lithium storage properties

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**Fig. S1** A typical EDX spectrum for the Fe-Mo-precursor/RGO hybrid.

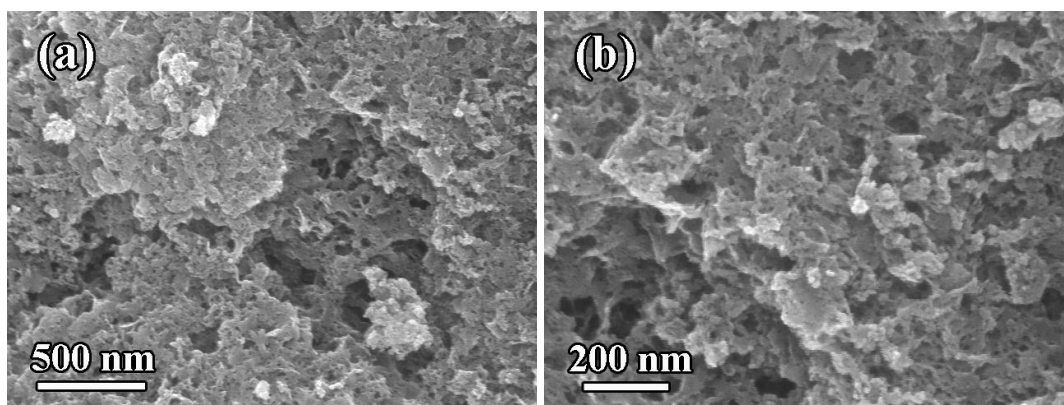


Fig. S2 SEM images for the free Fe-Mo-precursor.

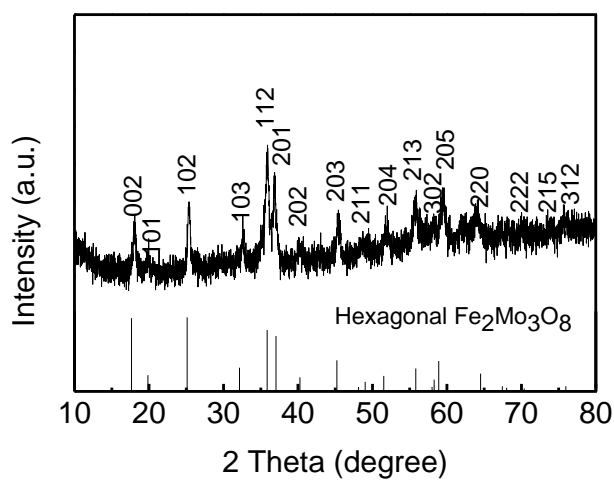


Fig. S3 Representative XRD pattern of the free  $\text{Fe}_2\text{Mo}_3\text{O}_8$ .

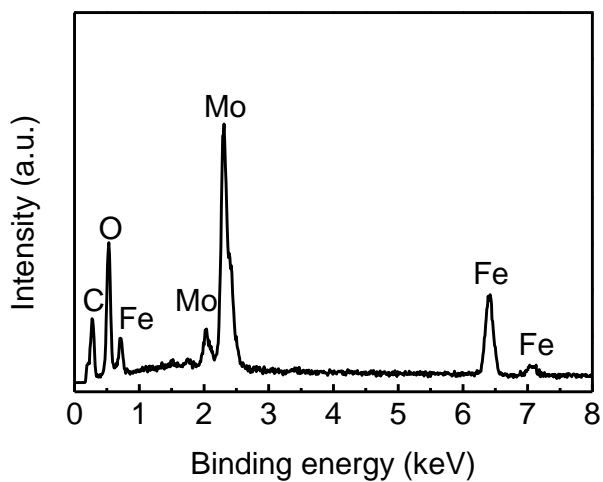


Fig. S4 A typical EDX spectrum for the  $\text{Fe}_2\text{Mo}_3\text{O}_8/\text{RGO}$  hybrid.

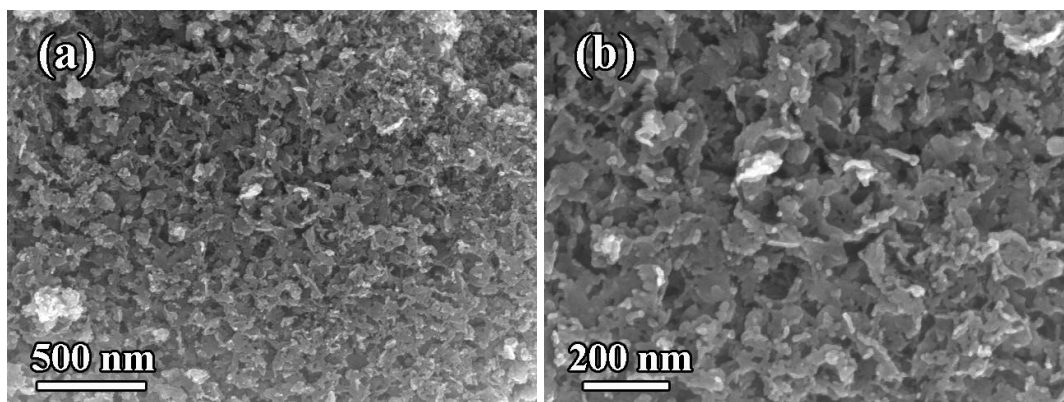


Fig. S5 SEM images for the free Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>.

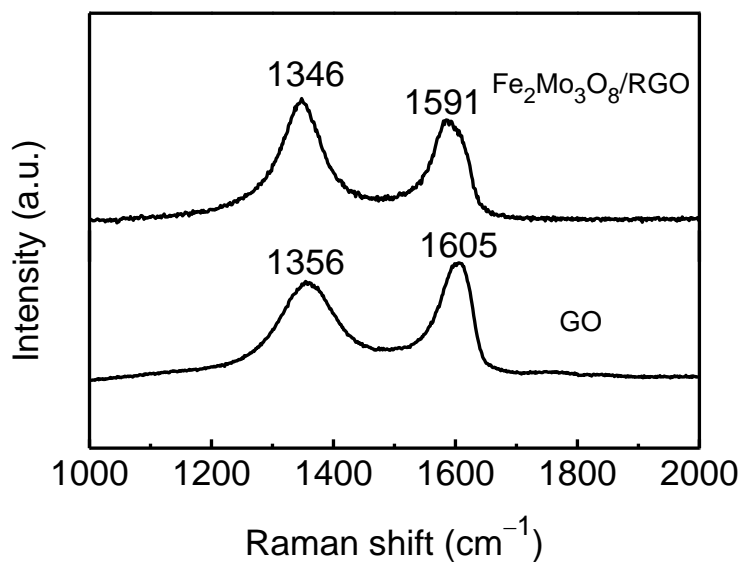
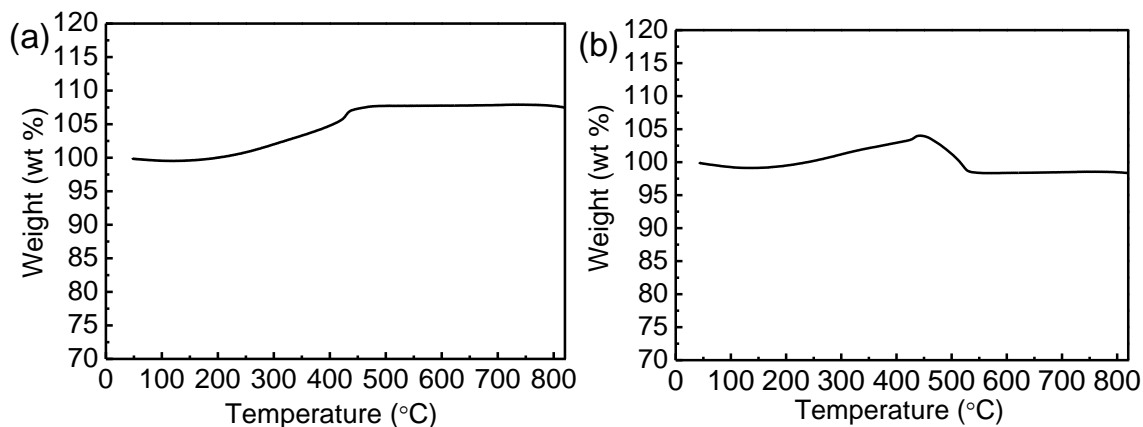
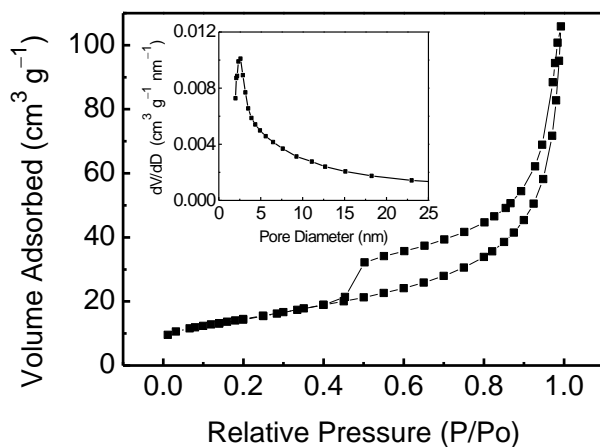


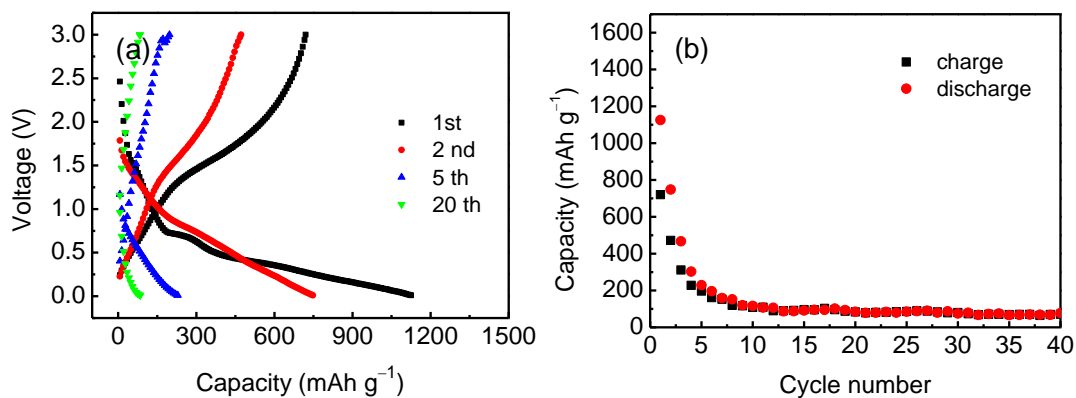
Fig. S6 (a) Raman spectrum of the Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>/RGO product. The peaks around 1346 and 1591 cm<sup>-1</sup> are attributed to the characteristic D-band and G-band vibration modes of carbon, respectively. (b) Raman spectrum of the GO. The peaks around 1356 and 1605 cm<sup>-1</sup> are attributed to the characteristic D-band and G-band vibration modes of carbon, respectively.



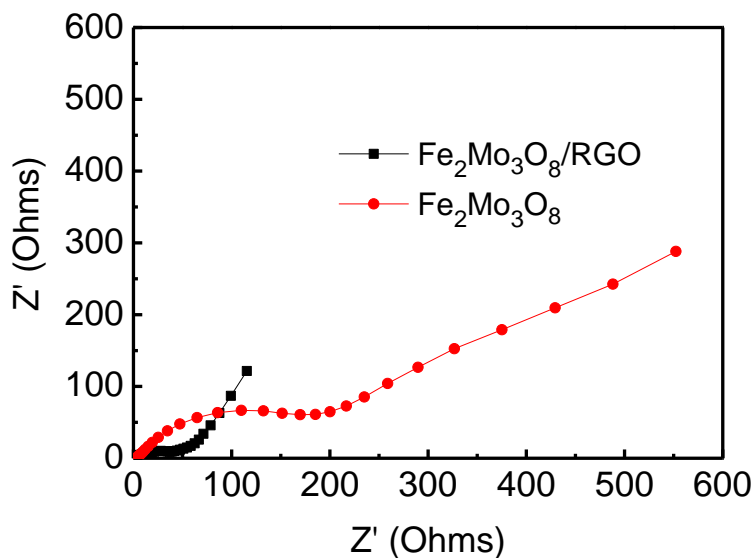
**Fig. S7** (a) TG result for the free Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>. The TG curve of the free Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub> exhibits a 7.8 wt % weight increase from 200 to 600 °C due to the oxidation of Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>. (b) TG result for the Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>/RGO hybrid. The weight change between 200 and 600 °C can be assigned to both the oxidation of the Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub> and the combustion of RGO. The total weight loss of the as-prepared Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>/RGO composite between 200 and 600 °C is 1.1 wt %. Therefore, the RGO content in the Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>/RGO hybrid is evaluated to be about 8.3 wt %.



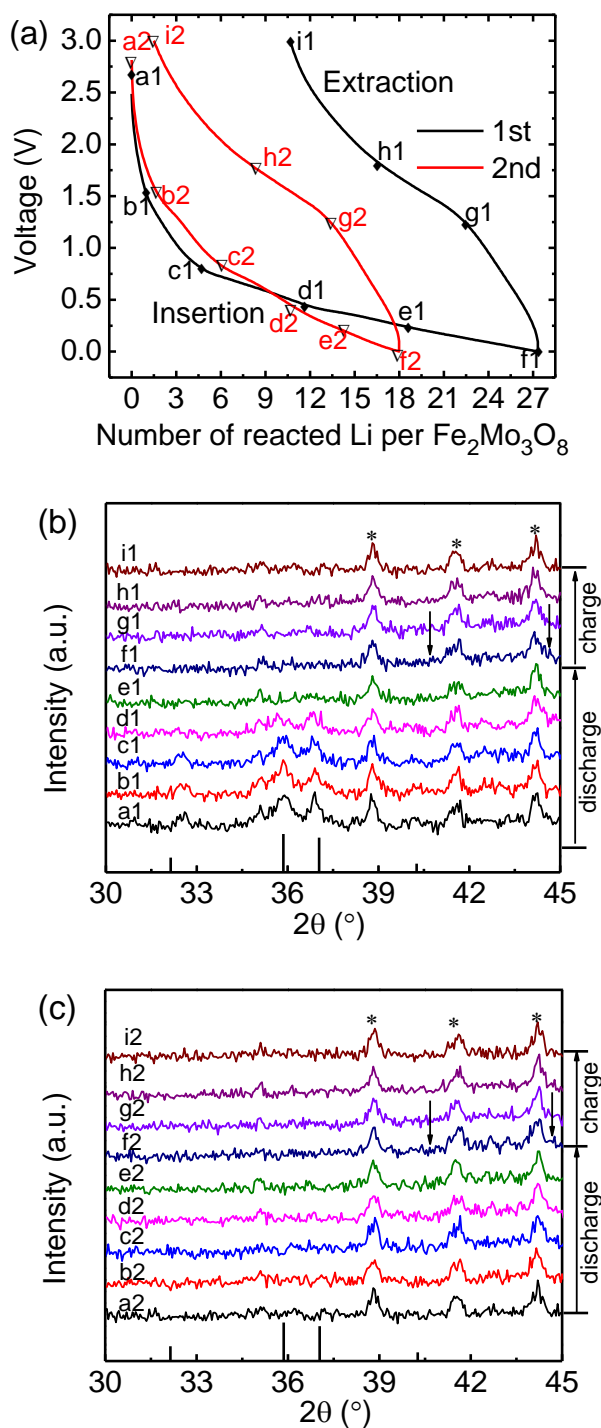
**Fig. S8** Nitrogen isotherm adsorption-desorption curves and the corresponding pore size distribution curves of the as-prepared Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>/RGO hybrid.



**Fig. S9** (a) Discharge and charge curves at a current density of 200 mA g<sup>-1</sup> cycled in the voltage range of 3–0.01 V vs. Li<sup>+</sup>/Li. (b) Cycling performance of the as-prepared Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub> electrode at 200 mA g<sup>-1</sup>.



**Fig. S10** Electrochemical impedance spectra of the electrodes of the Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>/RGO hybrid and pristine Fe<sub>2</sub>Mo<sub>3</sub>O<sub>8</sub>.



**Fig. S11** *In situ* XRD patterns collected at various states of discharge and charge of  $\text{Fe}_2\text{Mo}_3\text{O}_8/\text{RGO}$  hybrid/Li electrochemical cell: (a) the voltage composition trace for initial two charge/discharge cycles for the  $\text{Fe}_2\text{Mo}_3\text{O}_8/\text{RGO}$  hybrid electrode at  $120 \text{ mA g}^{-1}$  cycled in the voltage range of 3–0.01 V vs.  $\text{Li}^+/\text{Li}$ , where the letters a1 to i1 and a2 to i2 denote the  $x$  values (number of reacted Li per  $\text{Fe}_2\text{Mo}_3\text{O}_8$ ) at which the corresponding XRD patterns were taken. It is to be noted that the capacity contribution of RGO is ignored here due to the low content of RGO and its low specific capacity. (b) and (c) the XRD patterns of the  $\text{Fe}_2\text{Mo}_3\text{O}_8/\text{RGO}$  hybrid electrode corresponding to the denoted letters in the voltage-composition profile for the first and second cycle, respectively. The XRD peaks marked with an asterisk are assigned to BeO, and the arrow indicates where a XRD peak corresponding to metallic Mo and Fe should appear.