Supporting Information

Reduced-Graphene Oxide/Molybdenum Oxide/Polyaniline Ternary Composite for High Energy Density Supercapacitors: Synthesis and Properties

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Experimental section for precursors

Synthesis of graphene oxide (GO)[1]

GO was prepared with the size 12500 mesh, respectively. 20 g graphite powder was added to an 80°C solution of 30 mL concentrated H_2SO_4, 10 g $K_2S_2O_8$, and 10 g P_2O_5, the mixture was allowed to react for 6h. The result mixture was then slowly diluted with distilled water, filtered until the filtrate became neutral. The product was dried in air at ambient temperature until constant weight. The pre-oxidized graphite was then put into 0°C 460 mL concentrated H_2SO_4, then 60 g $KMnO_4$ was added gradually with stirring in ice bath while the temperature was controlled not to exceed 20 °C. The solution was then stirred at 35 °C for 2h. 920 mL of distilled water was slowly added to cause an increase in temperature to 95-100 °C; the solution was kept at that temperature for 30 min. The reaction was terminated by the addition of 2.8 L distilled water and 50 mL 30% H_2O_2 solution. The product was filtered and washed with 1:10 HCl solution (5 L). The GO product was then subjected to dialysis for a week to completely remove metal ions and acids. The GO dispersion was centrifuged and the precipitate was directly added to the solvent that needed in the next experimental step.

Synthesis of $Mo_3O_{10}(C_6H_8N)_2 \cdot 2H_2O$ (pre-Mo) [2]

0.002 mol of ammonium heptamolybdate ($(NH_4)_6Mo_7O_{24} \cdot 4H_2O$) was dissolved in 40 mL distilled water, and 0.036 mol aniline (ani) was added into the above solution. Afterwards, 1 M HCl aqueous solution was added dropwise with magnetic stirring at room temperature until white precipitate appeared (pH around 5). After a reaction with stirring at 50 °C for 8 hours, the product was filtrated and washed with ethanol, water and dried at 60 °C for one day under a vacuum.

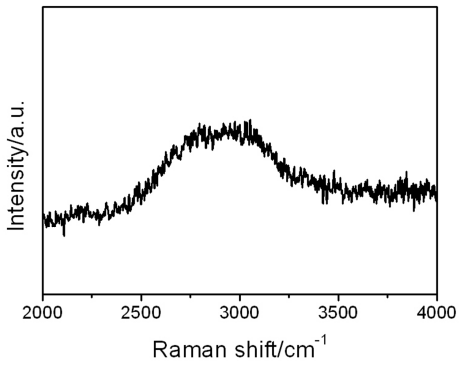


Fig. S1 Raman spectra of MoO_3/PANI in the range of 2000 ~4000 cm^{-1}

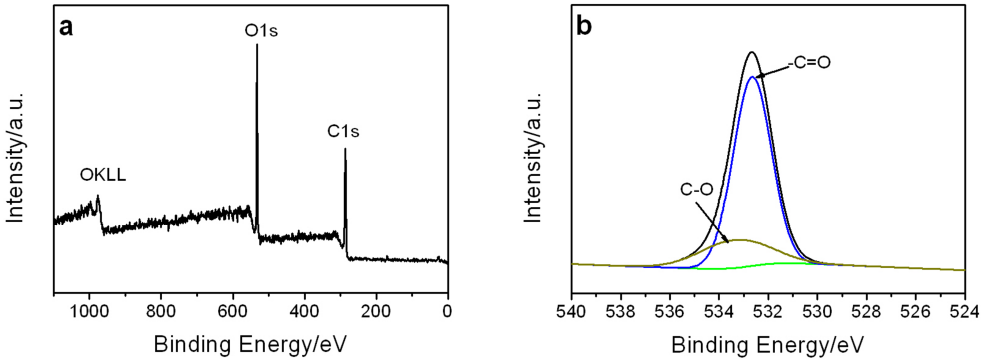


Fig. S2 The typical survey (a) and O 1s core-level (b) spectra of GO

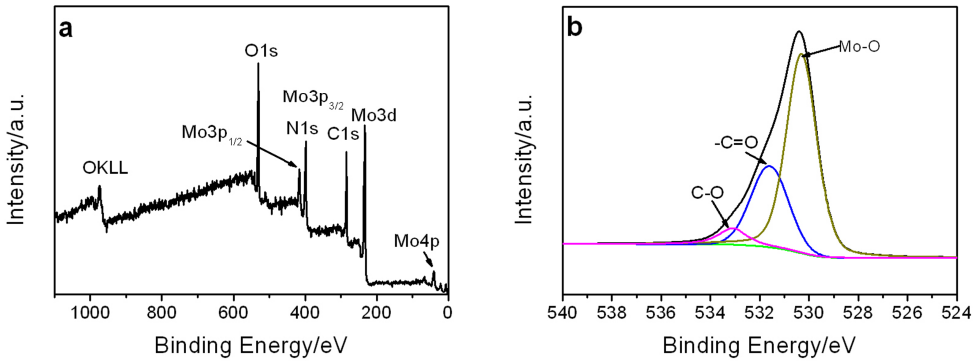


Fig. S3 The typical survey (a) and O 1s core-level (b) spectra of $RGO(MP)_8$

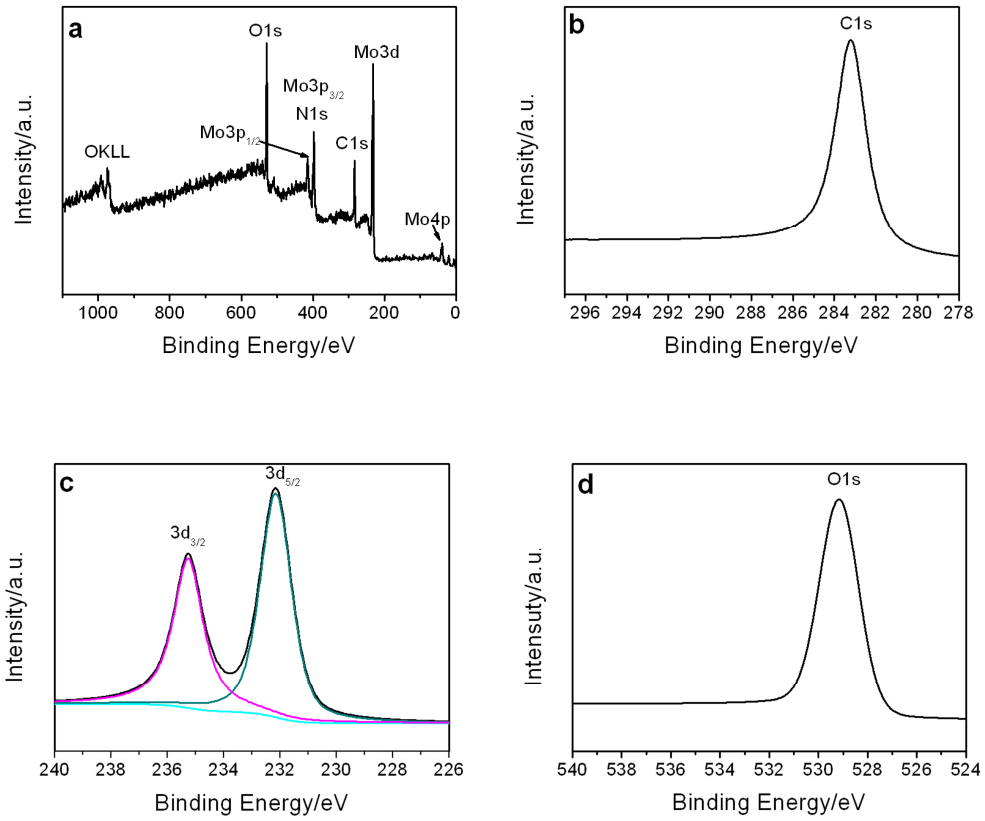
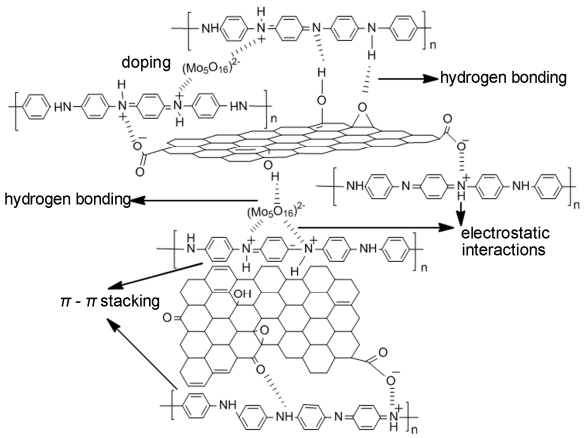


Fig. S4 The typical survey (a) and C 1s (b), Mo 3d (c), O 1s core-level (d) spectra of pre-Mo

Scheme S1 Proposed possible combining mode of RGO(MP)



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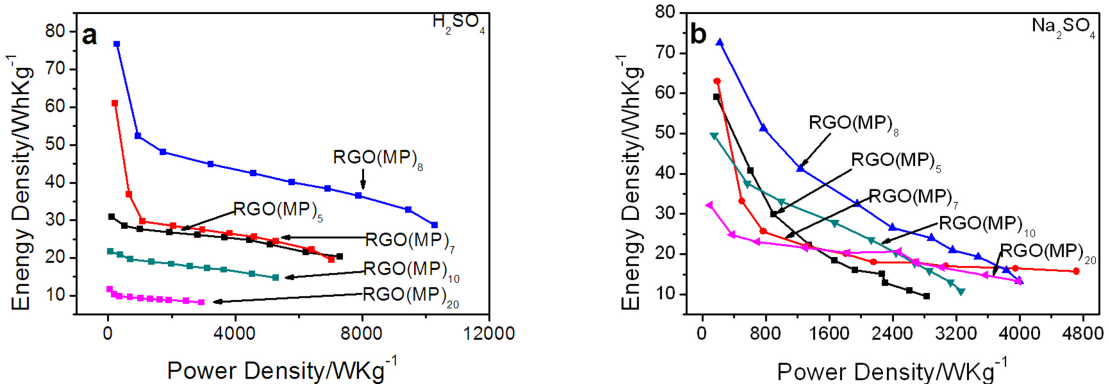

Fig. S5 Ragone plots of RGO(MP)$_{ratio}$ in 1 M H_2SO_4 (a) and Na_2SO_4 (b)

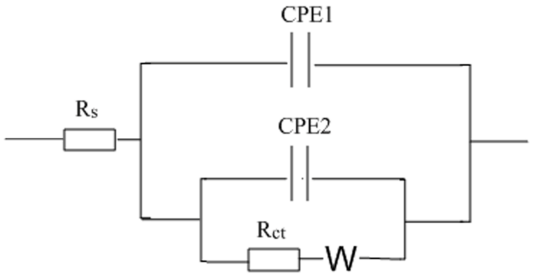

Fig. S6 Proposed equivalent circuit for RGO(MP)ratio

Table S1 Values of the equivalent circuit calculated from results testing in 1 M H_2SO_4

	Rs	CPE1		CPE2		Rct	W	χ^2
		Yo	n	Yo	n			
RGO(MP)$_5$	1.6	3.0E-3	0.80	0.17	0.86	3.37	1E-20	4.1E-4
RGO(MP)$_7$	1.4	1E-4	0.91	0.26	0.88	2.48	1.3E-3	2.3E-4
RGO(MP)$_8$	1.8	8.0E-5	0.82	0.27	0.9	1.61	2.2E-3	4.7E-4
RGO(MP)$_{10}$	1.8	6.3E-5	0.92	0.11	0.87	1.93	2.7E-3	4.3E-4
RGO(MP)$_{20}$	1.6	1.2E-4	0.80	0.026	0.80	14.0	4.4E-4	1E-4
MP	1.4	2.5E-4	0.80	0.1	0.80	29.0	2.8E-4	6.7E-4

Table S2 Values of the equivalent circuit calculated from results testing in 1 M Na_2SO_4

Na_2SO_4	Rs	CPE1		CPE2		Rct	W	χ^2
		Yo	n	Yo	n			
RGO(MP)$_5$	10.1	1.7E-3	0.84	0.11	0.91	5.11	3.7E-3	8.6E-4
RGO(MP)$_7$	10.7	2.4E-3	1.0	0.099	0.80	3.97	5.3E-3	5.1E-4
RGO(MP)$_8$	10.9	2.2E-4	0.83	0.13	0.92	3.83	2.3E-3	3.7E-4
RGO(MP)$_{10}$	11.2	1.4E-2	0.91	8.3E-2	0.80	4.18	2.3E-3	9.9E-5
RGO(MP)$_{20}$	10.5	7.9E-2	0.67	4.0E-2	0.76	5.3	1.5E-2	6.2E-4
MP	10.2	2.5E-5	0.8	4.9E-2	0.74	67.5	7.5E-2	1.9E-4

1.Wang, H.; Hao, Q.; Yang, X.; Lu, L.; Wang, X., *ACS Appl. Mater. Interfaces* 2010, **2**, 821.
2.(a) Wang, S.; Gao, Q.; Zhang, Y.; Gao, J.; Sun, X.; Tang, Y., *Chem.Eur J.* 2011**, 17**, 1465; (b) Gao, Q.; Zhang, C.; Xie, S.; Hua, W.; Zhang, Y.; Ren, N.; Xu, H.; Tang, Y., *Chem.Mater.* 2009**, 21**, 5560.