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An ionic liquid-modified reduced graphene oxide electrode material with favourable electrochemical properties

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This updated version of the Electronic Supplementary Information replaces the original version first published on-line on 31 Mar 2020. There were some minor errors in the title, Table S1 and Table S2 which have now been corrected in this updated version.

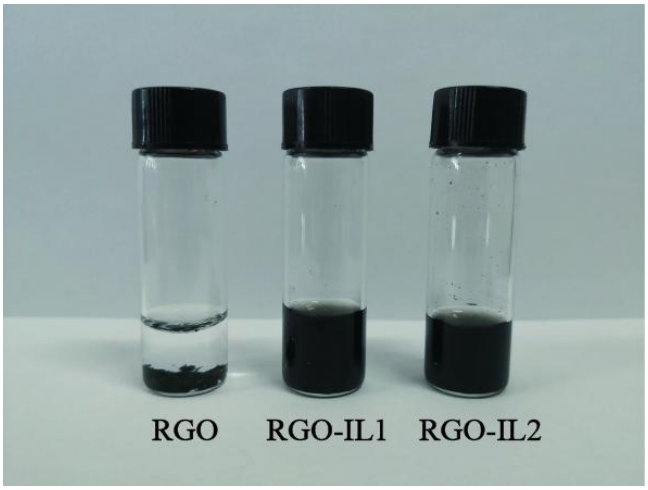

Figure S1. Photograph of the water dispersions of RGO, RGO-IL1 and RGO-IL2.

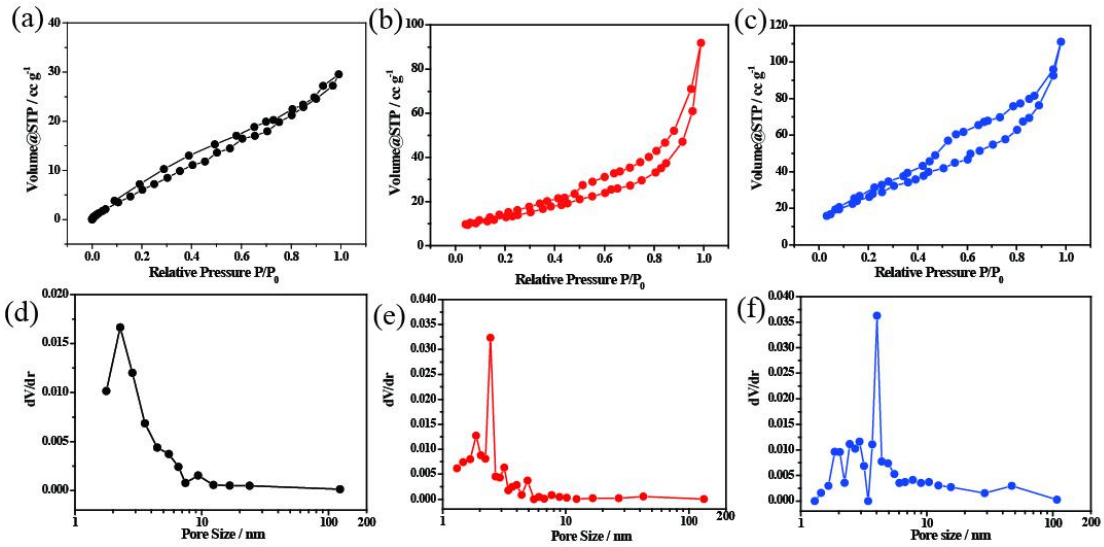

Figure S2. Nitrogen adsorption isotherms of (a) RGO, (b) RGO-IL1 and (c) RGO-IL2. BJH desorption pore size distribution curves of (d) RGO, (e) RGO-IL1 and (f) RGO-IL2.

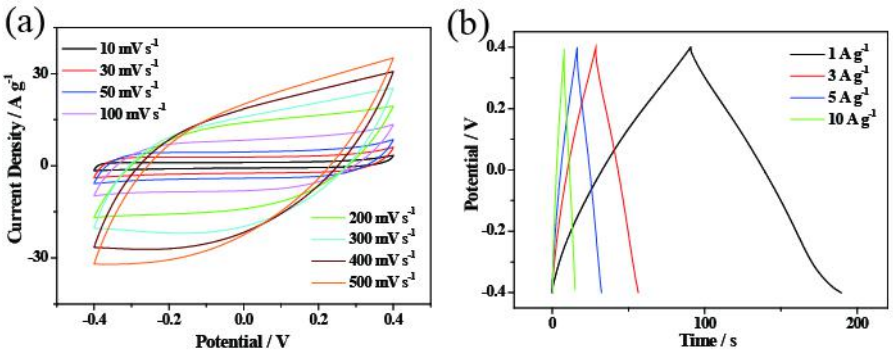

Figure S3. (a) CV curves of RGO at different scanning rates in the potential range from −0.4 to 0.4 V in 1.0 M H_2SO_4. (b) GCD curves of RGO at current density from 1 to 10 A g^{-1} in 1.0 M H_2SO_4.

Table S1. Comparison of RGO-IL1 and RGO-IL2 with other graphene electrodes in terms of specific capacitance and measurement conditions.

Electrodes	Electrolyte	Current density (A g^{-1})	Specific capacitance (F g^{-1})	Ref.
OHCF	1M $TEABF_4$/AN	1	188	44
CNDHS	1M $TEABF_4$/AN	1	183	45
The crumpled graphene balls	5M KOH	0.1	181	46
Cl-RGO	1M H_2SO_4	1	178	47
Ionothermal-RGO	6M KOH	0.2	155	48
MCNM	1M $TEABF_4$/AN	1	149	49
CNT/graphene	PVA-H_3PO_4	1	138	50
RGO	1M H_2SO_4	1	114	This work
RGO-IL1	1M H_2SO_4	1	173	This work
RGO-IL2	1M H_2SO_4	1	193	This work

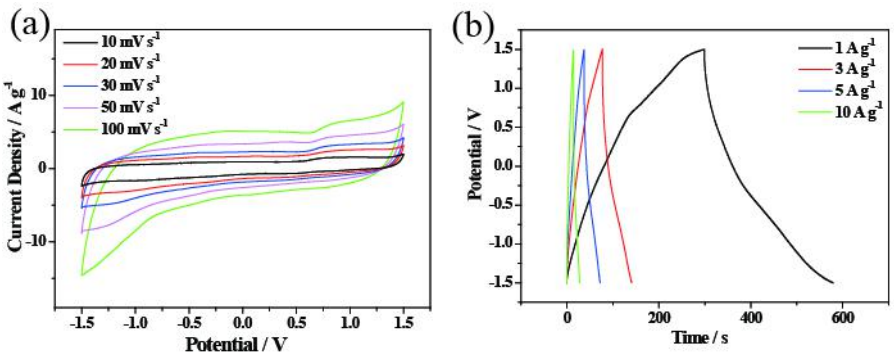

Figure S4. (a) CV curves of RGO at different scanning rates in the potential range from −1.5 to 1.5 V in [Bmim]PF_6/AN (m:m = 1:1). (b) GCD curves of RGO at current density from 1 to 10 A g^{-1} in [Bmim]PF_6/AN (m:m = 1:1).

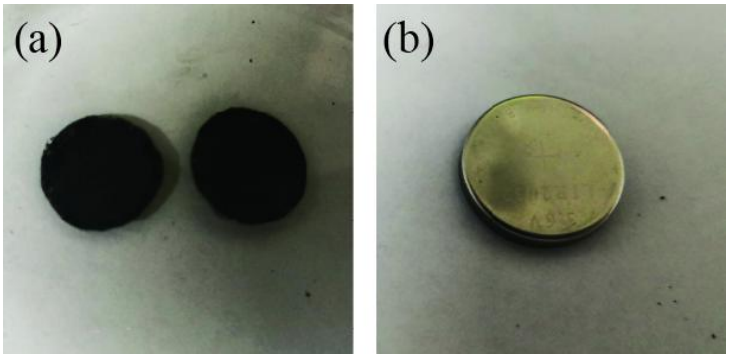

Figure S5. Photographs of (a) the completed RGO-IL electrode slices and (b) the assembled coin-type supercapacitor based on RGO-IL.

Table S2. Comparison of RGO-IL1 and RGO-IL2 with other ionic liquid modified RGO supercapacitor in terms of potential window and energy density.

Electrodes	Electrolyte	Potential window (V)	Energy density (Wh kg^{-1})	Ref.
PIL:RG-O	1M EMIM-NTf_2	3.5	6.50	30
ILG	1M [Bmim]PF_6/AN	2.2	25.30	32
PIL:RGO	[MPPy][TFSI]	2.0	40.00	34
rGO-Im-IL	PVA-NaCl	2.0	36.67	54
IL-RGO	1M $EMIMBF_4$	4.0	49.00	61
FGO-178/POAP	0.1M $HClO_4$	1.1	48.33	62
RGO-IL1	1M [Bmim]PF_6/AN	3.0	32.02	This work
RGO-IL2	1M [Bmim]PF_6/AN	3.0	50.19	This work