Electronic Supplementary Information

High-Energy Flexible Quasi-Solid-State Lithium-Ion Capacitors Enabled by Freestanding rGO-Encapsulated Fe_3O_4 Nanocube anode and Holey rGO Film Cathode

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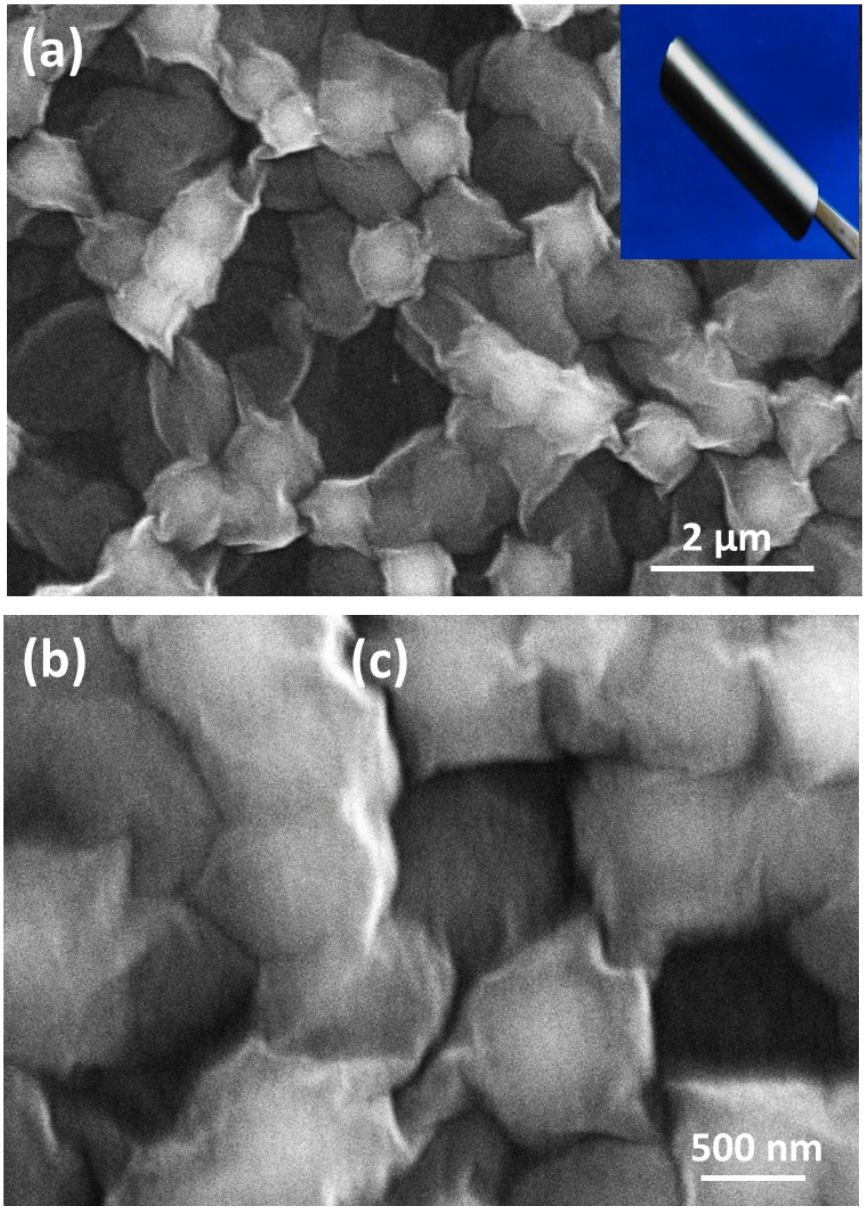

Figure S1 SEM image (a, b) and the photograph (c) of the GO@Fe_2O_3 film.

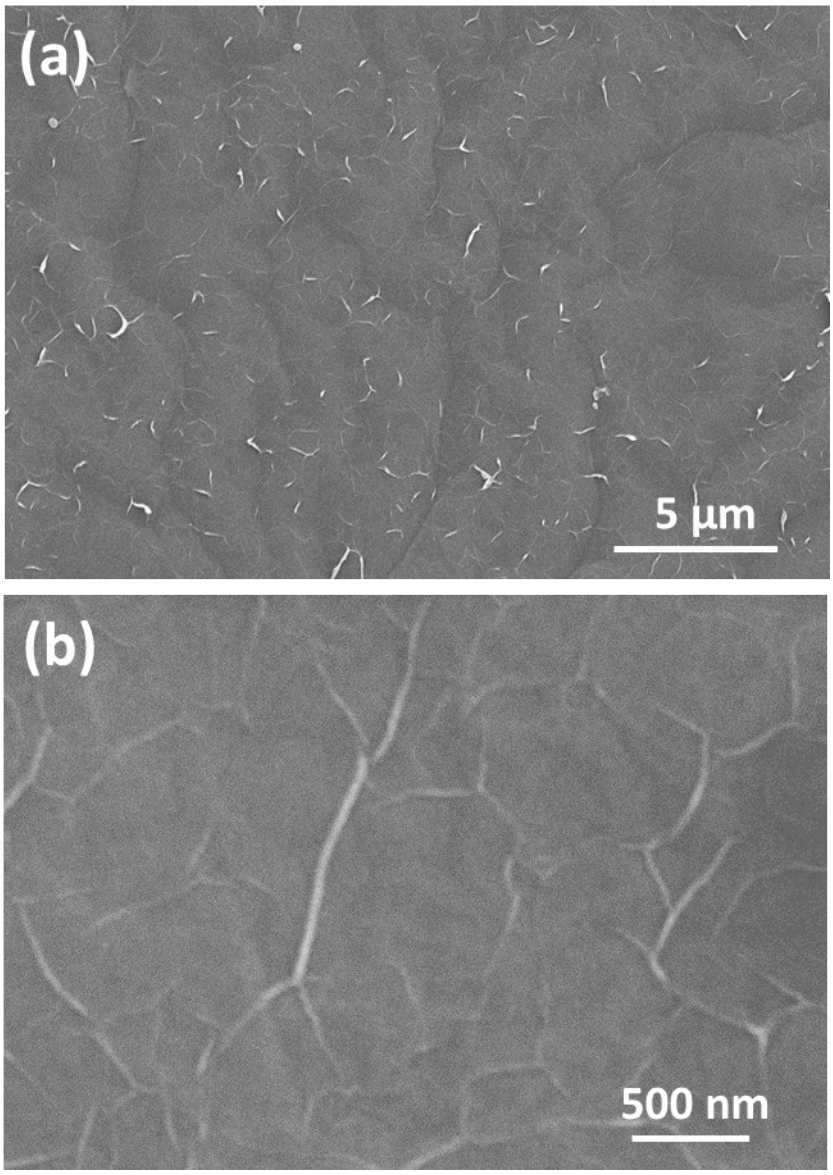

Figure S2 SEM image (a, b) of the GO film.

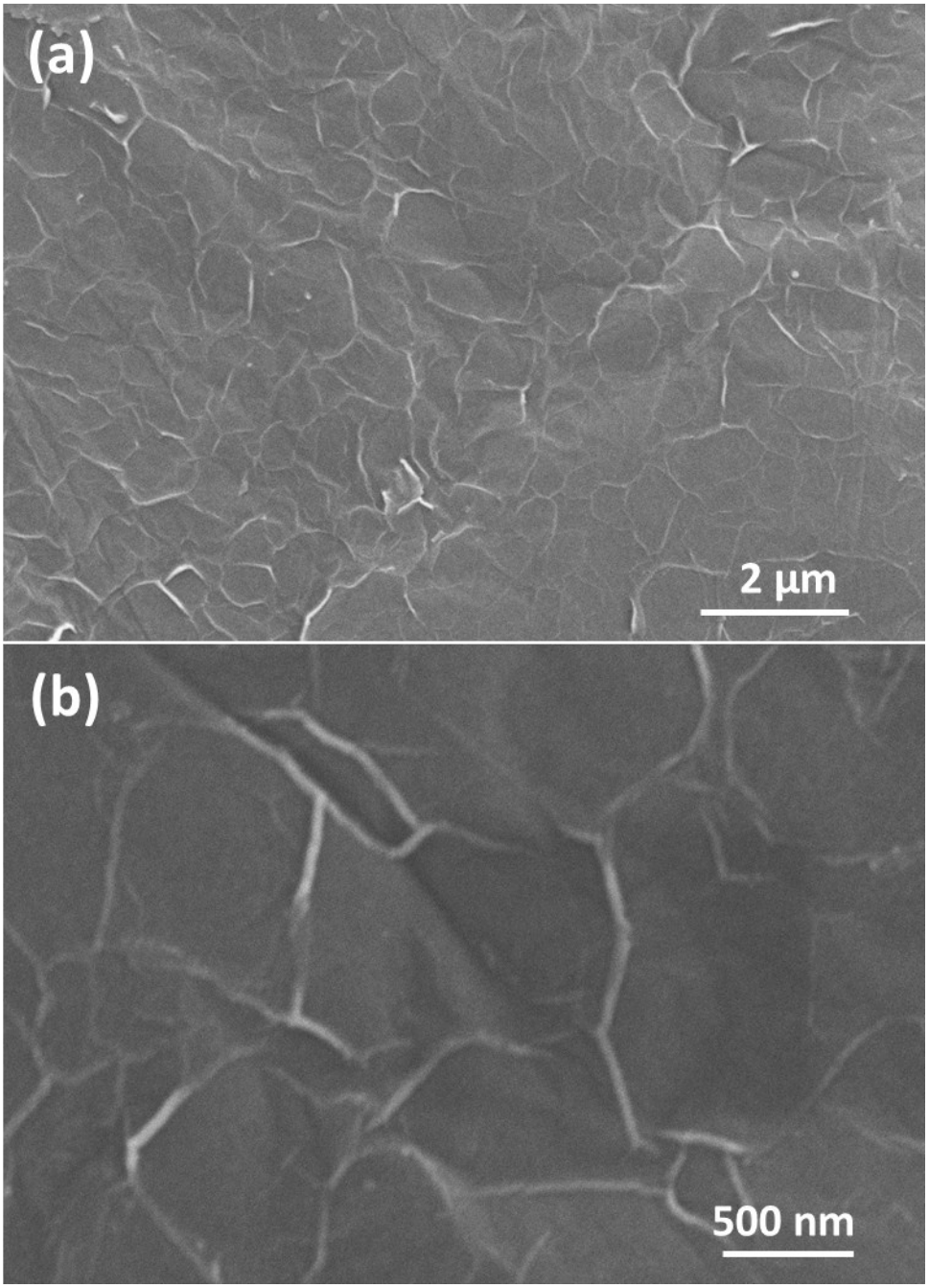

Figure S3 SEM image (a, b) of the rGO film.

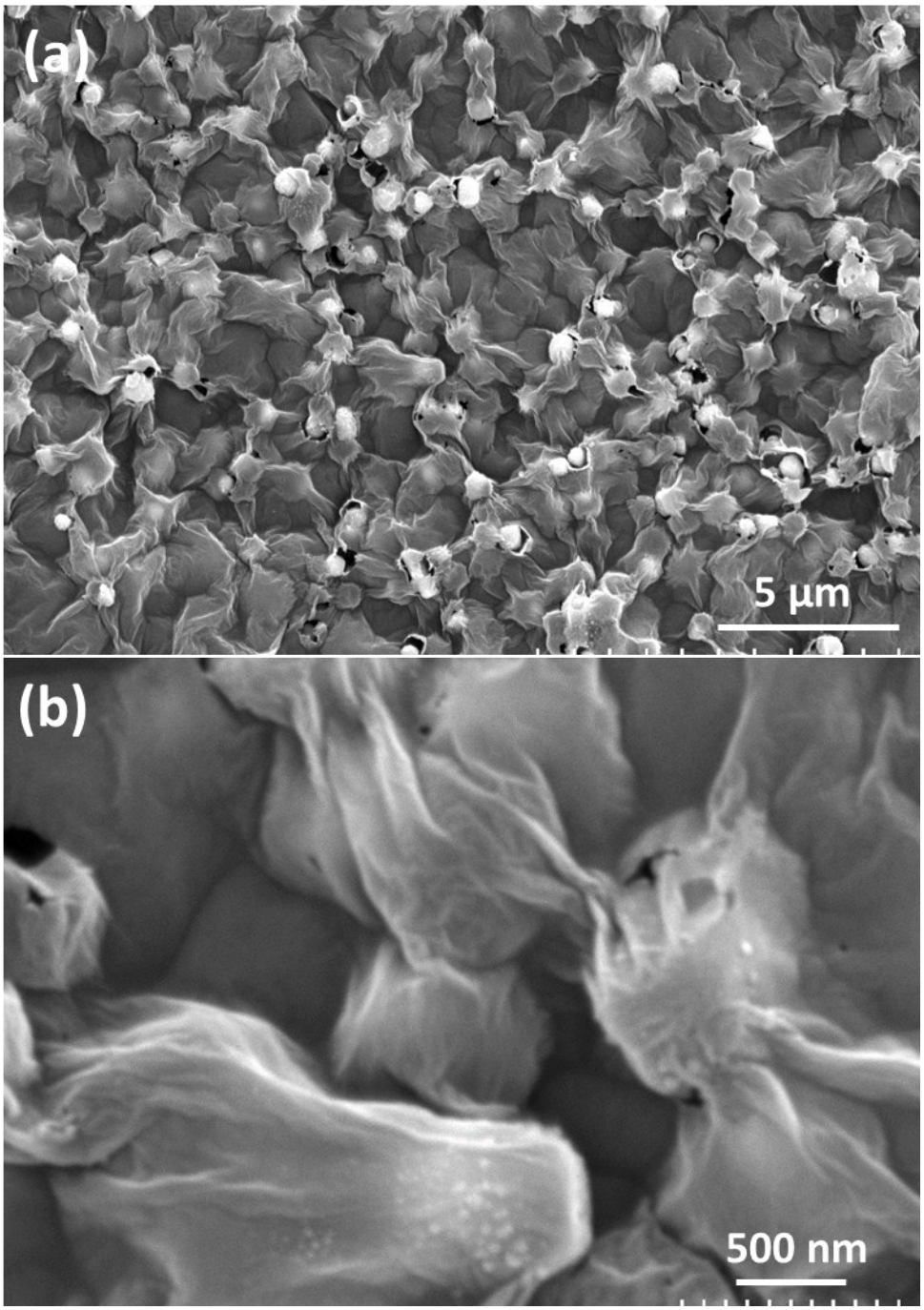

Figure S4 SEM image (a, b) of the rGO@Fe_3O_4 film, which was prepared by annealing GO@Fe_2O_3 film at 900 ^oC in Ar atmosphere.

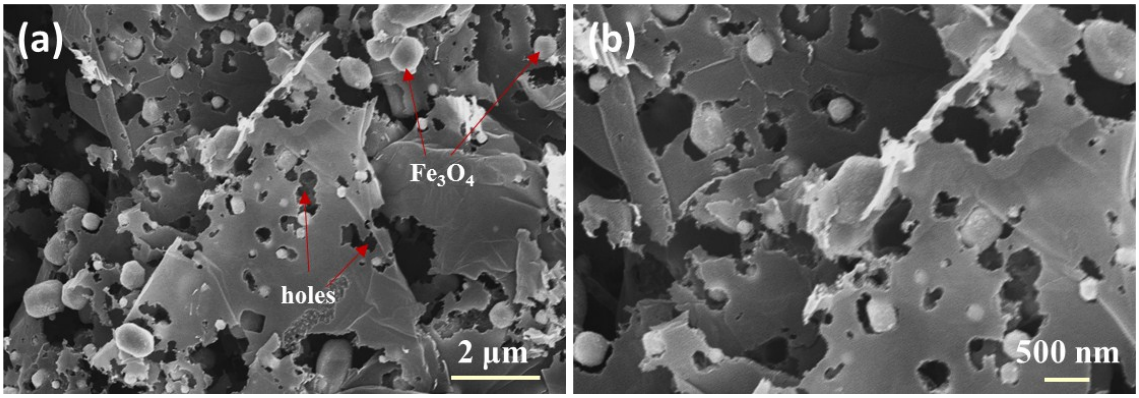

Figure S5 SEM images (a, b) of the rGO@Fe_3O_4 samples, which were prepared by annealing GO@haematite at 900 °C in Ar.

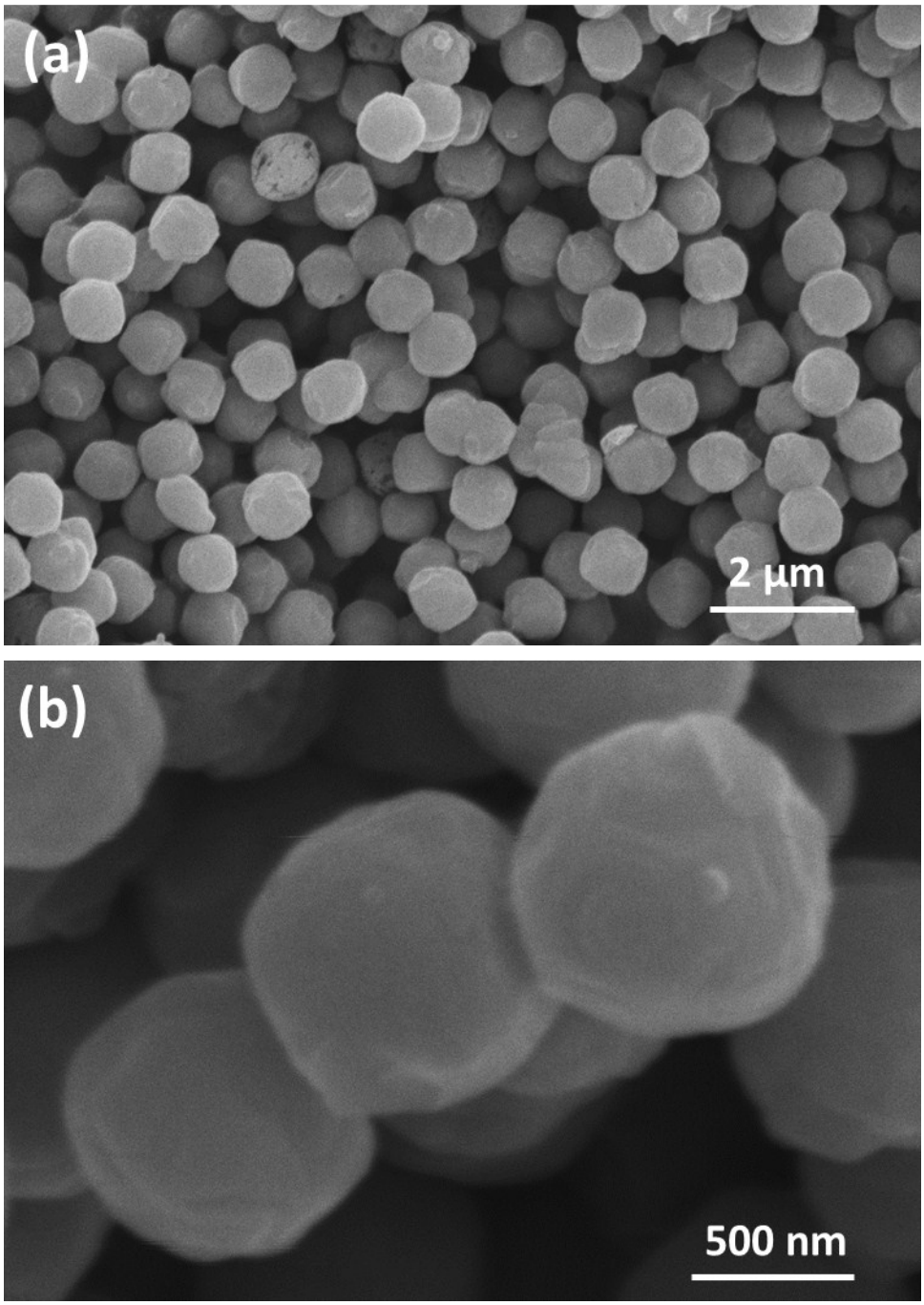

Figure S6 SEM image (a, b) of the pure Fe_3O_4 nanocubes, which was obtained by annealing Fe_2O_3 nanocubes at 650 ^oC.

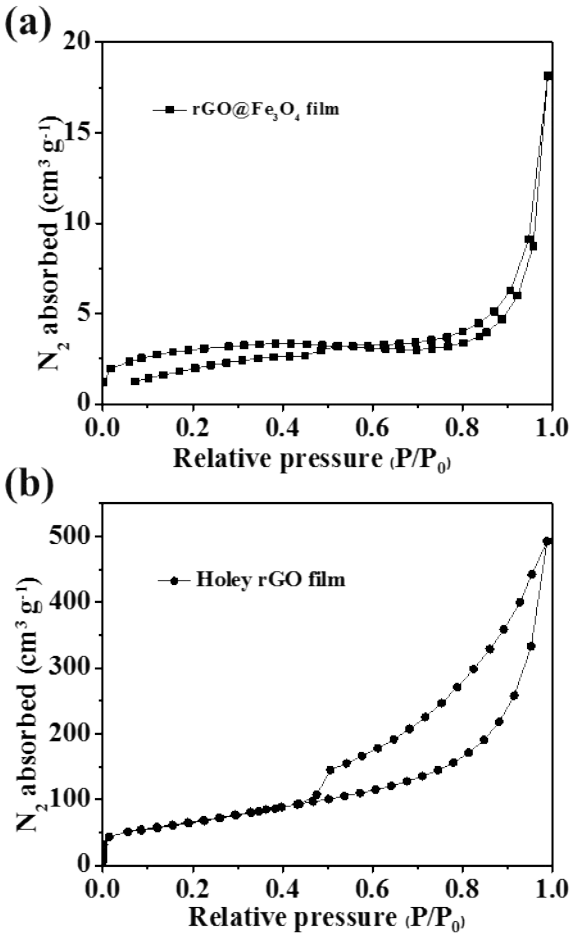

Figure S7 Nitrogen adsorption isotherms of (a) rGO@Fe_3O_4 and (b) holey rGO.

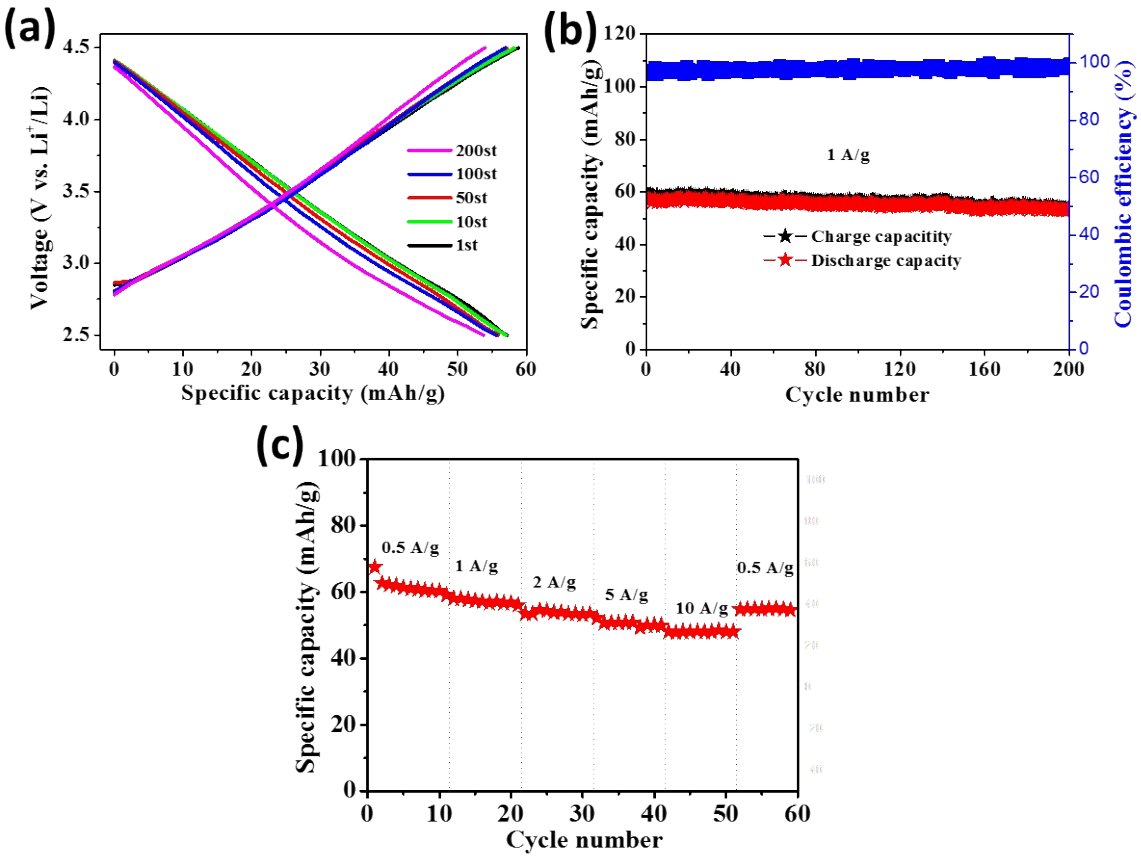

Figure S8 Charge-discharge curves (a) at 1 A g^{-1}, cycling performance (b) at 1 A g^{-1}, and rate capability (c) of holey rGO film.

Table S1 Electrochemical performances of various LICs in references.

Hybrid System (anode//cathode)	Power Density (W kg^{-1})	Energy Density (Wh kg^{-1})	Ref.
CC@$NiCo_2O_4$//Graphene	568.2	60.9	1
	11360	37.56	
CNT@V_2O_5//AC	210	40	2
	6300	6.9	
Graphene@Fe_2O_3//Graphene	200	121	3
	18000	60.1	
Graphene@Fe_3O_4//Graphene	5	204	4
	1000	122	
Graphene@TiO_2//Graphene	303	72	5
	2000	10	
PF-Graphene//Graphene	141	148.3	6
	7800	71.5	
Graphene–$Li_4Ti_5O_{12}$//Graphene	45	95	7
	3000	32	
C-$LiTi_2(PO_4)_3$// AC	-	14	8
	180	-	
Nb_2O_5-C//AC	-	74	9
	18510	15	
TiP_2O_7//AC	46	13	10
	371	-	
MnNCN//AC	-	103	11
	8533	-	
Li_3VO_4-CNFs//Graphene	173	110	12
	3870	-	
rGO@Fe_3O_4//rGO	250	148.75	Our work
	25000	70.5	

References

1 Z. Gao, W. Yang, J. Wang, N. Song and X. Li, *Nano Energy*, 2015, **13**, 306-317.

2 Z. Chen, V. Augustyn, J. Wen, Y. Zhang, M. Shen, B. Dunn and Y. Lu, *Adv Mater*, 2011, **23**, 791-795.

3 E. Kim, H. Kim, B. J. Park, Y. H. Han, J. H. Park, J. Cho, S. S. Lee and J. G. Son, *Small*, 2018, **14**, e1704209.

4 F. Zhang, T. Zhang, X. Yang, L. Zhang, K. Leng, Y. Huang and Y. Chen, *Energy Environ Sci*, 2013, **6**, 1623.

5 F. Wang, C. Wang, Y. Zhao, Z. Liu, Z. Chang, L. Fu, Y. Zhu, Y. Wu and D. Zhao, *Small*, 2016, **12**, 6207-6213.

6 T. Zhang, F. Zhang, L. Zhang, Y. Lu, Y. Zhang, X. Yang, Y. Ma and Y. Huang, *Carbon*, 2015, **92**, 106-118.

7 K. Leng, F. Zhang, L. Zhang, T. Zhang, Y. Wu, Y. Lu, Y. Huang and Y. Chen, *Nano Research*, 2013, **6**, 581-592.

8 V. Aravindan, W. Chuiling, M. V. Reddy, G. V. Rao, B. V. Chowdari and S. Madhavi, *Phys Chem Chem Phys*, 2012, **14**, 5808-5814.

9 K. H. Lim E, Jo C, et al., *ACS Nano*, 2014, **8**, 8968-8978.

10 V. Aravindan, M. V. Reddy, S. Madhavi, S. G. Mhaisalkar, G. V. Subba Rao and B. V. R. Chowdari, *J Power Sources*, 2011, **196**, 8850-8854.

11 C. Liu, C. Zhang, H. Fu, X. Nan and G. Cao, *Adv Energy Mater*, 2017, **7**, 1601127.

12 F. Wang, Z. Liu, X. Yuan, J. Mo, C. Li, L. Fu, Y. Zhu, X. Wu and Y. Wu, *J Mater Chem A*, 2017, **5**, 14922-14929.