Supporting Information

Lithiated carbon cloth as dendrite-free anode for high-performance lithium battery

Hao Cheng,[‡a] Shiyun Zhang,[‡a] Jian Mei,[b] Lvchao Qiu,[b] Peng Zhang,[c] Xiongwen Xu,[d] Jian Tu,[d] Jian Xie*[ae] and Xinbing Zhao[ae]

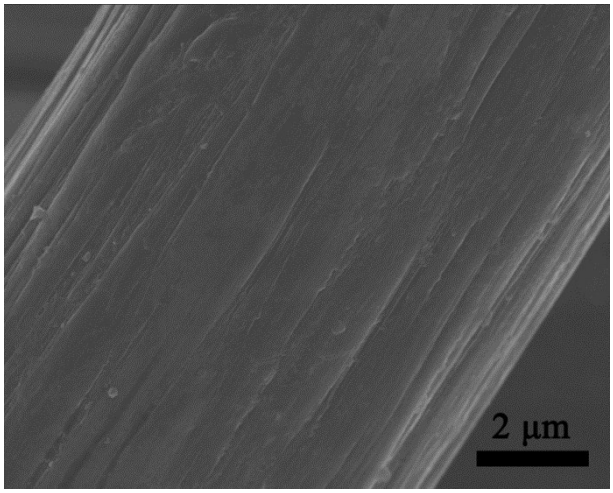

Fig. S1. SEM image of a single carbon fiber in carbon cloth.

[a]*State Key Laboratory of Silicon Materials, School of Materials Science and Engineering, Zhejiang University, Hangzhou 310027, P. R. China. E-mail: xiejian1977@zju.edu.cn; Fax: +86-571-87951451; Tel: +86-571-87951451*
[b]*State Grid Zhejiang Electric Power Research Institute, Hangzhou 310014, P. R. China*
[c]*Hangzhou Skyrich Power Co., Ltd., Hangzhou 310022, P. R. China*
[d]*LI-FUN Technology Co., Ltd., Zhuzhou 412000, P. R. China*
[e]*Key Laboratory of Advanced Materials and Applications for Batteries of Zhejiang Province, Hangzhou 310027, P. R. China*
‡Hao Cheng and Shiyun Zhang contributed equally to this work.

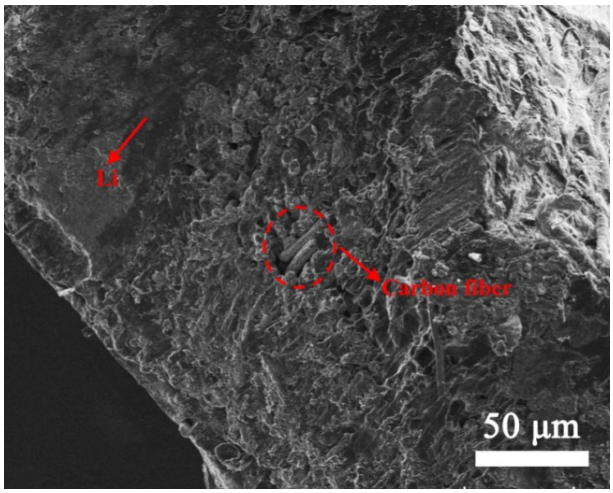

Fig. S2. Cross-section SEM image of the LCC electrodes.

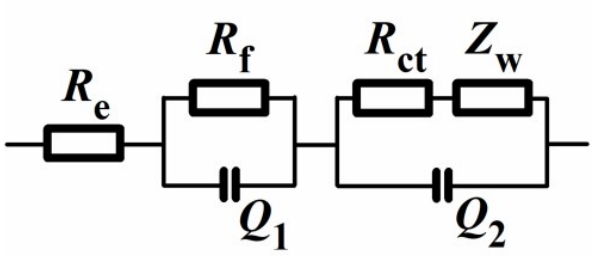

Fig. S3. Equivalent circuit for the fitting of the electrochemical impedance, where R_e represents ohm resistance of cell components, R_f and Q_1 correspond to the surface film resistance and relaxation capacitance, R_{ct} and Q_2 correspond to the charge transfer resistance and double-layer capacitance, and Z_w is related to the bulk diffusion of Li ions.

Table S1 Fitting results of the Nyquist plots in Fig. 2 using the equivalent circuitin Fig. S3.

Sample	R_e(Ω)	R_f (Ω)	R_{ct} (Ω)
LCC, 0 h	9.7	134.6	121.0
LCC, 50 h	3.5	370.6	259.1
LCC, 100 h	3.0	352.1	325.2
LCC, 1st cycle	12.2	38.5	7.3
LCC, 100th cycle	6.5	87.0	8.6
Li, 0 h	3.0	198.1	104.6
Li, 50 h	3.2	395.4	179.3
Li, 100 h	5.5	554.7	335.8
Li, 1st cycle	3.5	82.6	23.8
Li, 100th cycle	4.9	169.4	37.2

Table S2 Comparison of load mass fraction of Li in different carbon-based Li composite anodes.

Sample	Mass fraction of Li	References
CF/Ag-Li	40.7%	1
Li-CF	37%	2
Graphene-Li	67.9%	3
LCC	**61%**	**This work**

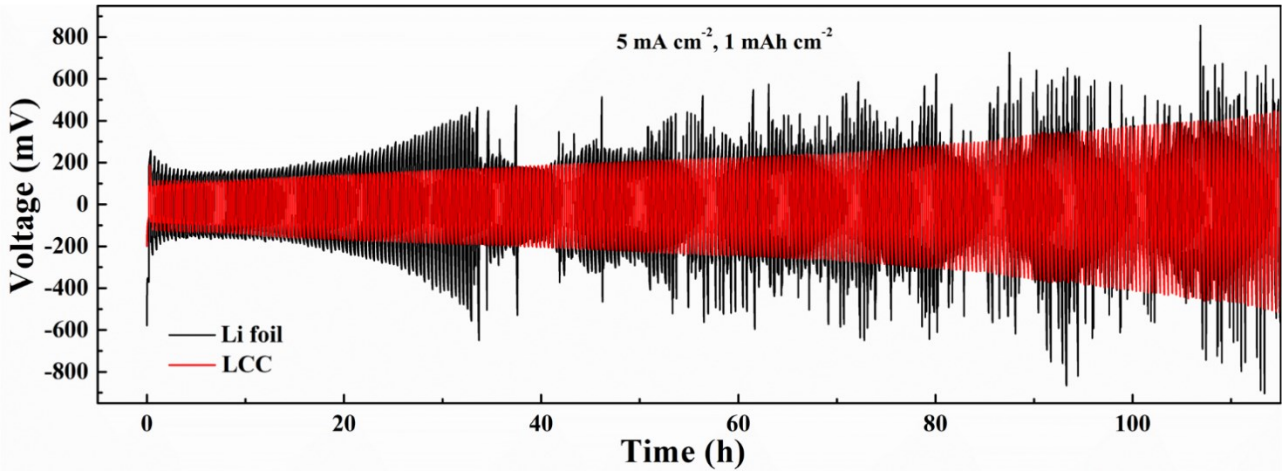

Fig. S4. Galvanostatic discharge/charge profiles of Li and LCC electrodes in symmetric cells at 5 mA cm^{-2} with a capacity of 1 mAh cm^{-2}.

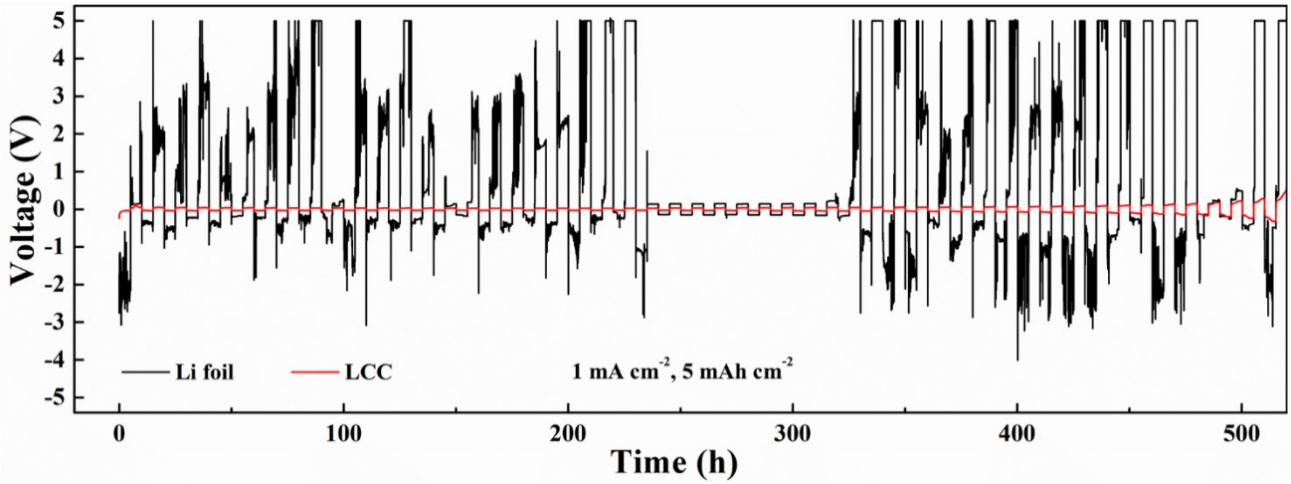

Fig. S5. Galvanostatic discharge/charge profiles of Li and LCC electrodes in symmetric cells at 1 mA cm^{-2} with a capacity of 5 mAh cm^{-2}.

Table S3 Performance comparison of different 3-D carbon hosts for Li metal anodes.

Sample	Current density (mA cm^{-2})	Capacity (mAh cm^{-2})	Cycling time (h)	References
CF/Ag-Li	1	1	400	1
Li-CF	3	1	120	2
Graphene-Li	1	1	330	3
rGO-Li	1	1	500	4
	3	1	70	
Li-CNTs	3	1	100	5
LiCNE	1	1	200	6
Li-CMN	1	1	500	7
LCC	**1**	**1**	**700**	**This work**
	3	**1**	**300**	

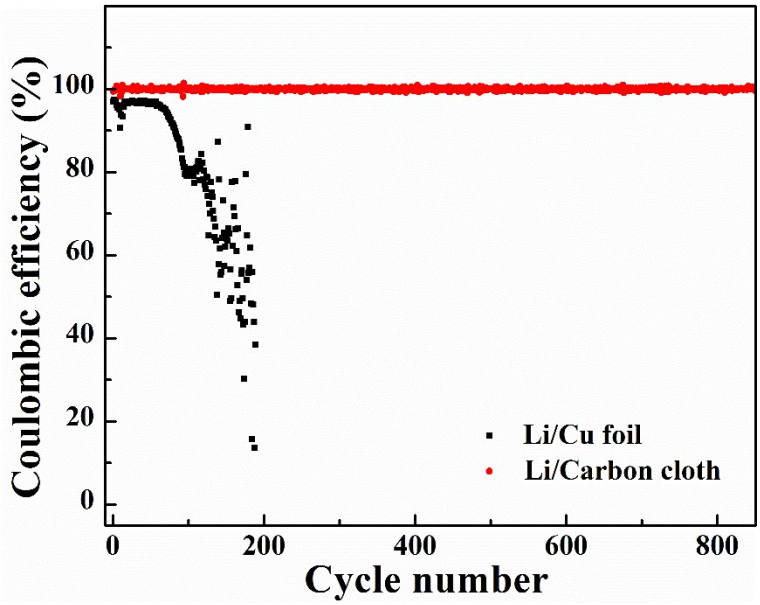

Fig. S6. Coulombic efficiency comparison of the Li/Cu cell and Li/carbon cloth cell.

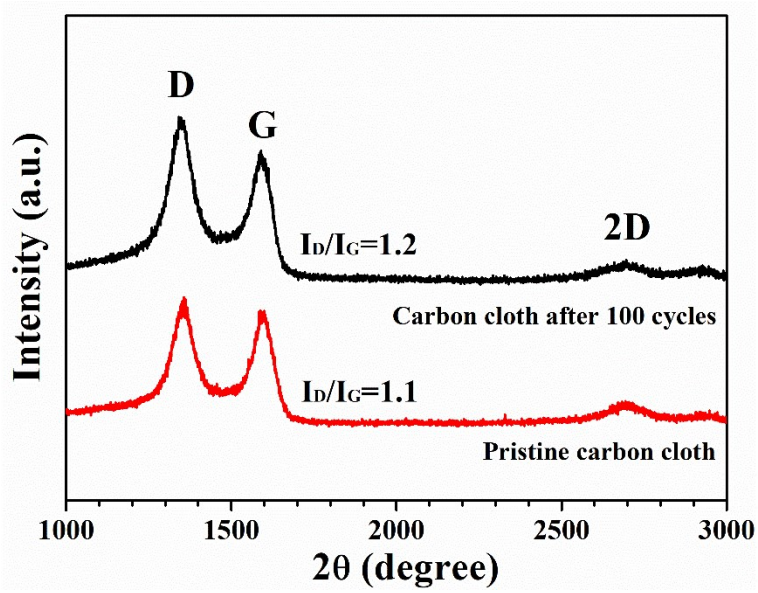

Fig. S7. Raman spectra of the pristine carbon cloth and the carbon cloth after 100 cycles.

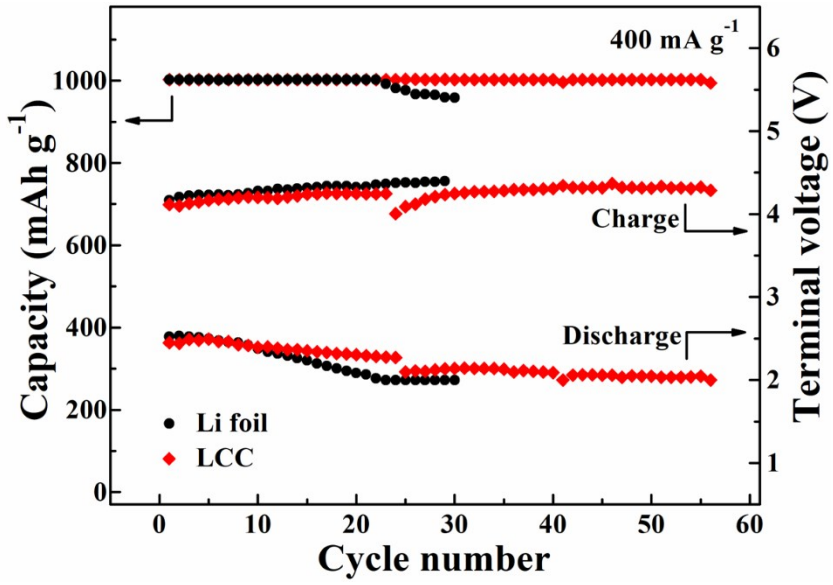

Fig. S8. Cycling performance the Li–O_2 cells using Li or LCC anodes at 400 mA g^{-1} with a limited capacity of 1000 mAh g^{-1}.

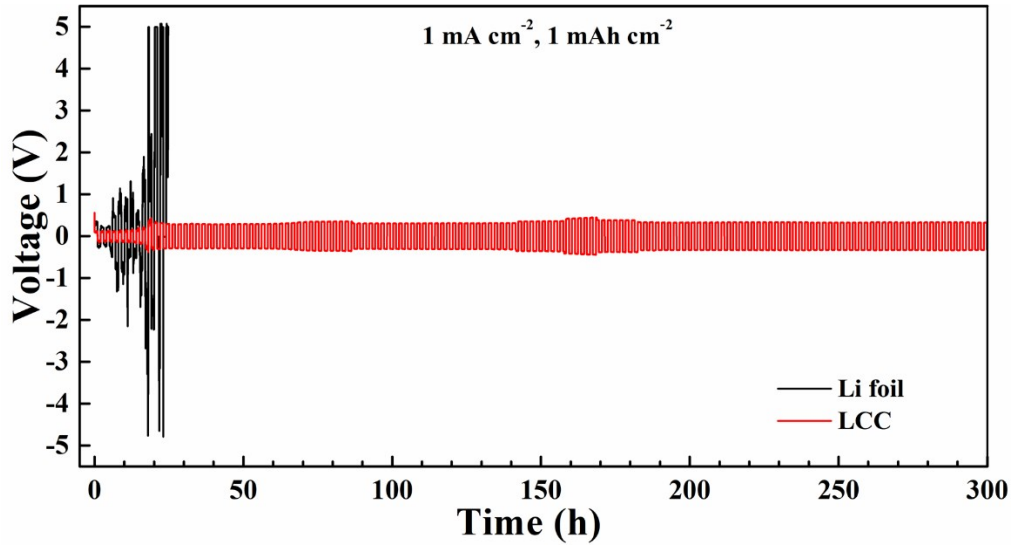

Fig. S9. Galvanostatic discharge/charge profiles of Li and LCC electrodes in symmetric cells with 1 M $LiClO_4$/TEGDME electrolyte tested in O_2 atmosphere at 1 mA cm^{-2} with a capacity of 1 mAh cm^{-2}.

References

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Information for videos

Video S1 Fabrication process of the LCC electrode.

Video S2 Dynamic changes of the Li electrode at 1 mA cm^{-2} at 100 times speed.

Video S3 Dynamic changes of the LCC electrode at 1 mA cm^{-2} at 100 times speed.