

## Electronic Supplementary Material (ESI) for

### An efficient bifunctional catalyst of Fe/Fe<sub>3</sub>C carbon nanofibers for rechargeable Li-O<sub>2</sub> Batteries

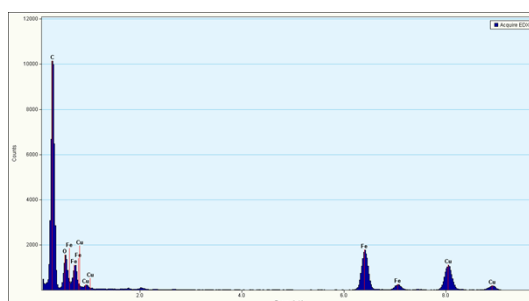
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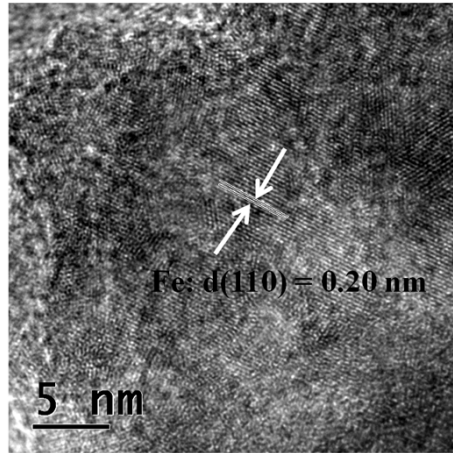
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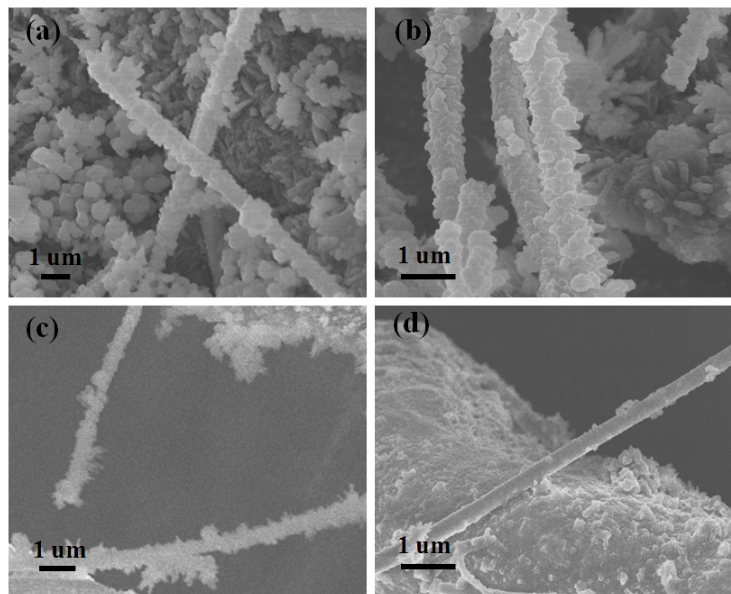
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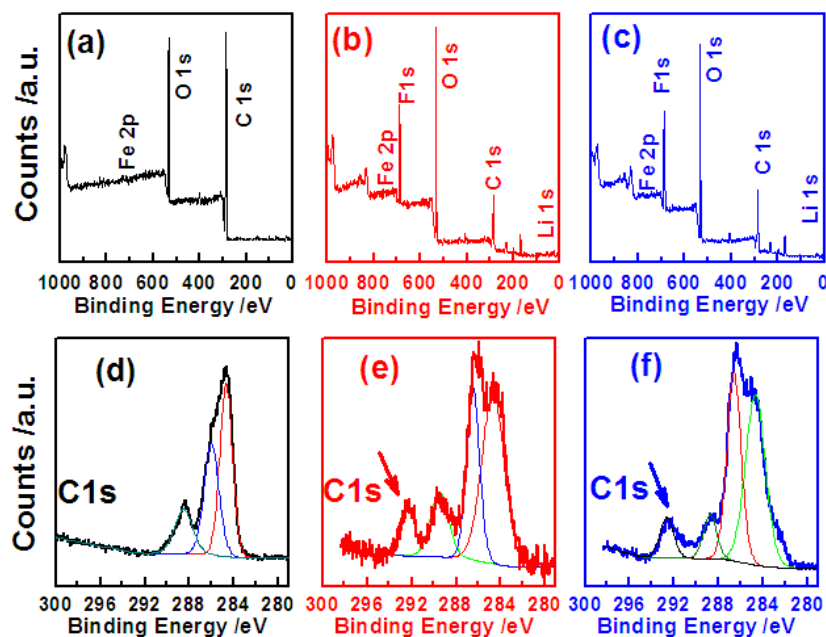
**Fig. S1.** EDS pattern of Fe/Fe<sub>3</sub>C-CNFs.



**Fig. S2.** HR-TEM image of Fe/Fe<sub>3</sub>C-CNFs.



**Fig. S3.** SEM images of (a)~(c) Fe/Fe<sub>3</sub>C-CNF cathode after discharge and (d) Fe/Fe<sub>3</sub>C-CNF cathode after recharge.



**Fig. S4.** XPS spectra for Fe/Fe<sub>3</sub>C-CNF cathodes marked black for fresh electrode, red for after discharge and blue for recharge: (a)~(c) full spectra; (d)~(f) C 1s.

As revealed in the Li 1s XPS spectra in Fig. 4(d), the main discharge product of Li<sub>2</sub>O<sub>2</sub> is generated, and after charge, the Li<sub>2</sub>O<sub>2</sub> is decomposed. When switched to the C 1s XPS spectra in Figs. S4(d~f), the signal for C1s at 292.2 eV for Li<sub>2</sub>CO<sub>3</sub> can be found in the discharged and recharged Fe/Fe<sub>3</sub>C-CNF cathodes.<sup>1-2</sup> In addition, most of them cannot be decomposed in the charged process.

## References

- 1 F. Li, D. M. Tang, Y. Chen, D. Golberg, H. Kitaura, T. Zhang, A. Yamada and H. Zhou, *Nano letters*, 2013, **13**, 4702.
- 2(a) M. M. Ottakam Thotiyl, S. A. Freunberger, Z. Peng and P. G. Bruce, *Journal of the American Chemical Society*, 2013, **135**, 494; (b) S. A. Freunberger, Y. Chen, N. E. Drewett, L. J. Hardwick, F. Bardé and P. G. Bruce, *Angewandte Chemie International Edition*, 2011, **50**, 8609; (c) Y. Zhang, H. Zhang, J. Li, M. Wang, H. Nie and F. Zhang, *Journal of Power Sources*, 2013, **240**, 390.