Supporting Information

Engineering flexible carbon nanofibers concatenated MOFs-derived hollow octahedral $CoFe_2O_4$ as anode materials for enhanced lithium storage

Fangfang Xue,[a] Yangyang Li,[a] Chen Liu,[a] Zhigang Zhang,[a] Jun Lin,[a] Junyang, Hao,[a] Qiuhong Li*[a]

[a]*Pen-Tung Sah Institute of Micro-Nano Science and Technology, Xiamen University, Xiamen 361005, China. E-mail: liqiuhong@xmu.edu.cn; Fax: +86-0592-2187196; Tel: +86-0592-2187198*

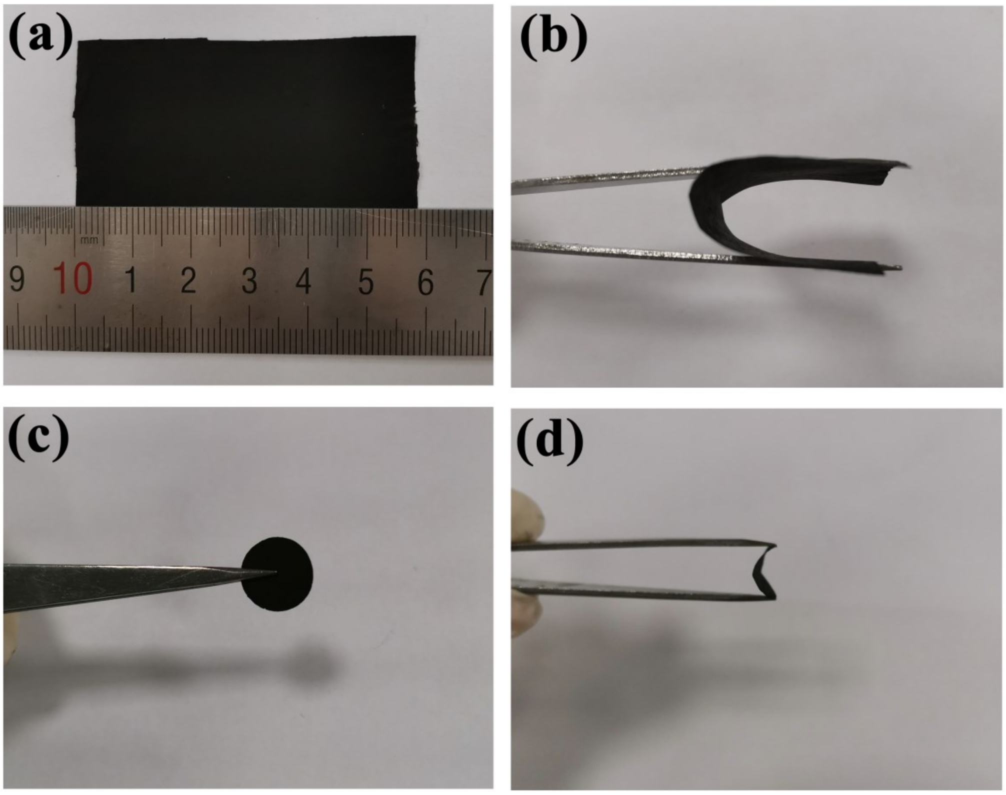

Fig. S1. Digital photographs of the $CoFe_2O_4$@CNF film and its flexible appearance.

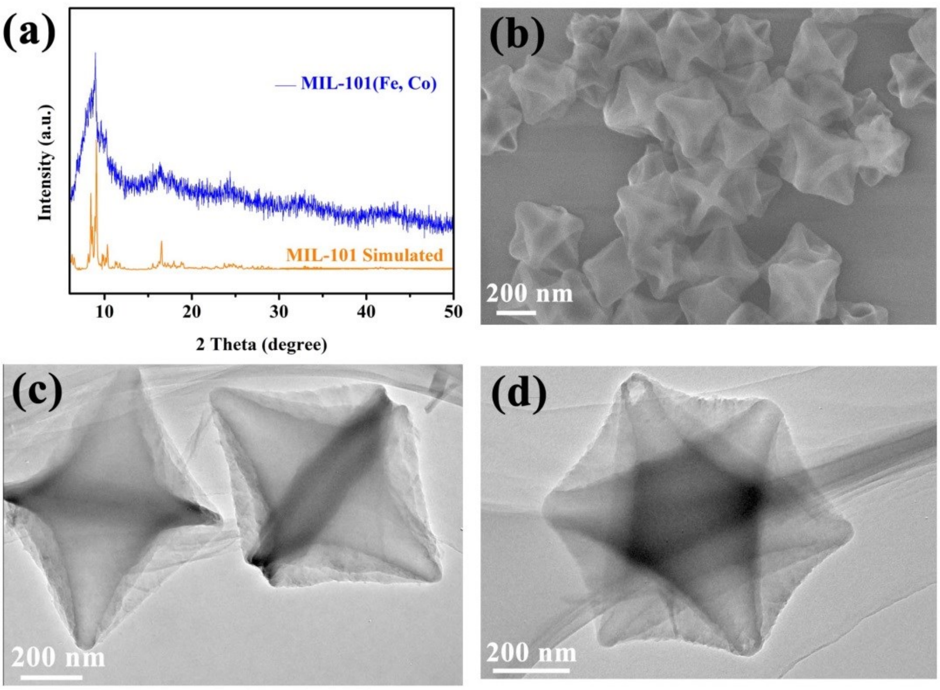

Fig. S2. (a) XRD pattern, (b) SEM image and (c,d) TEM images of MIL-101(Fe,Co).

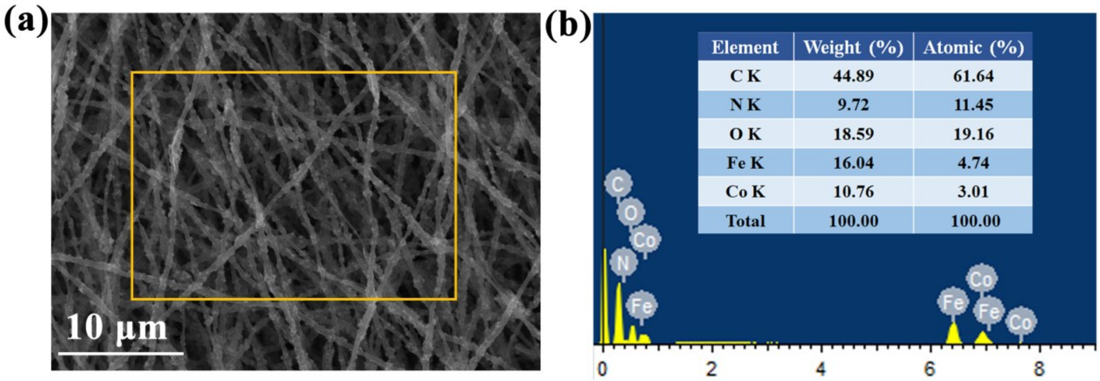

Fig. S3. (a) SEM image and selected area of $CoFe_2O_4$@CNF, (b) corresponding EDS pattern of selected area.

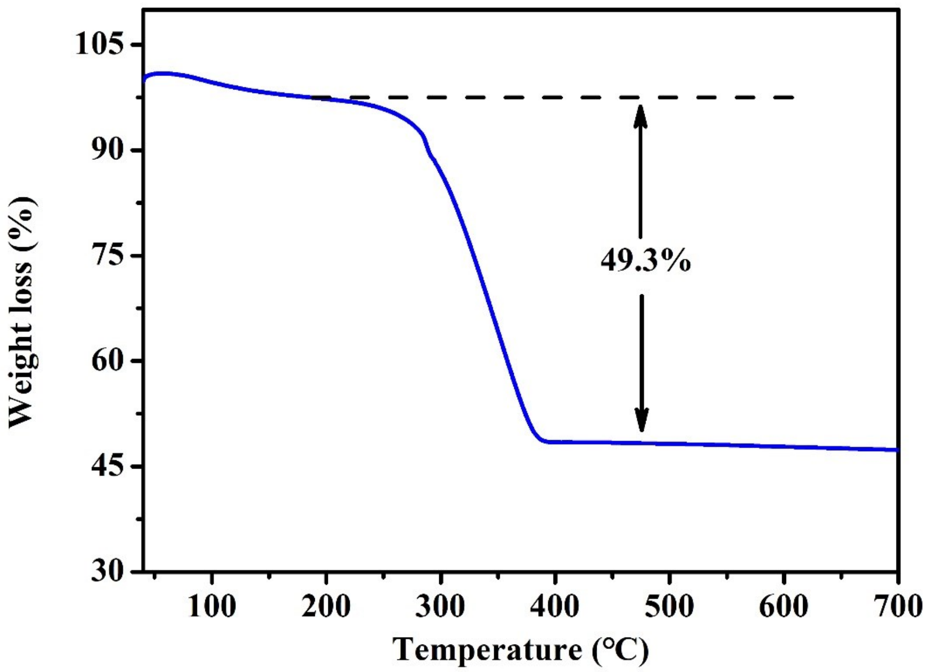

Fig. S4. TGA curve of $CoFe_2O_4$@CNF composite at a heating rate of 10 °C min^{-1} under air flow.

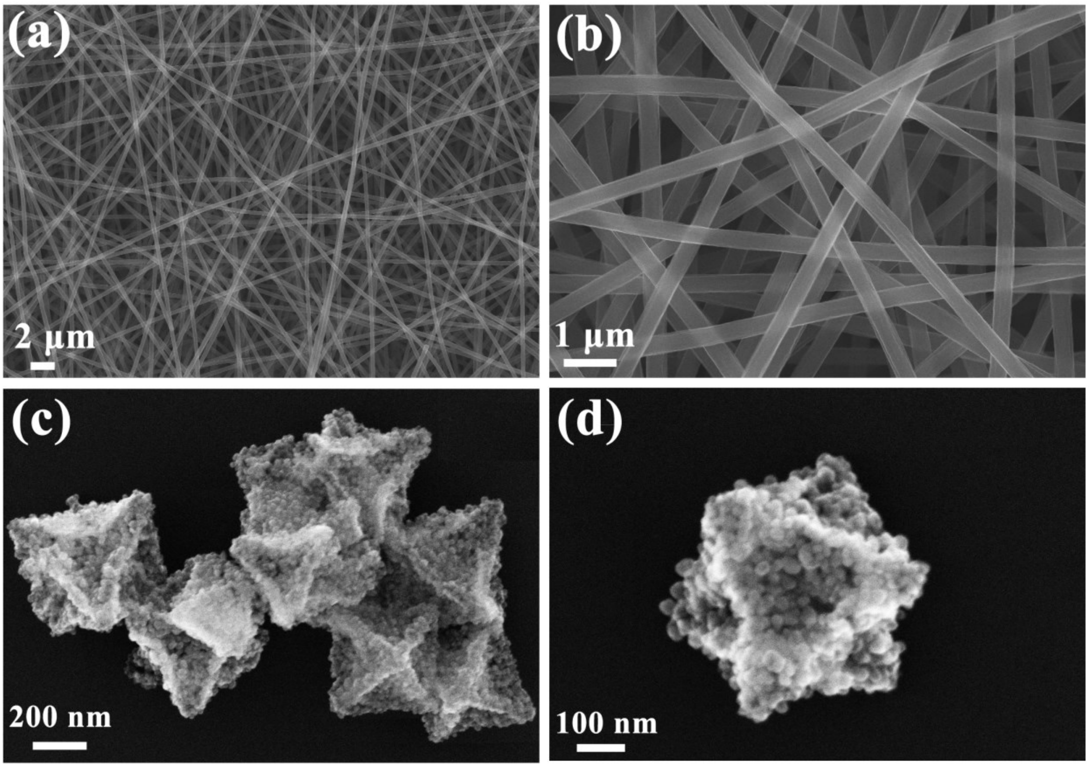

Fig. S5. SEM images of the (a, b) CNFs, (c, d) $CoFe_2O_4$ nanoparticles.

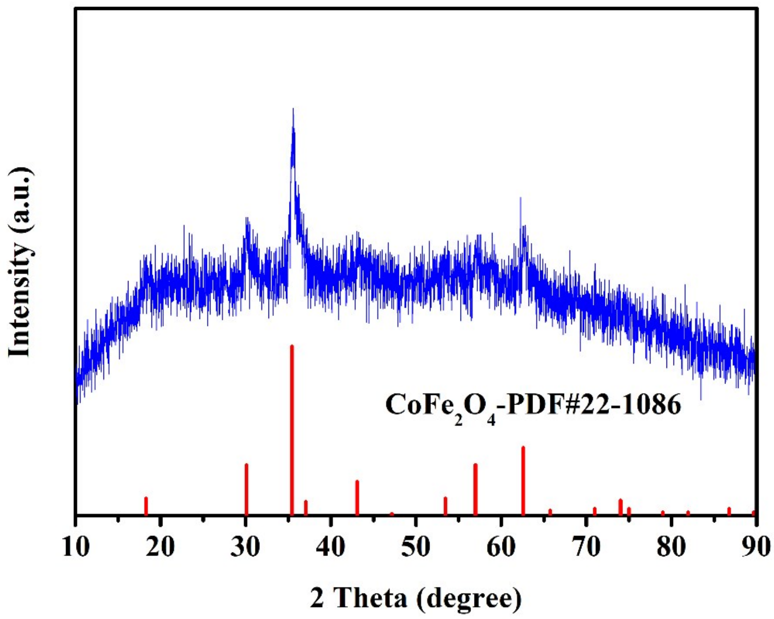

Fig.S6. XRD pattern of pure $CoFe_2O_4$.

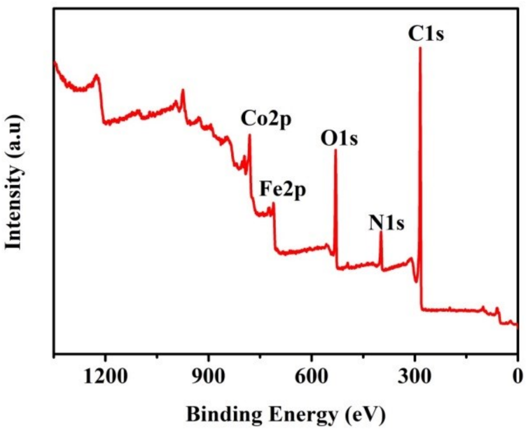

Fig.S7. XPS survey spectrum of the $CoFe_2O_4$@CNF.

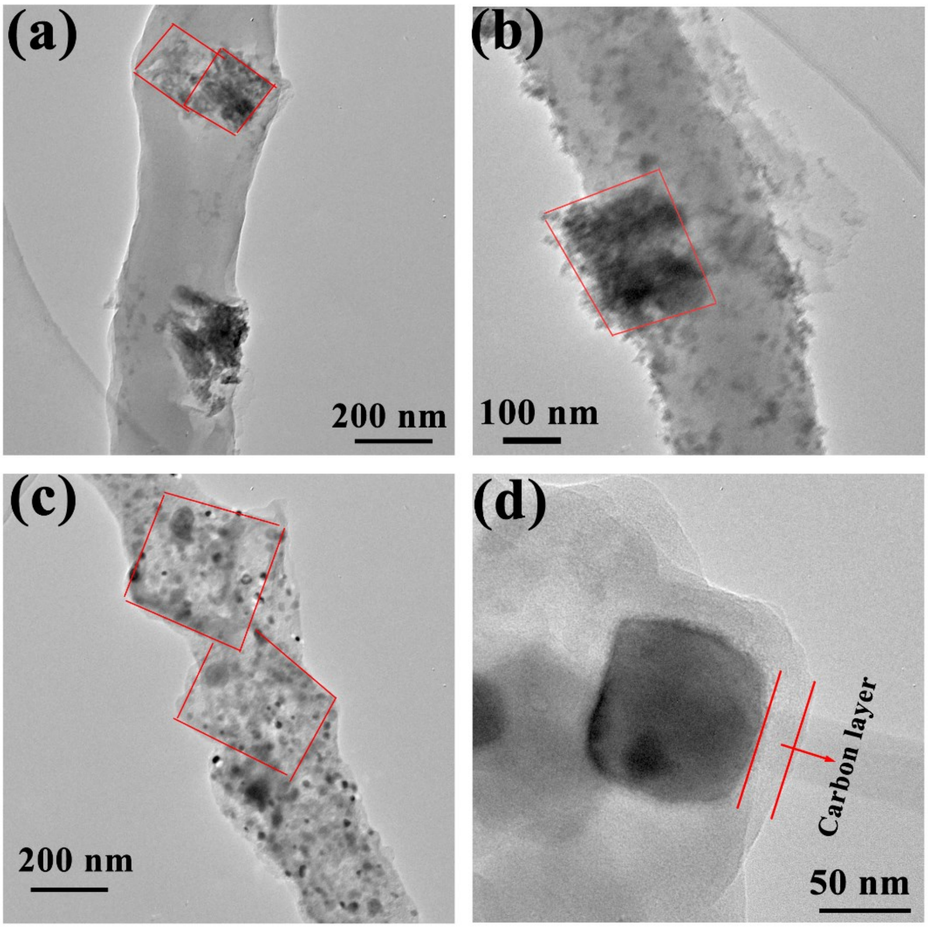

Fig. S8. TEM images of $CoFe_2O_4$@CNF after (a, b) 50 cycles and (c, d) 100 cycles at 0.1 A g^{-1}.

Table S1. Electrochemical performances of reported $CoFe_2O_4$-based anode for LIBs.

Materials	Cycling Performance			Rate performance		Referrence
	Capacity (mAh/g)	Cycles	Current density (mA/g)	Capacity (mAh/g)	Current density (A/g)	
$CoFe_2O_4$@ CNF	1230	240	100	770,706, 581,474, 371,and 216	0.1, 0.2, 0.5, 1, 2 and 5	**This work**
$CoFe_2O_4$ NPs@C	1111	200	400	1271, 972, 814, 617 and 433	0.1, 0.2, 0.4, 0.8, and 1.2	[1]
$CoFe_2O_4$ octahedra	992	200	100	845, 715, 618, 519, and 366	0.2, 0.5, 1, 2 and 5	[2]
$CoFe_2O_4$ nanoporous spheres	300	1000	1000	1057, 978, 911, 763, 484 and 270	0.1, 0.5, 0.8, 1, 2, and 3	[3]
$CoFe_2O_4$/MnO_2/C nanotubes	713.6	250	100	799.8, 648.8, 470.4,and 310.6	0.1, 0.2, 0.5, and 1	[4]
$CoFe_2O_4$ nanoparticles	1133	120	100	1097, 952, 857, 843, 761 and 679	0.1, 0.2, 0.4, 0.8, 1.6 and 3.2	[5]
CNTs@ $CoFe_2O_4$	1077	100	100	1125, 1032, 996, 963, 932 , 806 and 694	0.2, 0.4, 0.6, 0.8, 1, 2 and 3	[6]
$CoFe_2O_4$ nanotubes	831.4	150	50	865.7, 693.9, 564.9, 424.5, and 214.7	0.1, 0.2, 0.5, 1, and 2	[7]
$CoFe_2O_4$ nanofiber	942	80	100	888, 730, 590, 468, and 330	0.3, 0.5, 1, 2 and 5	[8]
$CoFe_2O_4$/ graphene	925.6	50	100	772.3, 430.6 and 305.3	200, 800 and 1600	[9]

Table S2. The data of $CoFe_2O_4$@CNF based on the equivalent circuit.

sample	**Rs(Ω)**	**Rct(Ω)**	**Rf(Ω)**
1st cycle	3.553	364.0	117.4
5th cycle	4.436	281.2	88.26
20th cycle	2.062	81.9	62.93
100th cycle	2.861	72.4	14.51

Referrences

1 J. Liu, J. Liang, H. Zhou, C. Xiao, F. Liang, S. Ding, $CoFe_2O_4$ nanoparticles anchored on bowl-like carbon backbone for enhanced reversible lithium storage, RSC Adv., 2016, **6**, 50153–50157.

2 J. Guo, X. Zhang, Y. Sun, X. Zhang, Mesoporous $CoFe_2O_4$ octahedra with high capacity and long-life lithium storage properties, RSC Adv., 2016, **6**,18–22.

3 D. Li, G. Li, H. Ge, J. Zhang, X. Meng, Fabrication of $CoFe_2O_4$ and $NiFe_2O_4$ nanoporous spheres as promising anodes for high performance lithium-ion batteries, New J. Chem., 2017, **41**, 15501–15507.

4 J. Zhou, T. Yang, M. Mao, W. R, Q. Li, Enhanced electrochemical performance of hierarchical $CoFe_2O_4/MnO_2/C$ nanotubes as anode materials for lithium-ion batteries, J. Mater. Chem. A, 2015, **3**, 12328.

5 J. Mao, X. Hou, X. Wang, S. Hu, L. Xiang, The cubic aggregated $CoFe_2O_4$ nanoparticle anode material for lithium ion battery with good performance Mater. Lett., 2015, **161**, 652–655.

6 L. Wang, L. Zhuo, H. Cheng, C. Zhang, F. Zhao, Porous carbon nanotubes decorated with nanosized cobalt ferrite as anode materials for high-performance lithium-ion batteries, J. Power Sources, 2015, **283**, 289–299.

7 H. Wang, D. Liu, Y. Li, Q. Duan, Single-spinneret electrospinning fabrication of $CoFe_2O_4$ nanotubes as high-performance anode materials for lithium-ion batteries, Mater. Lett., 2016, **172**, 64–67.

8 H. Qiao, Y. Yu, R. Li, X. Xue, Q. Wei, Facile synthesis of one-dimensional mesoporous cobalt ferrite nanofibers for high lithium storage anode material, Ionics, 2019, **25**, 125–132.

9 M. Zhang, X. Yang, X. Kan, X. Wang, L. Ma, M. Jia, Carbon-encapsulated $CoFe_2O_4$ /graphene nanocomposite as high performance anode for lithium ion batteries, Electrochim. Acta, 2013,**112**, 727–734.