Electronic Supplementary Material (ESI) for RSC Advances.

Synthesis of interconnected mesoporous $ZnCo_2O_4$ nanosheets on a 3D Graphene foam as a binder-free anode for high-performance Li-ion batteries

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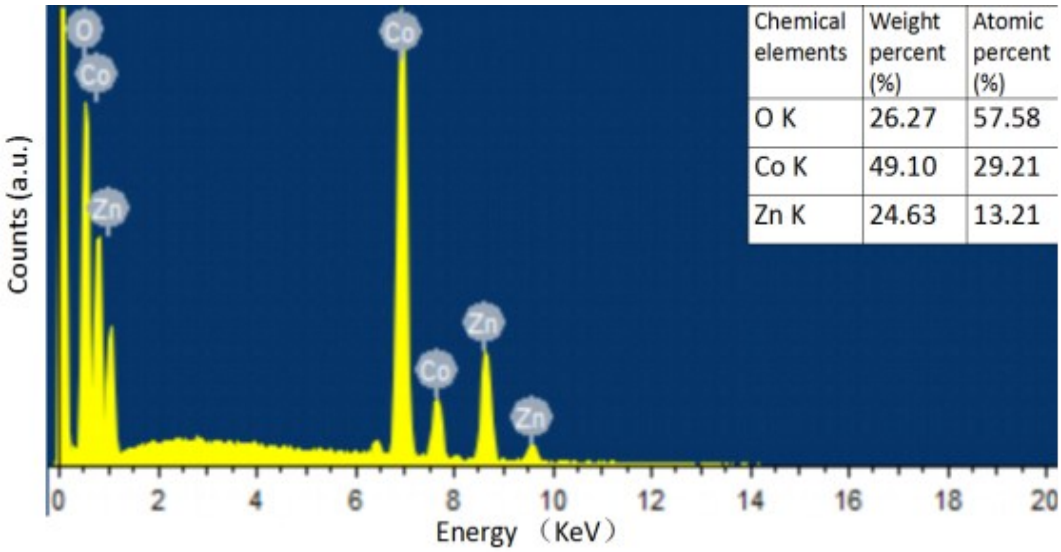

Chemical elements	Weight percent (%)	Atomic percent (%)
O K	26.27	57.58
Co K	49.10	29.21
Zn K	24.63	13.21

Fig.S1 EDS image of $ZnCo_2O_4$ nanosheet arrays scraped from 3DGF@NF substrate.

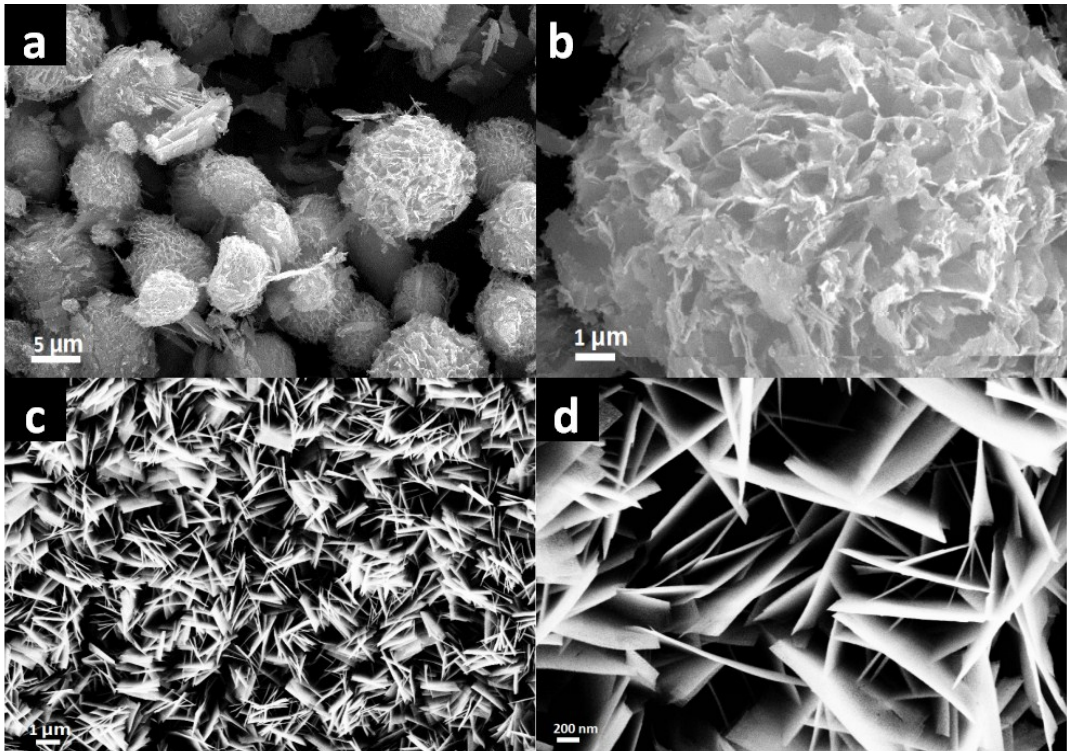

Fig.S2 SEM images of (a-b) $ZnCo_2O_4$ powders and (c-d) $ZnCo_2O_4$@NF at different magnifications.

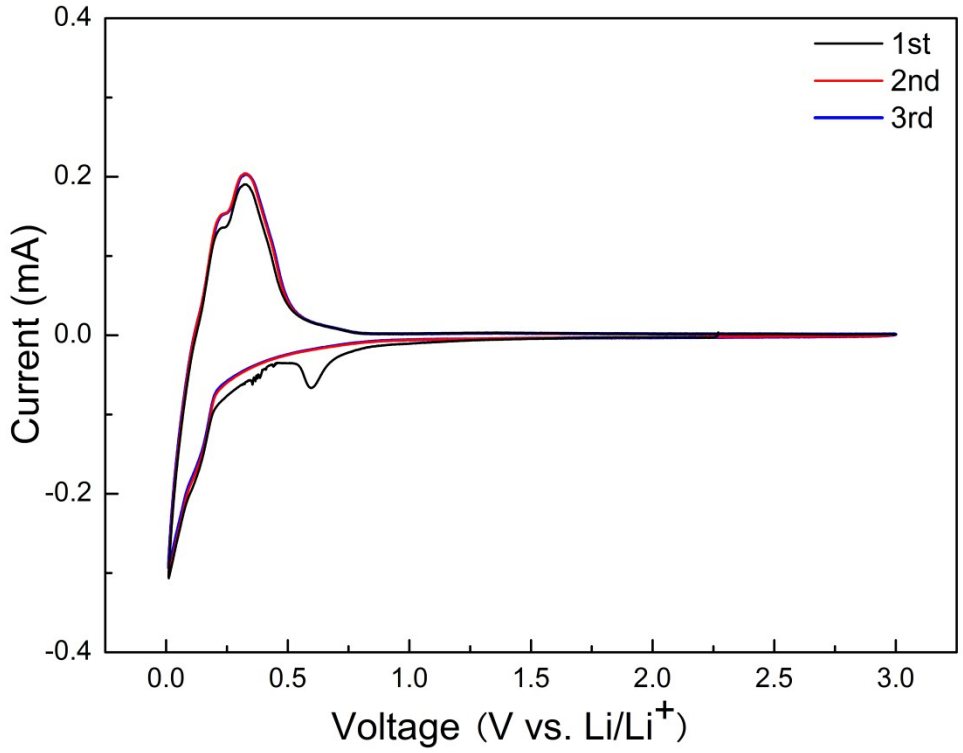

Fig.S3 CV curves of the pure 3DGF@NF electrode for the initial three cycles at a scan rate of 0.5 mV s^{-1} in the voltage range of 0.01-3.0 V.

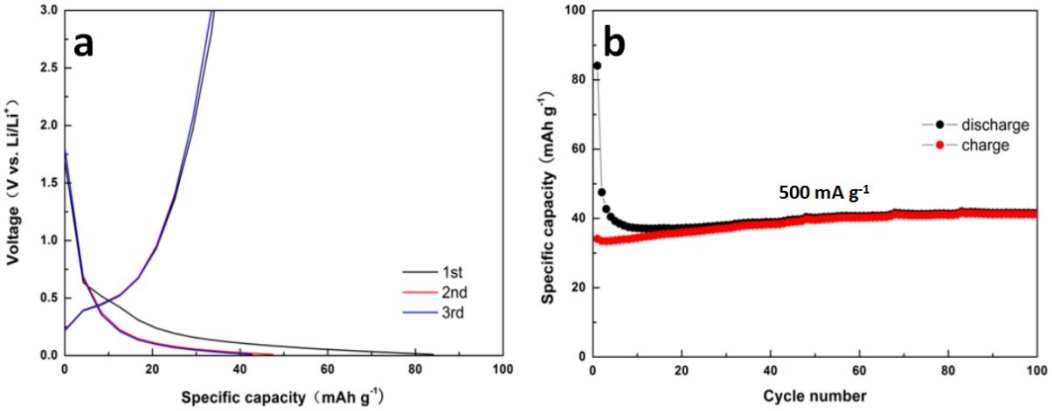

Fig.S4 (a) Galvanostatic charge-discharge voltage profiles of the pure 3DGF@NF electrode for the first three cycles at a current of 500 mA g^{-1}; (b) Cycling performance of the pure 3DGF@NF electrode at the current density of 500 mA g^{-1}.

TableS1. Comparison of Li-ion electrochemical performance of $ZnCo_2O_4$ based electrodes.

Materials	Current density ($mA\ g^{-1}$)	Capacity ($mAh\ g^{-1}$)	Cycle number	Initial efficiency	Ref.
$Co_3O_4/ZnCo_2O_4$ hollow spheres	230	934	300	65%	1
$ZnCo_2O_4$/graphene	90	1124.8	90	65%	2
$ZnO/ZnCo_2O_4$	500	730	150	63.7%	3
$ZnCo_2O_4$ film/Ni foam	400	1726	100	76%	4
Zn-Co-O/C	1000 4000	991.7 823.4	200 1000	77.8% —	5
$ZnCo_2O_4$/rGO/CNTs	500	1026.6	200	74.3%	6
$ZnCo_2O_4$/rGO/Ni foam	100 500	1208 1032	100 100	70.4% 65.5%	7
$ZnCo_2O_4$/Carbon cloth	200	1200	160	—	8

$ZnCo_2O_4$/Ni foam	500	1100	50	73.5%	[9]
$ZnCo_2O_4$ nanoflakes/Ni foam	1000	1138	500	—	[10]
$ZnCo_2O_4$ nanoribbon arrays/Ni foam	200	1422	80	81%	[11]
$ZnCo_2O_4$@3DGF@NF	500	1223	240	55%	This work

1. Q. Wang, B. Yu, X. Li, L. Xing and X. Xue, *J. Mater. Chem. A*, 2016, **4**, 425-433.
2. A. K. Rai and J. Kim, *Solid State Sci.*, 2015, **48**, 90-96.
3. M. Zhen, X. Zhang and L. Liu, *RSC Adv.*, 2016, **6**, 43551-43555.
4. J. Yuan, C. Chen, Y. Hao, X. Zhang, S. Gao, R. Agrawal, C. Wang, Z. Xiong, H. Yu and Y. Xie, *J. Electroanal. Chem.*, 2017, **787**, 158-162.
5. C. Ding, X. Jiang, X. Huang, H. Zhang, W. Zhong, Y. Xia and C. Dai, *J. Alloys Compd.*, 2018, **736**, 181-189.
6. Z. Wang, Q. Ru, Y. Mo, L. Guo, X. Chen, X. Hou and S. Hu, *J. Mater. Sci.- Mater. Electro.*, 2017, **28**, 9081-9090.
7. Y. Wang, Y. Zhang, J. Ou, Q. Zhao, M. Liao and D. Xiao, *RSC Adv.*, 2016, **6**, 547-554.
8. B. Liu, J. Zhang, X. Wang, G. Chen, D. Chen, C. Zhou and G. Shen, *Nano Lett.*, 2012, **12**, 3005-3011.
9. B. Qu, L. Hu, Q. Li, Y. Wang, L. Chen and T. Wang, *ACS Appl. Mater. Interfaces*, 2014, **6**, 731-736.
10. X. Hou, S. Bai, S. Xue, X. Shang, Y. Fu and D. He, *J. Alloys Compd.*, 2017, **711**, 592-597.
11. Z. Zhang, X. Zhang, Y. Feng, X. Wang, Q. Sun, D. Yu, W. Tong, X. Zhao and X. Liu, *Electrochim. Acta*, 2018, **260**, 823-829.