Supporting Information

Designed Synthesis of Hollow Co_3O_4 Nanoparticles Encapsulated in Thin Carbon Nanosheet Array for High and Reversible Lithium Storage

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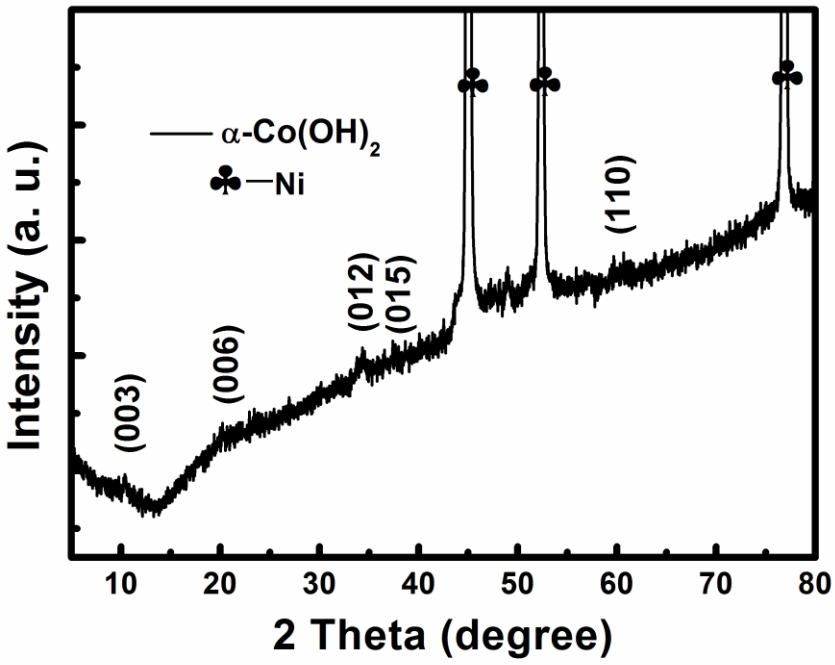


Figure S1. XRD pattern of the $Co(OH)_2$/Ni foam.

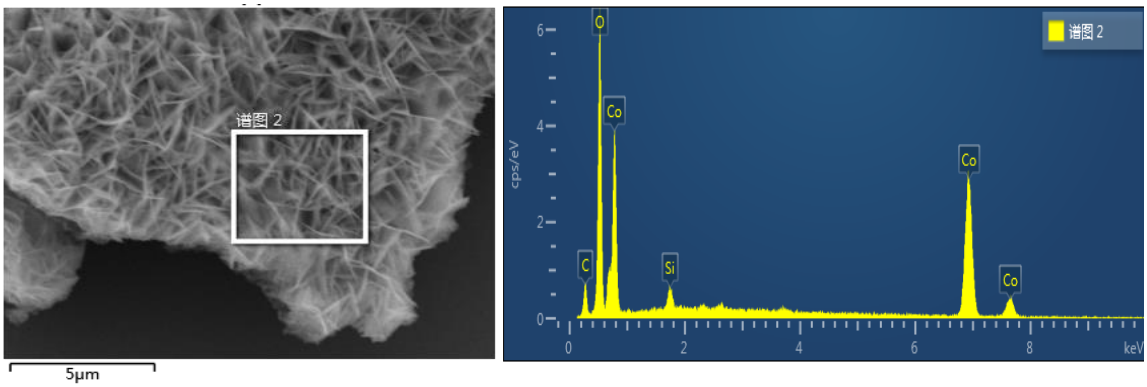


Figure S2. EDS result of the Co_3O_4/carbon nanosheet array.

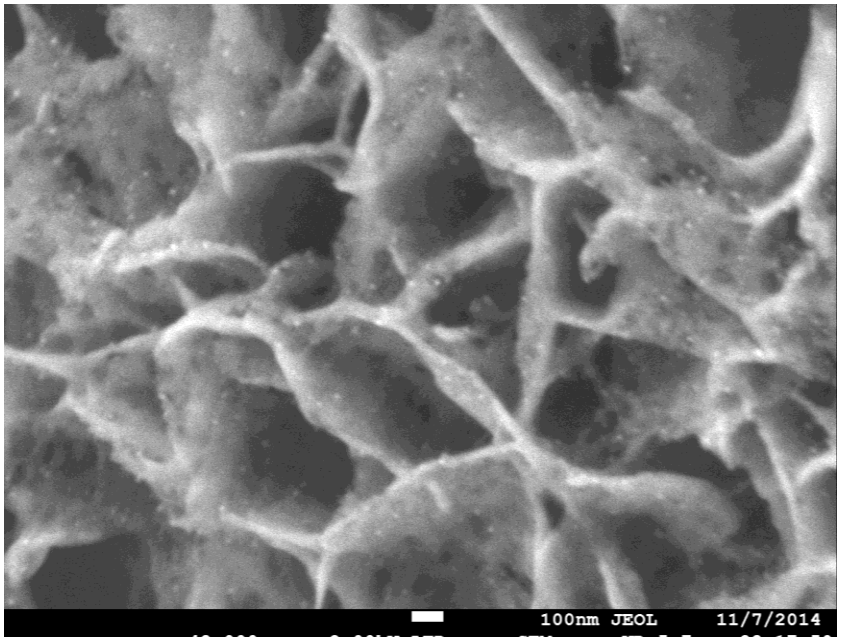
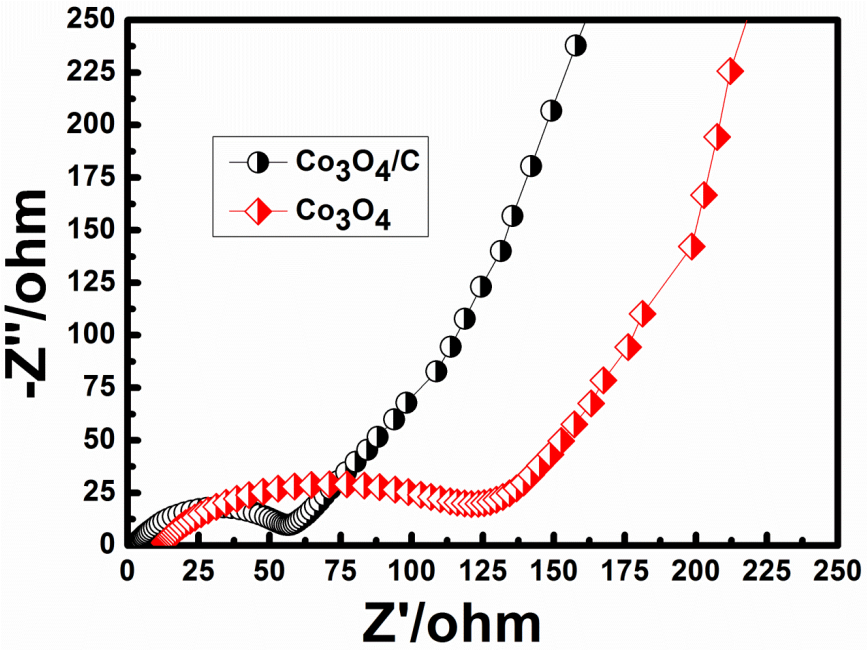


Figure S3. SEM image of the Co_3O_4/carbon nanosheet array after 100 charge-discharge cycles at 500 mAh/g.



Fugire S4. Electrochemical impedence spectra of the Co_3O_4/carbon nanosheet arrays and bare Co_3O_4 NPs after 1st cycle.

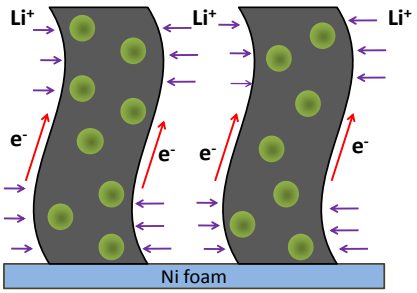


Figure S5. The mechanism illustrative image is presented to show the possible reason of the high Li storage performance for the Co_3O_4/carbon nanosheet array on Ni foam.

Table S1. The comparisons of the electrochemical performance of Co_3O_4/carbon nanosheets array with the reported results.

Active nanomaterials	Current density (mAg^{-1})	Cycle number	Specific capacity ($mAhg^{-1}$)	References
Cobalt oxide/graphene composites	74	20	800	[1]
Co_3O_4-carbon nanotube	200	60	815	[2]
Foam-like freestanding Co_3O_4 nanosheets	150	50	631	[3]
Mesoporous $CoNiO_2$ nanosheets	100	50	450	[4]
Mesoporous Co_3O_4 nanobelt array	177	25	789	[5]
Self-stacked Co_3O_4 nanosheets	178	50	1010	[6]
Lemongrass-like Co_3O_4	450	100	981	[7]
Chrysanthemum-like Co_3O_4 architectures	50	20	400	[8]
Porous Co_3O_4 nanoplates	200	50	750	[9]
Hollow Co_3O_4/carbon nanosheets array	100	100	1052	This work

1. S. Yang, G. Cui, S. Pang, Q. Cao, U. Kolb, X. Feng, J. Maier and K. Mullen, *Chemsuschem*, 2010, **3**, 236-239.
2. L. Zhuo, Y. Wu, J. Ming, L. Wang, Y. Yu, X. Zhang and F. Zhao, *J. Mater. Chem. A*, 2013, **1**, 1141.
3. Y. Fan, H. Shao, J. Wang, L. Liu, J. Zhang and C. Cao, *Chem. Commun.*, 2011, **47**, 3469-3471.
4. Y. Liu, Y. Zhao, Y. Yu, J. Li, M. Ahmad and H. Sun, *New J. Chem.*, 2014, **38**, 3084.
5. Y. Wang, H. Xia, L. Lu and J. Y. Lin, *ACS Nano*, 2010, **4**, 1425-1432.
6. X. Wang, H. Guan, S. M. Chen, H. Q. Li, T. Y. Zhai, D. M. Tang, Y. Bando and D. Golberg, *Chem. Commun.*, 2011, **47**, 12280-12282.
7. Y. J. Fu, X. W. Li, X. L. Sun, X. H. Wang, D. Q. Liu and D. Y. He, *J. Mater. Chem.*, 2012, **22**, 17429-17431.
8. M. Ren, S. Yuan, L. Su and Z. Zhou, *Solid State Sci.*, 2012, **14**, 451-455.
9. Q. M. Su, J. Zhang, Y. S. Wu and G. H. Du, *Nano Energy*, 2014, **9**, 264-272.