Supporting Information

Prepartion and Lithium Storage of Core-Shell Honeycomb-Like Co_3O_4@C Microspheres

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Keywords: Anode material, Co_3O_4, core-shell, honeycomb, lithium storage.

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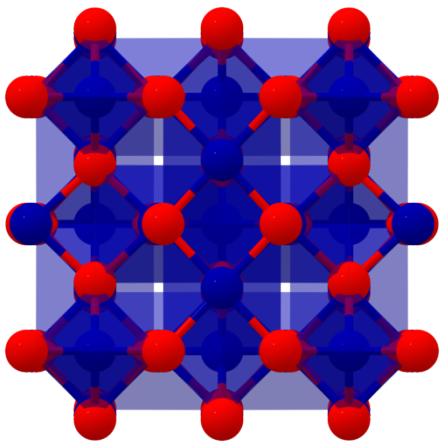

Figure S1. crystal structure of Co_3O_4

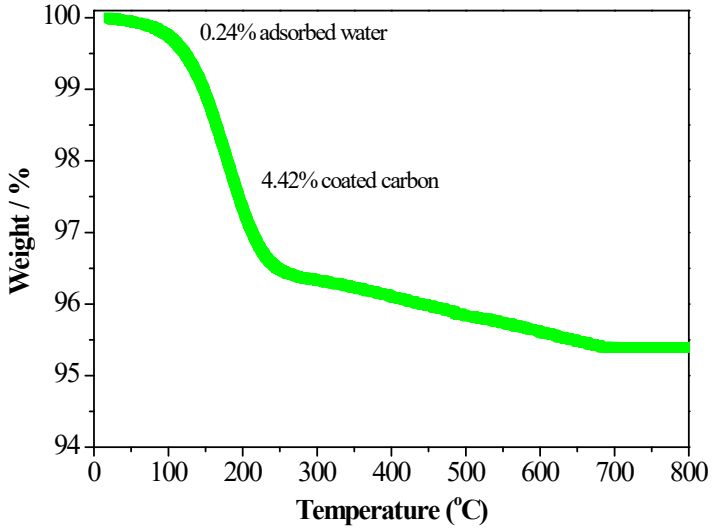

Figure S2. Thermogravimetric curve of $CSHCo_3O_4$@C microspheres

Figure S3. (a-c) SEM images, (d) HRTEM image of $CSHCo_3O_4$@C microspheres

Figure S4. (a) SEM image of $CSHCo_3O_4$@C microsphere, EDX mapping of (b) Co, (c) O, (d) C

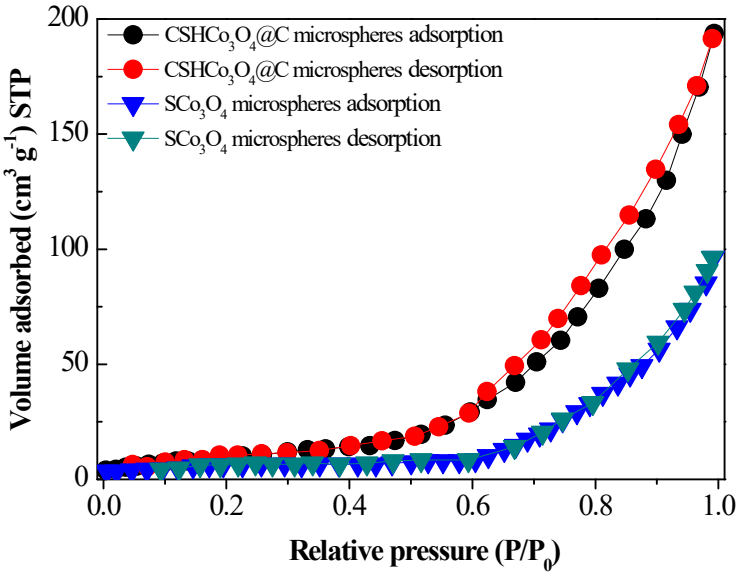

Figure S5. N_2 adsorption/desorption curves of $CSHCo_3O_4$@C and

SCo_3O_4 microspheres

Figure S6. Charge and discharge curves of (a) $CSHCo_3O_4$@C, (b) FCo_3O_4, and (c) SCo_3O_4 microspheres

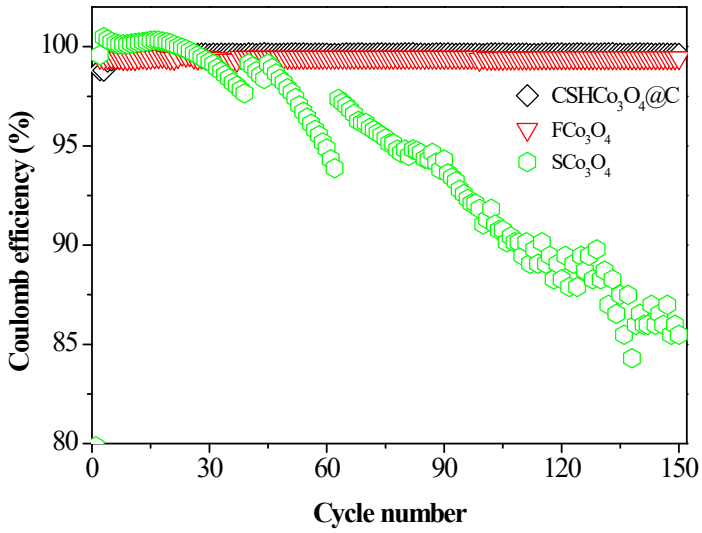

Figure S7. The coulombic efficiency of $CSHCo_3O_4$@C, SCo_3O_4, and FCo_3O_4 microspheres at 0.2 C for 150 cycles

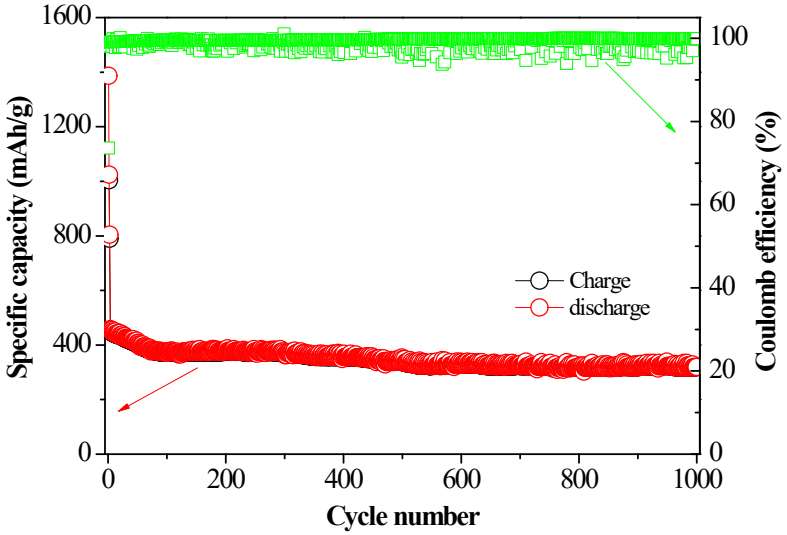

Figure S8. Cycling performance of $CSHCo_3O_4$@C microspheres at 5 C after 1000 cycles

Figure S9. σ values of $CSHCo_3O_4$@C, SCo_3O_4, and FCo_3O_4 microspheres

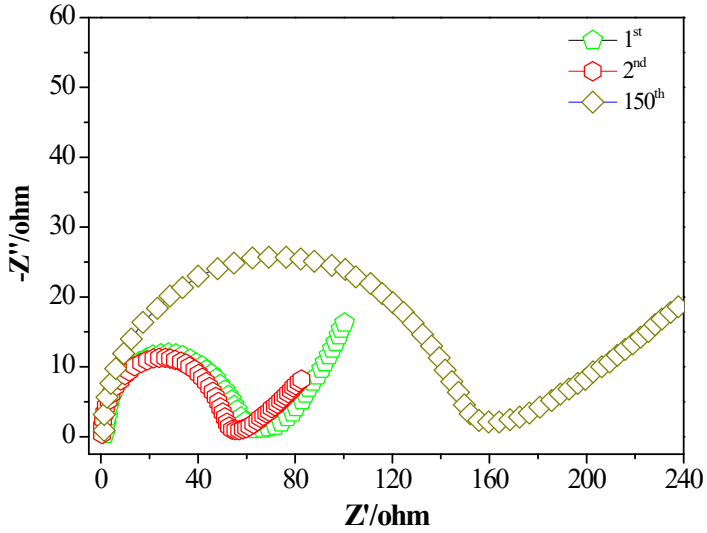

Figure S10. The 1st, 2nd, and 150th electrochemical impedance spectroscopy of CSHCo$_3$O$_4$@C microspheres

Table S1. The rate capability comparison of the reported cobalt oxide materials and CSHCo$_3$O$_4$@C microspheres

Materials	Specific capacity (mA h g^{-1})	Current density (mA g^{-1})	Reference
CoO@N-C nanocubes	309	1000	[1]
G-Co$_3$O$_4$ rose-spheres	462.3	4450	[2]
CNFs/Co$_3$O$_4$	867	2000	[3]
3D hierarchical porous Co$_3$O$_4$	987	1200	[4]
CSHCo$_3$O$_4$@C	**318.9**	**8900**	**This work**

Table S2. Electrochemical performance comparison of the reported cobalt oxide materials with different structure and $CSHCo_3O_4$@C microspheres

Materials	Specific capacity ($mA\ h\ g^{-1}$)	Current density ($mA\ g^{-1}$)	Cycles	Reference
Co_3O_4 hexapods	166	90	100	[5]
CoO nanoparticles	458	200	80	[6]
Pristine CoO nanorods	259	71.6	50	[7]
Co_3O_4/carbon nanowires	534	100	20	[8]
$CSHCo_3O_4$@C	**1091.2**	**178**	**150**	**This work**

Table S3. The resistance values of $CSHCo_3O_4$@C, FCo_3O_4, SCo_3O_4 microspheres after fitting of EIS data

Materials	R_s (ohm/cm^2)	Q_1 ($\mu F/cm^2$)	R_{ct} (ohm/cm^2)	Q_2 ($\mu F/cm^2$)
$CSHCo_3O_4$@C	1.38	1.86	82.15	2534.18
FCo_3O_4	1.09	1.57	112.36	5867.39
SCo_3O_4	1.21	1.73	135.78	1037.47

Table S4. The resistance values of $CSHCo_3O_4$@C microspheres during cycling

$CSHCo_3O_4$@C	R_s (ohm/cm^2)	Q_1 (μF/cm^2)	R_{ct} (ohm/cm^2)	Q_2 (μF/cm^2)
1st	3.57	0.76	63.37	3123.56
2nd	2.83	0.37	53.85	3908.51
150th	1.69	1.35	157.63	7325.56

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