

Supporting Information

Table S1. Different ZIFs-derives nanomaterials employed in cathodes as chemical regulators for LSBs.

Sulfur host/ separator coating layer	Dimension; morphology	Scale (nm)	Sulfur loading; sulfur mass ratio in cathode (mg cm ⁻² ; %; μL mg ⁻¹)	Voltage window (vs. Li ⁺ /Li) (V)	Electrolyte; volume	Cycle performance	Rate performance	Ref
<i>Pristine and modified ZIFs</i>								
ZIF-8	3D; Rhombic dodecahedron	N/A	N/A; 16.8%	1.0-3.0	1.0 M LiTFSI & 0.1 M LiNO ₃ in DOL/DME (v:v=1:1); N/A	0.1C/200 th /420 mAh g ⁻¹	1C/450 mAh g ⁻¹	151
ZIF-8	3D; Rhombic dodecahedron	150/1000/3000	N/A; 30%	1.8-2.8	0.6 M LiTFSI & 0.1 M LiNO ₃ in DOL/DME (v:v=1:1); 60 μL	(Best 150 nm) 0.5C/100 th /~700 mAh g ⁻¹	(150-200 nm) 1C/710 mAh g ⁻¹	49
ZIF-8	3D; Rhombic dodecahedron	15/70/200/800/ 2000	N/A; 30%	1.8-2.8	0.6 M LiTFSI & 0.1 M LiNO ₃ in DOL/DME (v:v=1:1); 60 μL	(Best 200 nm) 0.5C/250 th /~712 mAh g ⁻¹	N/A	153
ZIF-8	3D; Porous framework	~20	2, 3.6, 7.4; 53.3%	1.7-2.8	1.0 M LiTFSI & 0.1 M LiNO ₃ in DOL/DME (v:v=1:1); 15, 8.74, 4.25 μL mg ⁻¹	(2 mg cm ⁻²) 0.2C/100 th /1060 mAh g ⁻¹ ; 2C/500 th /674 mAh g ⁻¹ ; (3.6 mg cm ⁻²) N/A/200 th /2.8 mAh cm ⁻² ; (7.4 mg cm ⁻²) N/A/200 th /4.5 mAh cm ⁻²	(2 mg cm ⁻²) 2C/803 mAh g ⁻¹ ; (3.6 mg cm ⁻²) 2C/~700 mAh g ⁻¹ ; (7.4 mg cm ⁻²) 2C/~450 mAh g ⁻¹	154
ZIF-8@CNTs sponge	3D; Rhombic dodecahedron	40/500	N/A, 8; 64%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 20 μL mg ⁻¹	(Best 500 nm) 0.1C/100 th /1269 mAh g ⁻¹ ; (8 mg cm ⁻²) 0.1C/100 th /1250 mAh g ⁻¹	1C/840 mAh g ⁻¹	156
Ni-doped ZIF- 8@CC	3D; Rhombic dodecahedron	~220	1.5, 5.5; 10, 29%	1.8-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 30, 80 μL	(1.5 mg cm ⁻²) 0.2C/50 th /1036 mAh g ⁻¹ ; 1C/500 th /715 mAh g ⁻¹ ; (5.5 mg cm ⁻²) 0.13C/100 th /~900 mAh g ⁻¹	(1.5 mg cm ⁻²) 3C/666 mAh g ⁻¹	157
ZIF-67-PPy	3D; Rhombic dodecahedron	~500	0.5-1.2; 37.8%	1.7-2.7	1.0 M LiTFSI in DOL/DME (v:v=1:1); 35 μL	0.5C/200 th /353.6 mAh g ⁻¹	1C/500 mAh g ⁻¹	158
ZIF-67@MnO ₂	3D; Rhombic dodecahedron	~500	N/A; 52.5%	1.6-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 30 μL	0.5C/100 th /895 mAh g ⁻¹ ; 1C/100 th /686 mAh g ⁻¹ ; 2C/100 th /484 mAh g ⁻¹	5C/~500 mAh g ⁻¹ ; 10C/210 mAh g ⁻¹	159
ZIF-67	3D; Rhombic dodecahedron	80-100	1.6; 49%	1.5-3.0	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	2C/300 th /816 mAh g ⁻¹	2C/826 mAh g ⁻¹	56
ZIF-8@3DC	3D; Porous framework	N/A	1.8-2.0; 70%	1.7-2.8	1.0 M LiTFSI & 1.5 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	1C/200 th /943.8 mAh g ⁻¹ ; 3C/800 th /545.4 mAh g ⁻¹	3C/>500 mAh g ⁻¹	161
ZIF-8	2D; Membrane	N/A	2.5; 70%	N/A	1.0 M LiTFSI & 0.1 M LiNO ₃ in DOL/DME (v:v=1:1); N/A	0.4C/200 th /1231.3 mAh g ⁻¹ ; 0.8C/200 th /514.8 mAh g ⁻¹	N/A	57
ZIF-L(Co)-PMIA	2D; Nanosheet	1000	N/A, 9.23, 6.92; N/A	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	0.2C/350 th /961.1 mAh g ⁻¹ ; (6.92 mg cm ⁻²) 0.2C/150 th /4.11 mAh cm ⁻² ; (9.23 mg cm ⁻²) 0.2C/150 th /~8 mAh cm ⁻²	2C/774.8 mAh g ⁻¹	162

Zn/Co-ZIF	2D; Nanosheet	~2000	2.5, 5.3; 74.6%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 20 μ L mg ⁻¹	(2.5 mg cm ⁻²) 2C/1000 th /630 mAh g ⁻¹ ; (5.3 mg cm ⁻²) 0.2C/60 th /5.3 mAh cm ⁻²	(2.5 mg cm ⁻²) 3C/788 mAh g ⁻¹	163
CPP@PVA/ZIF-8	3D; Rhombic dodecahedron	500-600	1.2; 60%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 35 μ L	0.2C/300 th /~800 mAh g ⁻¹	(1.2 mg cm ⁻²) 3C/701.9 mAh g ⁻¹ ; (2.0 mg cm ⁻²) 3C/646.4 mAh g ⁻¹	164
ZIFs derived NC								
microporous carbon polyhedrons (MPCPs)	3D; Rhombic dodecahedron	~1500	N/A; 34.4%, 50.4%	1.2-3.0	①1.0 M LiPF ₆ in EC/DEC (w:w=1:1) ②1.0 M LiTFSI in TEGDME ③1.0 M LiTFSI in DOL/DME (v:v=1:1); N/A	(Best 34.4%, ③) 100 mA g ⁻¹ /100 th /490 mAh g ⁻¹ ;	(34.4%, ①) 1000 mA g ⁻¹ /~200 mAh g ⁻¹ ; (50.4%, ③) 1000 mA g ⁻¹ /~200 mAh g ⁻¹	167
Hollow N-doped carbon (HNC)	3D; Rhombic dodecahedron	~400	1, 5; 49%	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 30 μ L mg ⁻¹	(1 mg cm ⁻²) 1C/500 th /404.3 mAh g ⁻¹ ; (5 mg cm ⁻²) 0.2C/200 th /~250 mAh g ⁻¹	(1 mg cm ⁻²) 2C/433 mAh g ⁻¹	168
Hierarchical porous carbon (HPC)	2D; Nanosheet	2000	2; 56%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 10 μ L mg ⁻¹	0.2C/100 th /800 mAh g ⁻¹ ; 0.5C/300 th /587 mAh g ⁻¹	2C/785 mAh g ⁻¹	169
NC	3D; Rhombic dodecahedron	~500	0.8-1.0; 41.25%, 45%	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	(Best 800 °C, 41.25%) 800 mA g ⁻¹ /400 th /618 mAh g ⁻¹	(Best 800 °C, 41.25%) 1600 mA g ⁻¹ /700 mAh g ⁻¹	170
rGO/ZIF-8(C)	3D; Rhombic dodecahedron	~100	1.5-2.5; 56%	1.5-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	1C/500 th /736 mAh g ⁻¹	2C/688 mAh g ⁻¹	171
CNT-threaded nitrogen-doped porous carbon film (CNCF) S, N	3D; Irregular polyhedron	~600	3, 6.9; 70%	1.8-2.6	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	(3 mg cm ⁻²) 1C/1800 th /614 mAh g ⁻¹ ; (6.9 mg cm ⁻²) 0.2C/300 th /790 mAh g ⁻¹	(3 mg cm ⁻²) 10C/652 mAh g ⁻¹	172
dually doped porous carbon nanofibers (SN- PCNF)	3D; Rhombic dodecahedron	N/A	1.3-1.5; 83.3%	1.6-3.0	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	0.1C/150 th /554 mAh g ⁻¹	0.5C/553 mAh g ⁻¹	173
Metal/NC								
RGO/C-Co	3D; Rhombic dodecahedron	~900	1; 56.7%	1.8-2.6	1.0 M LiTFSI & 0.1 M LiNO ₃ in DOL/DME (v:v=1:1); N/A	0.3 A g ⁻¹ /300 th /949 mAh g ⁻¹	5 A g ⁻¹ /479 mAh g ⁻¹	175
Co-N/KB	3D; Irregular polyhedron	N/A	3-5; 56%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 10, 20, 30 μ L mg ⁻¹	(5 mg cm ⁻² , 30 μ L mg ⁻¹) 0.1C/100 th /838 mAh g ⁻¹ ; (3 mg cm ⁻² , 30 μ L mg ⁻¹) 1C/400 th /546 mAh g ⁻¹	(3 mg cm ⁻² , 30 μ L mg ⁻¹) 1C/629 mAh g ⁻¹	176
Co@NCNP/NCNT	3D; Rhombic dodecahedron	~1500	4, 6, 10, 14; 17.5%, 21%, 24.5%	1.8-2.7	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A (gel electrolyte)	(4 mg cm ⁻²) 2 mA cm ⁻² /500 th /555 mAh g ⁻¹ ; (14 mg cm ⁻²) 2 mA cm ⁻² /200 th /350 mAh g ⁻¹	(4 mg cm ⁻²) 2 mA cm ⁻² /611 mAh g ⁻¹	177
Co-NC@N-HCSs	3D; Rhombic dodecahedron	~100	1.23-1.76; 64%	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME	(1.334 mg cm ⁻²) 1C/450 th /399.7 mAh g ⁻¹	(1.61 mg cm ⁻²) 3C/495.5 mAh g ⁻¹	178

					(v:v=1:1); 12 $\mu\text{L mg}^{-1}$			
Co-NC@C	3D; Rhombic dodecahedron	~1000	1.0-1.4, 3.8-10.2; 56%	1.7-2.7	1.0 M LiTFSI & 0.2 M LiNO ₃ in DOL/DME (v:v=1:1); 8.3-16 $\mu\text{L mg}^{-1}$	(1.0-1.4 mg cm ⁻²) 1C/2700 th /454.9 mAh g ⁻¹ ; (10.2 mg cm ⁻²) 0.1C/80 th /6.3 mAh cm ⁻²	(1.0-1.4 mg cm ⁻²) 5C/635.8 mAh g ⁻¹	179
C-Co/TiO ₂	3D; Rhombic dodecahedron	300-400	1.5; 49%	1.5-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	1C/300 th /466.3 mAh g ⁻¹ ; 2C/300 th /384.5 mAh g ⁻¹	3C/383.8 mAh g ⁻¹	180
Cellular Co@N-C	2D; Honeycomb-like nanosheet	6000	25, 3.6, 4.9, 7.5; 49%, 76.5%	1.7-2.7	0.5 M LiOTf & 0.5 M LiNO ₃ in DOL/DME (v:v=1:1); 8.3-16 $\mu\text{L mg}^{-1}$	(3.6 mg cm ⁻²) 2C/850 th /514 mAh g ⁻¹ ; (7.5 mg cm ⁻²) 1C/300 th /~400mAh g ⁻¹	(3.6 mg cm ⁻²) 5C/485 mAh g ⁻¹ ; 10C/390 mAh g ⁻¹	181
Co-NGC@NCNF	N/A	N/A	2, 4.2, 6.5; 77%	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 12 $\mu\text{L mg}^{-1}$	(2 mg cm ⁻²) 2C/500 th /556.9 mAh g ⁻¹ ; (6.5 mg cm ⁻²) 0.5C/150 th /~650mAh g ⁻¹ (1.5 mg cm ⁻²) 4C/800 th /~500 mAh g ⁻¹ ;	(2 mg cm ⁻²) 5C/671 mAh g ⁻¹	182
Co@NC	2D; Nanosheet	5000 (length) 200 (thickness) 3000 (width)	1.5, 6.11, 10.73; 60%	1.7-2.8	1.0 M LiTFSI & 0.2 M LiNO ₃ in DOL/DME (v:v=1:1); 30, 40, 50 μL	(6.11 mg cm ⁻²) 0.2C/180 th /3.7 mAh cm ⁻² ; (10.73 mg cm ⁻²) 0.2C/120 th /6.21 mAh cm ⁻²	(1.5 mg cm ⁻²) 4C/634 mAh g ⁻¹	27
Co-SAs/NC	3D; Rhombic dodecahedron	~100	1.5, 4.3; 56%	1.8-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 15, 5.7 $\mu\text{L mg}^{-1}$	(1.5 mg cm ⁻²) 1C/500 th /667 mAh g ⁻¹ ; (4.3 mg cm ⁻²) 0.2C/150 th /935 mAh g ⁻¹ (2 mg cm ⁻²)	(1.5 mg cm ⁻²) 2C/815 mAh g ⁻¹	79
Co-SAs	3D; Rhombic dodecahedron	~600	2, 3, 4, 5; 52.5%	1.7-2.7	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 35-50 μL	(1 mg cm ⁻²) 1C/600 th /737 mAh g ⁻¹ ; (5 mg cm ⁻²) 1C/150 th /~550 mAh g ⁻¹	(2 mg cm ⁻²) 10C/670 mAh g ⁻¹	185
Co-N ₄ @2D/3D carbon	2D/3D; Nanoflower	~3000	1.0, 2.8, 3.7, 4.6; 73%	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 15, 8 $\mu\text{L mg}^{-1}$	(1 mg cm ⁻²) 1C/500 th /700 mAh g ⁻¹ ; (4.6 mg cm ⁻²) 0.2C/100 th /~3.9 mAh cm ⁻²	(1 mg cm ⁻²) 5C/695 mAh g ⁻¹	186
CoSA-N-C	2D; Nanosheet	N/A	1.2, 4.9; 60%	1.7-2.8	1.0 M LiTFSI & 0.2 M LiNO ₃ in DOL/DME (v:v=1:1); 30, 40 μL	(1.2 mg cm ⁻²) 1C/1000 th /675 mAh g ⁻¹ ; (4.9 mg cm ⁻²) 0.2C/120 th /~4.3 mAh cm ⁻²	(1.2 mg cm ⁻²) 5C/624 mAh g ⁻¹	187
Co-N ₂	2D; Nanosheet	N/A	1, 7; 56%	1.8-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 17.3, 7.7 $\mu\text{L mg}^{-1}$	(1 mg cm ⁻²) 0.5C/700 th /571 mAh g ⁻¹ ; (4.9 mg cm ⁻²) 0.1C/70 th /5.9 mAh cm ⁻²	(1 mg cm ⁻²) 2C/799 mAh g ⁻¹	184
ZnN-cZIF-8	3D; Rhombic dodecahedron	~1000	5.74, 6.38; 56%	1.8-2.8	1.0 M LiTFSI & 0.1 M LiNO ₃ in DOL/DME (v:v=1:1); 6 $\mu\text{L mg}^{-1}$	(5.74 mg cm ⁻²) 0.2C/200 th /~700 mAh g ⁻¹	(6.38 mg cm ⁻²) 2C/~700 mAh g ⁻¹	188
Ag/VN@Co/NCNT	1D; Nanowire	~1000	1.0-1.3, 2.8, 5.1, 7.2, 10.3; 60%	1.7-2.8	1.0 M LiTFSI & 0.1 M LiNO ₃ in DOL/DME (v:v=1:1); 20, 10-15 $\mu\text{L mg}^{-1}$	(1.0-1.3 mg cm ⁻²) 2C/1000 th /600 mAh g ⁻¹ ; (10.3 mg cm ⁻²) 0.5C/100 th /4.37 mAh cm ⁻²	4C/767.7 mAh g ⁻¹	189
Ni-N ₅ /HNPC	3D; Hollow rhombic dodecahedron	~400	1.6, 2.7, 5.1; 64%	1.7-2.7	1.0 M LiTFSI & 0.1 M LiNO ₃ in DOL/DME (v:v=1:1); 20 μL	(1.6 mg cm ⁻²) 0.5C/500 th /798 mAh g ⁻¹ ; (5.1 mg cm ⁻²) 0.1C/80 th /~4.0 mAh cm ⁻²	(1.6 mg cm ⁻²) 4C/684 mAh g ⁻¹	190

Co _{0.75} Ni _{0.25} -NC/CNTs	1D; Nanotube	~100	1, 42%	1.7-2.8	N/A; N/A	0.2C/200 th /~600 mAh g ⁻¹	2C/~600 mAh g ⁻¹	191
Ni ₂ Co@rGO	3D; Irregular polyhedron	~2500	2, 4, 6.2; 60%	1.7-2.7	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 10, 7.5, 4.8 μL mg ⁻¹	(2 mg cm ⁻²) 1C/500 th /650.7 mAh g ⁻¹ ; (6.2 mg cm ⁻²) 0.2C/50 th /~5.7 mAh cm ⁻²	(2 mg cm ⁻²) 5C/437.3 mAh g ⁻¹	192
N, S-Mo ₂ C/C-ACF	3D; Nanoflower	~5000	0.9-1.3, 2.3; 60%	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 15 μL mg ⁻¹	(0.9-1.3 mg cm ⁻²) 1C/600 th /~550 mAh g ⁻¹ ; (2.3 mg cm ⁻²) 0.5C/80 th /800 mAh g ⁻¹	(0.9-1.3 mg cm ⁻²) 5C/630 mAh g ⁻¹	193
Metal (hydr)oxides/NC								
N-Co ₃ O ₄ @N-C/rGO	3D; Rhombic dodecahedron	~4000	2.13, 5.89; 64%	1.7-2.7	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 30 μL	(2.13 mg cm ⁻²) 2C/1000 th /611 mAh g ⁻¹ ; (5.89 mg cm ⁻²) 0.2C/500 th /568 mAh g ⁻¹	(2.13 mg cm ⁻²) 3C/652 mAh g ⁻¹	197
ZnO in ZDC@ZIF-8	3D; Rhombic dodecahedron	~600	N/A, 6.9; 60%	1.8-2.6	1.0 M LiTFSI & 0.1 M LiNO ₃ in DOL/DME (v:v=1:1); 20 μL	1C/300 th /683 mAh g ⁻¹ ; (6.9 mg cm ⁻²) 2.3 mA cm ⁻² /100 th /962 mAh g ⁻¹	3C/563 mAh g ⁻¹	198
ZPC@HMn ₃ O ₄ /NC	3D; Hollow dodecahedron	~1000	1.5; 56%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	5C/1000 th /301 mAh g ⁻¹	8C/430 mAh g ⁻¹	200
Ni-Co oxide/CNTs	1D; Nanotube	~60	1; N/A	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	0.2C/600 th /650 mAh g ⁻¹	2C/232.3 mAh g ⁻¹	202
C/NiCo ₂ O ₄	3D; Irregular polyhedron	~1800	N/A; 49%	1.5-3.0	1.0 M LiTFSI & 0.5 M Li ₂ S ₆ & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	0.5C/500 th /673 mAh g ⁻¹	2C/518 mAh g ⁻¹	203
ZnCo ₂ O ₄ @Ti ₃ C ₂	3D; Irregular polyhedron	N/A	1.0-1.5; 52.5%	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	0.5C/400 th /306 mAh g ⁻¹	2C/429.3 mAh g ⁻¹	204
CH@LDH	3D; Double-shell hollow rhombic dodecahedron	~1000	2.8-3.2; 52.5%	1.7-2.8	1.0 M LiTFSI & 0.2 M LiNO ₃ in DOL/DME (v:v=1:1); N/A	(3 mg cm ⁻²) 0.1C/100 th /653 mAh g ⁻¹	(3 mg cm ⁻²) 1C/500 mAh g ⁻¹	207
ZnCo-LDH-CNT	1D; Nanotube	100	1.5, 3, 5.5; 60%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A, 11, 6 μL mg ⁻¹	(1.5 mg cm ⁻²) 1C/500 th /687.8 mAh g ⁻¹ ; (5.5 mg cm ⁻²) 0.1C/100 th /4.4 mAh cm ⁻²	(1.5 mg cm ⁻²) 5C/730.1 mAh g ⁻¹	208
Metal chalcogenides/NC								
CoS ₂ -NC	3D; Rhombic dodecahedron	400-500	1-2; 49%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 40 μL mg ⁻¹	1C/300 th /600 mAh g ⁻¹	10C/268 mAh g ⁻¹	209
CoS ₂ -SPAN-CNT	1D; Nanofiber	~459	0.7-5.9; 43.2%	1.0-3.0	1.0 M LiPF ₆ in EC/DME/DEC (v:v:v=1:1:1); 25 μL mg ⁻¹	(2.4 mg cm ⁻²) 1C/400 th /880 mAh g ⁻¹ ; (4.6 mg cm ⁻²) 0.2C/50 th /4.2 mAh cm ⁻²	(2.4 mg cm ⁻²) 5C/223 mAh g ⁻¹	210
CoS ₂ @NGCNs	3D; Hollow sphere	500	1.1-1.5; N/A	1.5-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	1C/300 th /519.4 mAh g ⁻¹	2C/525.3 mAh g ⁻¹	142
Z-CoS ₂	3D; Hollow rhombic dodecahedron	~2000	N/A, 2.5-2.9; 47.2%	1.7-3.0	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	1C/1000 th /440 mAh g ⁻¹ ; (2.9 mg cm ⁻²) 0.2C/150 th /2.2 mAh cm ⁻²	5C/430 mAh g ⁻¹	211
CNTs/Co ₃ S ₄ @NC	3D; Hollow cubic	400	7.4; 74%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME	5C/1000 th /~720 mAh g ⁻¹	5C/850 mAh g ⁻¹	212

									(v:v=1:1); 50-150 μ L
H-LDH/Co ₉ S ₈	3D; Hollow rhombic dodecahedron	~1000	1.5-2.0, 3.0, 4.0; 64%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 40 μ L	(1.5-2.0 mg cm ⁻²) 1C/1500 th /~250 mAh g ⁻¹ ; (3 mg cm ⁻²) 1C/300 th /400 mAh g ⁻¹	2C/669.6 mAh g ⁻¹	213	
CC@CoSNC	2D; Nanosheet	N/A	1.2, 3.7, 8.2; N/A	1.7-2.8	1.0 M LiTFSI & 20 mM CoCp ₂ & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 15, 8 μ L mg ⁻¹	(1.2 mg cm ⁻²) 2C/1200 th /~600 mAh g ⁻¹ ; (4.6 mg cm ⁻²) 0.5C/300 th /734 mAh g ⁻¹ ; (8.2 mg cm ⁻²) 0.1C/55 th /~7 mAh cm ⁻²	(1.2 mg cm ⁻²) 4C/665 mAh g ⁻¹ ; (3.7 mg cm ⁻²) 0.5C/730 mAh g ⁻¹	214	
CoSe ₂ /C	3D; Rhombic dodecahedron	700	1.2, 4.4; 51.1%	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 30, 60 μ L	(1.2 mg cm ⁻²) 1C/400 th /503.4 mAh g ⁻¹ ; (4.4 mg cm ⁻²) 0.1C/100 th /537.5 mAh g ⁻¹	(1.2 mg cm ⁻²) 2C/~700 mAh g ⁻¹	215	
Co-Te/NC	3D; Hollow sphere	500	1.5; 56%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	2C/1000 th /558 mAh g ⁻¹	2C/898 mAh g ⁻¹	51	
CoSe ₂ /Co ₃ O ₄ @NC-CNT	3D; Hollow rhombic dodecahedron	~1000	2, 5.2, 8.4, 10.1; 64%	1.5-3.0	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 48 μ L	(2 mg cm ⁻²) 2C/500 th /602 mAh g ⁻¹ ; (10.1 mg cm ⁻²) 0.5C/100 th /557 mAh g ⁻¹	(2 mg cm ⁻²) 5C/688 mAh g ⁻¹	216	
ZnS-FeS/NC	3D; Hollow rhombic dodecahedron	~100	1.03-3.42; 49%	1.6-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	4C/200 th /600 mAh g ⁻¹ ; (3.34 mg cm ⁻²) 0.2C/200 th /796 mAh g ⁻¹	4C/718 mAh g ⁻¹	217	
ZnSe/NHC	3D; Hollow rhombic dodecahedron	~200	1, 3.2; 60%	1.7-2.8	1.0 M LiTFSI & 0.2 M LiNO ₃ in DOL/DME (v:v=1:1); 20, 50 μ L	(1 mg cm ⁻²) 3C/800 th /450 mAh g ⁻¹ ; (3.2 mg cm ⁻²) 1C/600 th /540.5 mAh g ⁻¹	(1 mg cm ⁻²) 3C/542 mAh g ⁻¹ ; (3.2 mg cm ⁻²) 3C/457.7 mAh g ⁻¹	218	
Ni _{0.1} Zn _{0.1} Co _{0.8} Se ₂ /NC	3D; Irregular polyhedron	~1000	1.0, 3.16, 4.60; 42%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 12, 7.6, 5.2 μ L mg ⁻¹	(1 mg cm ⁻²) 1C/400 th /550 mAh g ⁻¹ ; (4.60 mg cm ⁻²) 0.1C/100 th /598 mAh g ⁻¹	(1.0 mg cm ⁻²) 2C/681.74 mAh g ⁻¹	219	
CC@CoSe ₂ -ZnSe/NC	2D; Nanosheet	100 (thickness) 1200 (width)	1, 5.8, 7.6, 9.2; 56%	1.7-2.8	1.0 M LiTFSI & 0.2 M LiNO ₃ in DOL/DME (v:v=1:1); 30 μ L	(1 mg cm ⁻²) 1C/1800 th /400 mAh g ⁻¹ ; (9.2 mg cm ⁻²) 0.02C/45 th /489 mAh g ⁻¹	(1.0 mg cm ⁻²) 3C/764 mAh g ⁻¹	220	
Metal nitrides/NC									
CC@Co ₄ N/NC	2D; Nanosheet	N/A	1; N/A	1.7-2.8	1.0 M LiTFSI & 2 M Li ₂ S ₆ & 0.2 M LiNO ₃ in DOL/DME (v:v=1:1); 30 μ L	1C/400 th /745 mAh g ⁻¹	3C/~700 mAh g ⁻¹	223	
<i>h</i> -Co ₄ N@NC	3D; Hollow rhombic dodecahedron	~600	1.5, 3, 4.5, 6, 8; 60.4%	1.0-3.0	1.0 M LiTFSI & 3 wt% LiNO ₃ in DOL/DME (v:v=1:1); N/A	(1.5 mg cm ⁻²) 8C/400 th /481 mAh g ⁻¹ ; (4.5 mg cm ⁻²) 2C/400 th /516 mAh g ⁻¹ ; (8 mg cm ⁻²) N/A/150 th /~450 mAh g ⁻¹	(1.5 mg cm ⁻²) 8C/574 mAh g ⁻¹	224	
Co _{5.47} N _x -C	3D; Hollow sphere	200	1.8-2.2; 60.62%	1.7-2.6	1.0 M LiTFSI & 0.4 M LiNO ₃ in DOL/DME (v:v=1:1); N/A	2C/1000 th /425 mAh g ⁻¹	10C/320 mAh g ⁻¹	225	

Co-Co ₃ Mo ₃ N/NC	3D; Irregular polyhedron	~400	1.0-5.4; 52.5%	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 30, 15 μ L mg ⁻¹	(1.5 mg cm ⁻²) 1C/600 th /447 mAh g ⁻¹ ; (5.4 mg cm ⁻²) 0.1C/120 th /3.64 mAh cm ⁻²	(1.0-1.2 mg cm ⁻²) 3C/704.7 mAh g ⁻¹	226
<i>Metal phosphides/NC</i>								
CoP@HPCN	3D; Hollow rhombic dodecahedron	~1000	1.1, 2.3, 3.7; 56%	1.8-2.8	1.0 M LiTFSI & 0.2 M LiNO ₃ in DOL/DME (v:v=1:1); 30, 20, 15 μ L mg ⁻¹	(3.7 mg cm ⁻²) 0.2C/200 th /579 mAh g ⁻¹	(1.1 mg cm ⁻²) 3C/527.7 mAh g ⁻¹	228
CoP@N-C	3D; Rhombic dodecahedron	~500	1.5, 7.0; 64%	1.7-2.8	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); 12-15 μ L mg ⁻¹	(1.5 mg cm ⁻²) 1C/500 th /672 mAh g ⁻¹ ; (7.0 mg cm ⁻²) 1 mA cm ⁻² /100 th /891 mAh g ⁻¹ (2.31 mg cm ⁻²)	(1.5 mg cm ⁻²) 5C/712 mAh g ⁻¹	229
CoP@G/CC	2D; Nanosheet	N/A	2.31, 4.62, 9.55, 10.83; N/A	1.7-2.8	0.5 M LiTFSI & 0.5 wt% LiNO ₃ in DOL/DME (v:v=1:1); 12 μ L mg ⁻¹	2C/500 th /~900 mAh g ⁻¹ ; (9.55 mg cm ⁻²) 0.1C/60 th /5 mAh cm ⁻² ; (10.83 mg cm ⁻²) 0.05C/80 th /7 mAh cm ⁻²	(2.31 mg cm ⁻²) 3C/931 mAh g ⁻¹	230
CNT/CPO/CPNC	3D; Hollow rhombic dodecahedron	~1000	1.5-1.8; 49%	1.7-3.0	1.0 M LiTFSI & 1 wt% LiNO ₃ in DOL/DME (v:v=1:1); ~15 μ L mg ⁻¹	1C/500 th /681.5 mAh g ⁻¹	2C/544.3 mAh g ⁻¹	231
NCNT@Co-CoP	1D; Nanotube	100	4, 10; N/A	1.7-2.8	1.0 M LiTFSI & 2 wt% LiNO ₃ in DOL/DME (v:v=1:1); 15, 7 μ L mg ⁻¹	(4 mg cm ⁻²) 5C/900 th /603.9 mAh g ⁻¹ ; (10 mg cm ⁻²) 2C/100 th /4.4 mAh cm ⁻²	(4 mg cm ⁻²) 5C/710.6 mAh g ⁻¹	232