Supporting Information

Benzoate Acid-Dependent Lattice Dimension of Co-MOFs and MOF-Derived CoS_2@CNTs with Tunable Pore Diameters for Supercapacitors

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Table S1 Selected Bond Lengths [Å] and Angles [º] for Co-MOFs **1**-**3**.

		1	
Co(1)-O(2)	2.080(2)	Co(1)-O(4)#1	2.037(2)
Co(1)-O(1)	2.287(2)		
Co(1)-N(1)	2.071(2)	Co(1)-N(3)	2.080(2)
O(4)#1-Co(1)-O(2)	108.51(8)	N(1)-Co(1)-O(2)	104.20(9)
N(3)-Co(1)-O(2)	131.92(9)	O(4)#1-Co(1)-N(1)	91.61(9)
O(4)#1-Co(1)-N(3)	109.10(10)	N(1)-Co(1)-N(3)	103.58(10)
O(4)#1-Co(1)-O(1)	166.98(8)	N(1)-Co(1)-O(1)	84.91(9)
N(3)-Co(1)-O(1)	83.91(9)	O(2)-Co(1)-O(1)	60.55(7)
		2	
Co(1)-O(7)#1	2.039(5)	Co(1)-O(2)	2.043(6)
Co(1)-O(1)	2.408(8)	Co(1)-O(8)	2.436(7)
Co(1)-N(1)	2.077(7)	Co(1)-N(4)#2	2.086(7)
Co(2)-O(3)	2.070(5)	Co(2)-O(5)	2.075(6)
Co(2)-O(4)	2.296(7)	Co(2)-O(6)	2.337(7)
Co(2)-N(8)#2	2.094(7)	Co(2)-N(5)	2.095(7)
O(7)#1-Co(1)-O(2)	150.0(3)	O(7)#1-Co(1)-N(1)	100.9(3)
O(2)-Co(1)-N(1)	99.7(3)	O(7)#1-Co(1)-N(4)#2	98.3(3)
O(2)-Co(1)-N(4)#2	98.2(3)	N(1)-Co(1)-N(4)#2	102.6(3)
O(7)#1-Co(1)-O(1)	97.9(3)	O(2)-Co(1)-O(1)	59.9(3)
N(1)-Co(1)-O(1)	159.6(2)	N(4)#2-Co(1)-O(1)	82.3(3)
O(3)-Co(2)-O(5)	159.8(3)	O(3)-Co(2)-N(8)#2	95.7(2)
O(5)-Co(2)-N(8)#2	98.0(2)	O(3)-Co(2)-N(5)	95.1(2)
O(5)-Co(2)-N(5)	96.3(3)	N(8)#2-Co(2)-N(5)	102.8(2)
O(3)-Co(2)-O(4)	59.4(2)	O(5)-Co(2)-O(4)	106.2(2)

N(8)#2-Co(2)-O(4)	88.2(2)	N(5)-Co(2)-O(4)	153.5(2)
O(3)-Co(2)-O(6)	104.1(2)	O(5)-Co(2)-O(6)	59.9(2)
N(8)#2-Co(2)-O(6)	156.8(2)	N(5)-Co(2)-O(6)	87.4(2)
O(4)-Co(2)-O(6)	91.7(2)		
	3		
Co(1)-O(3)	2.061(2)	Co(1)-O(1W)	2.148(2)
Co(1)-O(1)	2.199(2)	Co(1)-O(2)	2.225(2)
Co(1)-N(1)	2.127(2)	Co(1)-N(3)	2.099(2)
O(1)-Co(1)-O(2)	59.89(7)	O(3)-Co(1)-O(1)	168.23(7)
O(1W)-Co(1)-O(1)	84.47(7)	N(1)-Co(1)-O(1)	92.96(7)
N(3)-Co(1)-O(1)	96.57(8)	O(3)-Co(1)-O(2)	109.17(7)
O(1W)-Co(1)-O(2)	85.33(7)	N(1)-Co(1)-O(2)	86.83(8)
N(3)-Co(1)-O(2)	156.42(7)	O(3)-Co(1)-O(1W)	90.48(7)
O(3)-Co(1)-N(1)	90.60(7)	O(3)-Co(1)-N(3)	94.41(8)
N(1)-Co(1)-O(1W)	172.00(7)	N(3)-Co(1)-O(1W)	94.31(8)
N(3)-Co(1)-N(1)	93.51(8)		

Symmetry mode for **1**: #1 -x+1, y+1/2, -z+1/2. For **2**: #1 x, y+1, z+1; #2 x+1, y+1, z.

Table S2 The accurate Co contents of all MOF-derived materials.

Samples	Co (wt %)
(*o*)-**Co@CNT**	7.3
(*m*)-**Co@CNT**	8.9
(*p*)-**Co@CNT**	10.1
(*o*)-**CoS_2@CNT**	10.6
(*m*)-**CoS_2@CNT**	11.5
(*p*)-**CoS_2@CNT**	12.3

Table S3 Specific capacitances of **CoS_2@CNT**s at different scan rates and current densities.

Specific capacitance (F g^{-1})										
	Scan rate (mV s^{-1})					Current density (A g^{-1})				
Sample	5	10	20	50	100	0.5	1	2	5	10
(*o*)-**CoS_2@CNT**	155	143	130	98	73	146	139	125	112	72
(*m*)-**CoS_2@CNT**	422	396	266	174	122	405	385	278	200	158
(*p*)-**CoS_2@CNT**	839	792	663	530	447	825	782	550	375	268

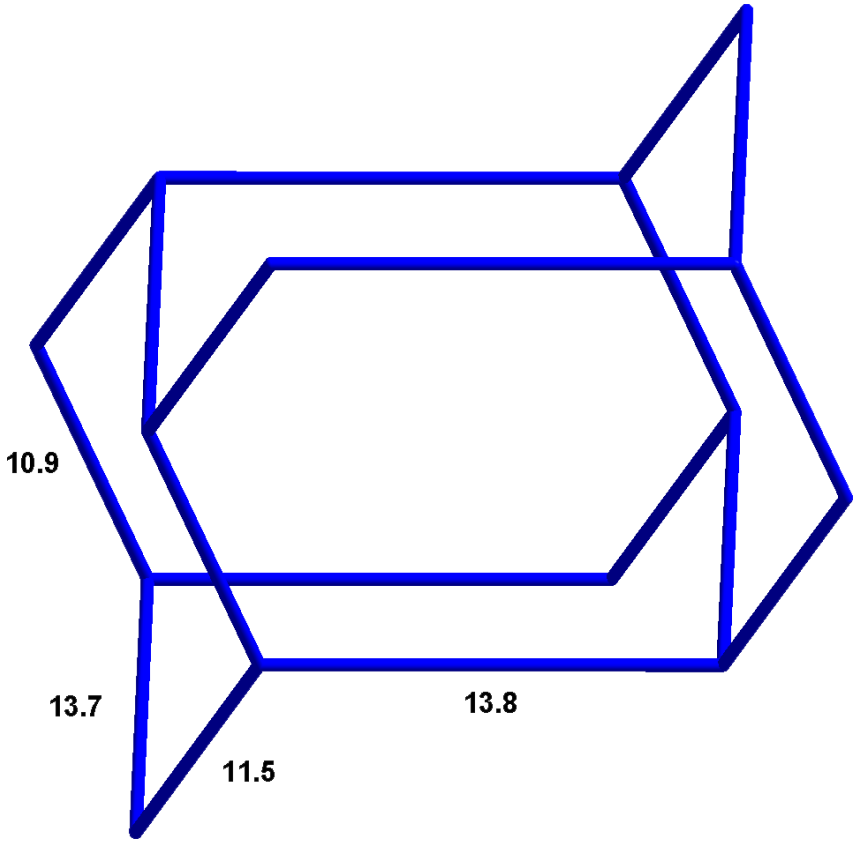

Fig. **S1** The adamantanoid cage with wide edges in **3**.

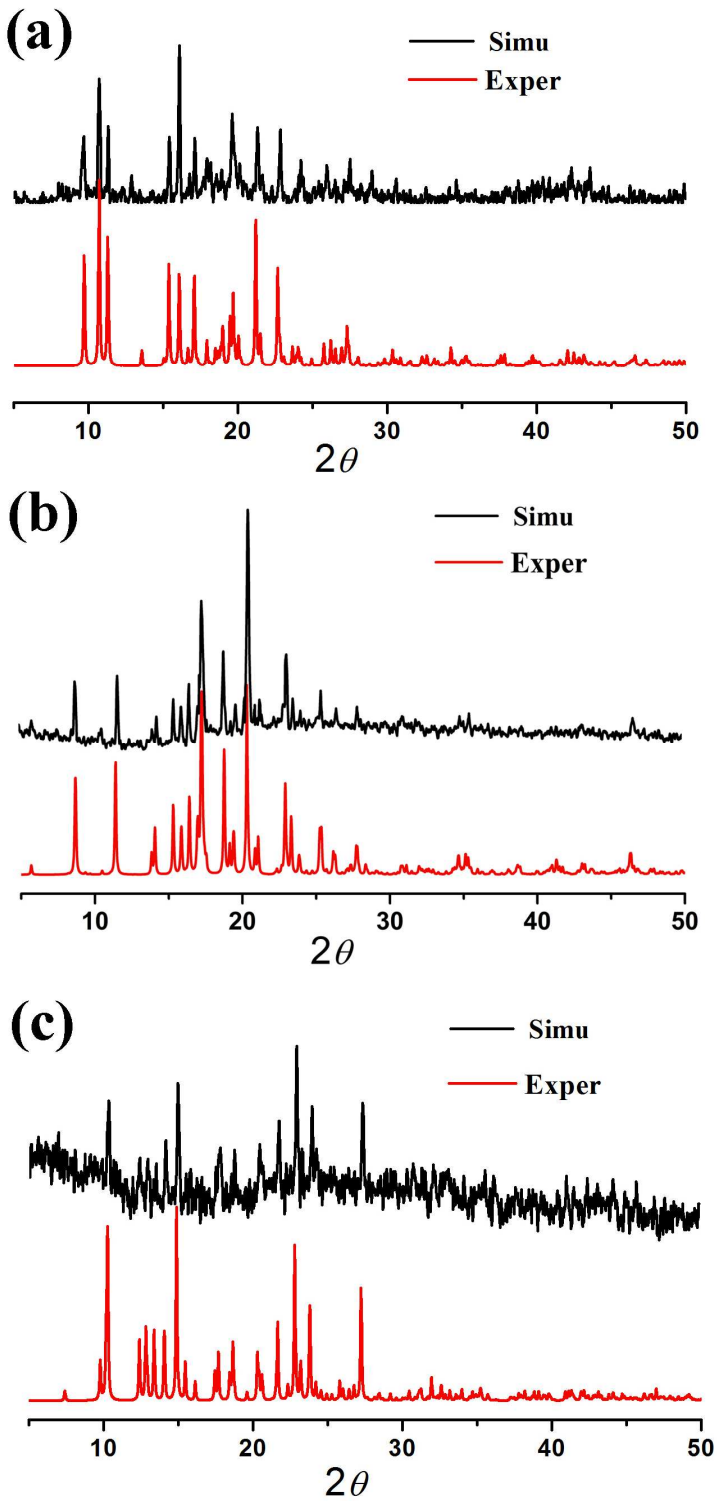

Fig. **S2** The simulated and experimental XRD patterns of Co-MOFs (**a**) **1**; (**b**) **2**; (**c**) **3**.

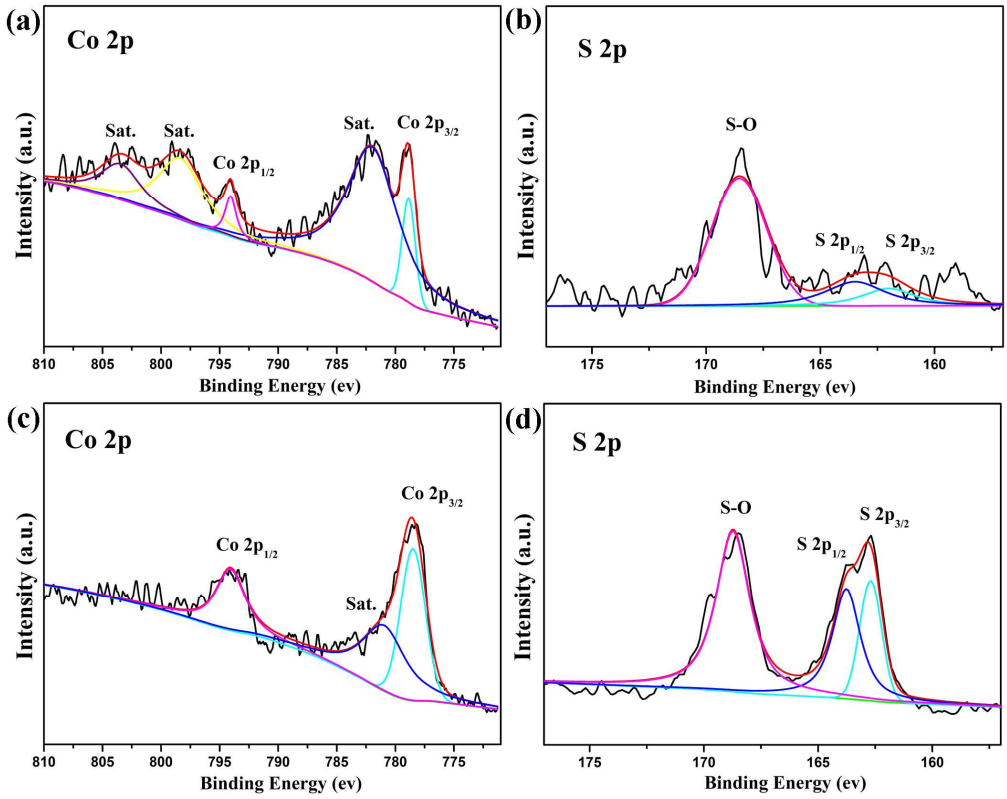

Fig. **S3** The Co 2p spectra and S 2p spectra of (**a**, **b**) (*o*)-**CoS_2@CNT**; (**c**, **d**) (*m*)-**CoS_2@CNT**.

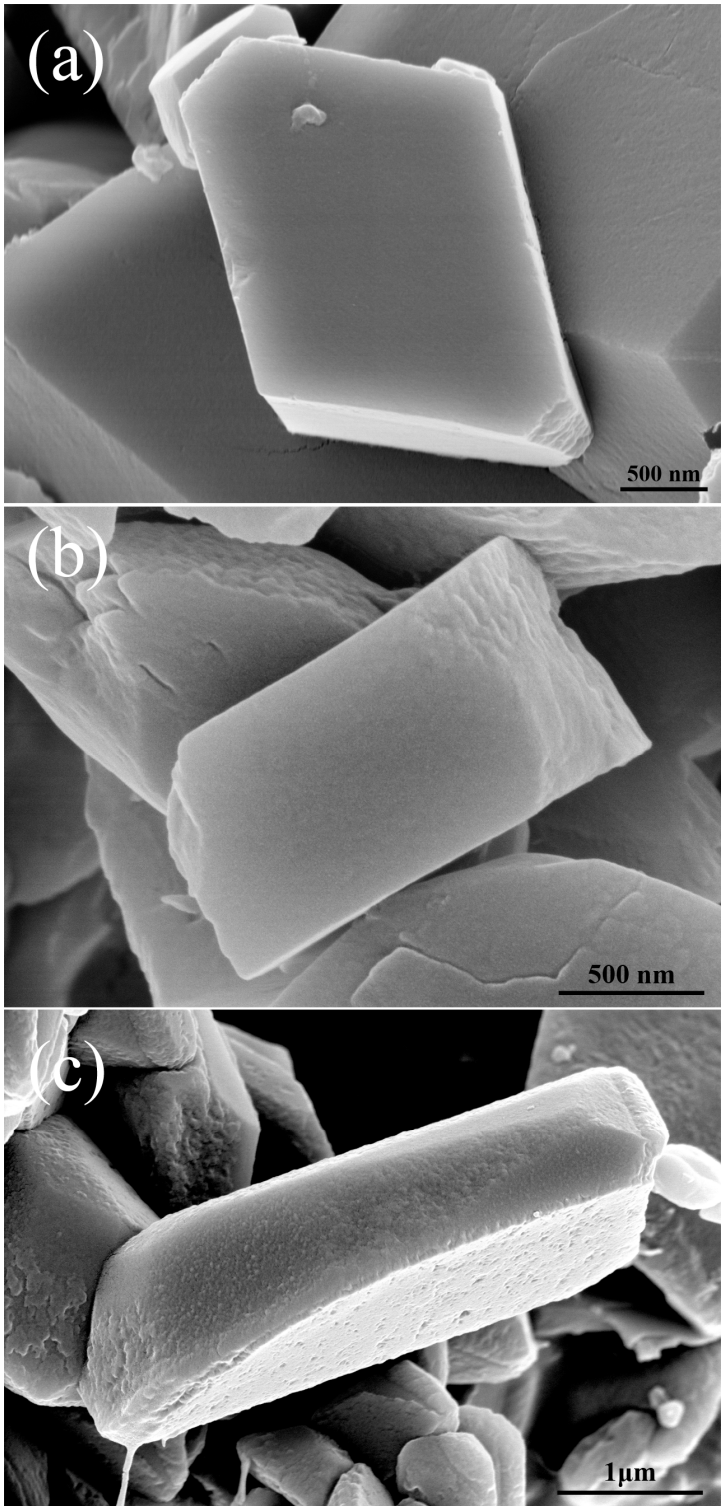

Fig. **S4** The FESEM images of Co-MOFs (**a**) **1**; (**b**) **2**; (**c**) **3**.

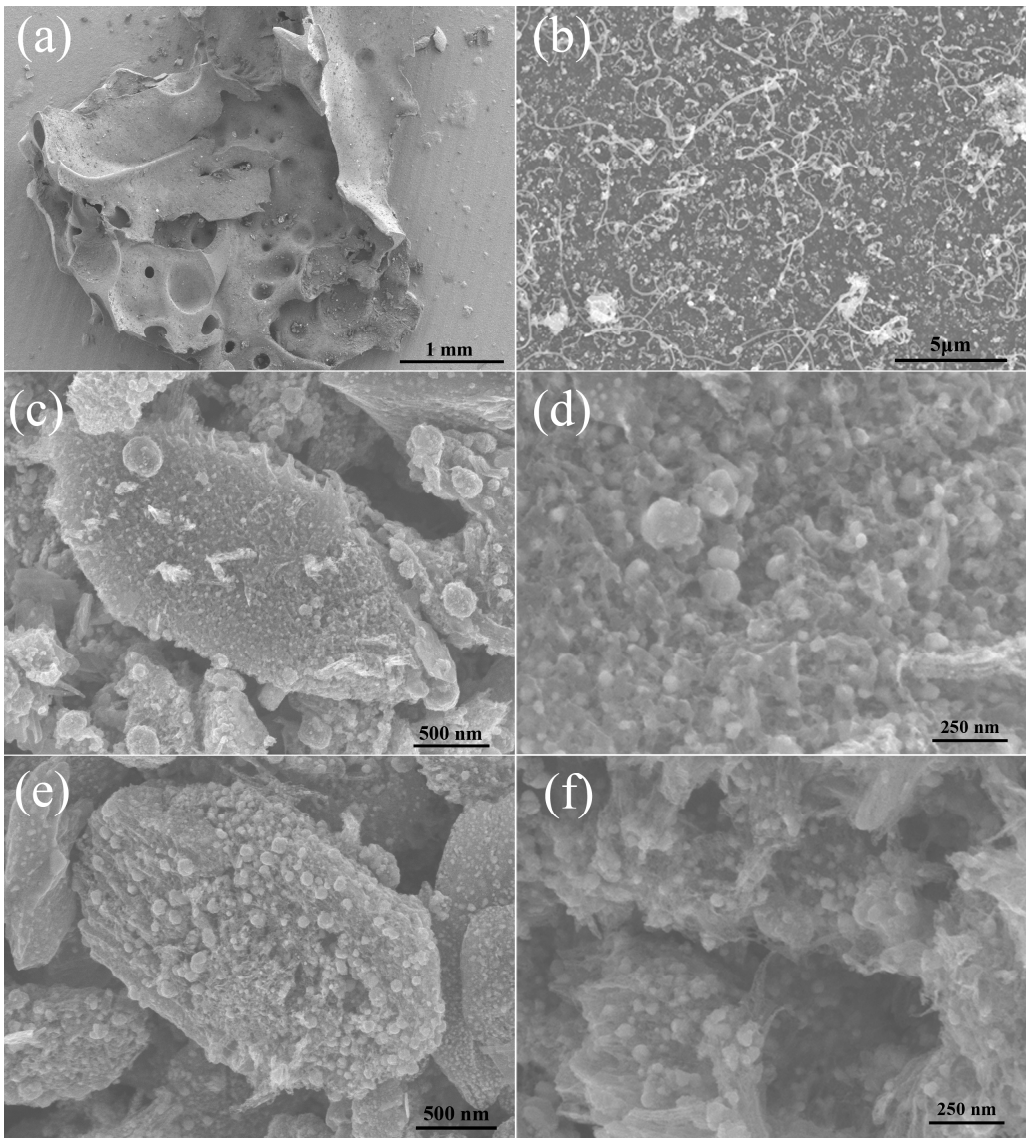

Fig. **S5** FESEM images of (**a**, **b**) (*o*)-**Co@CNT**; (**c**, **d**) (*m*)-**Co@CNT**; (**e**, **f**) (*p*)-**Co@CNT**.

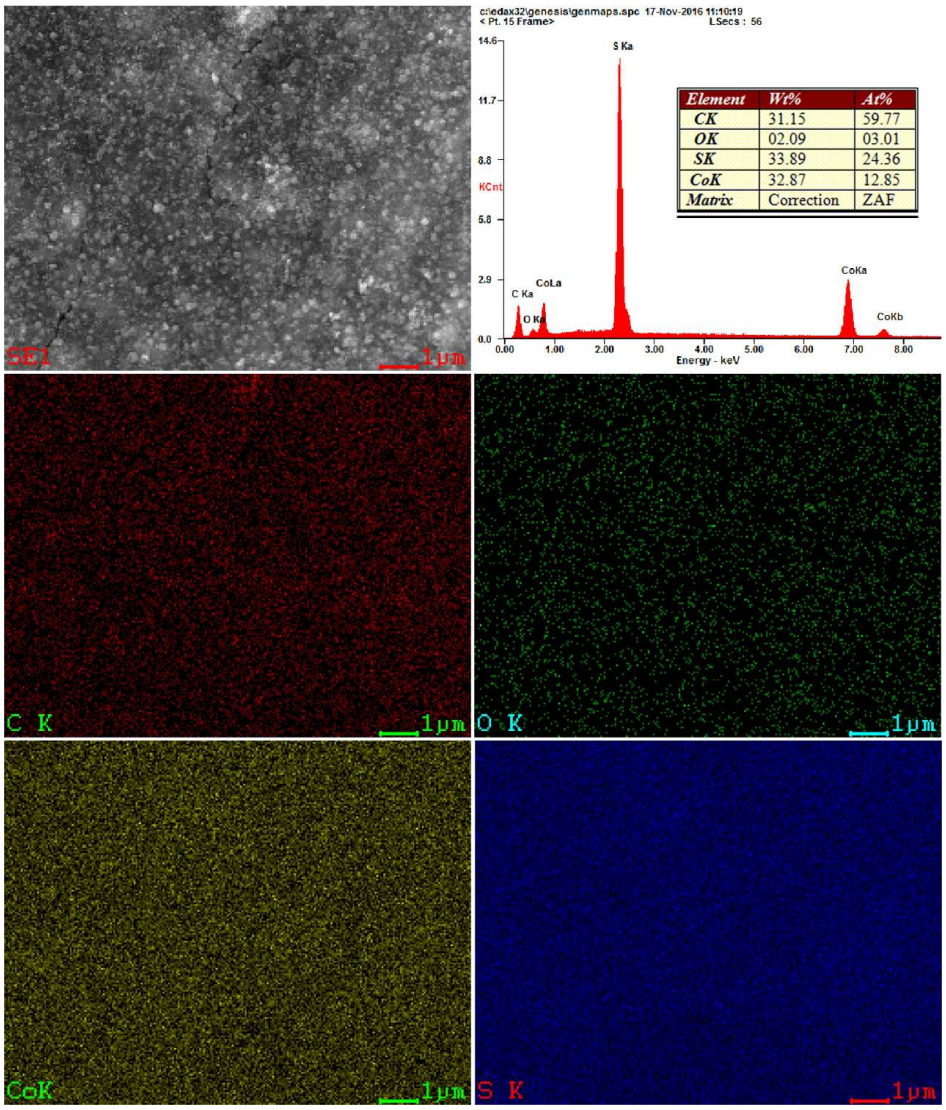

Fig. **S6** EDX results of (*o*)-**CoS_2@CNT**.

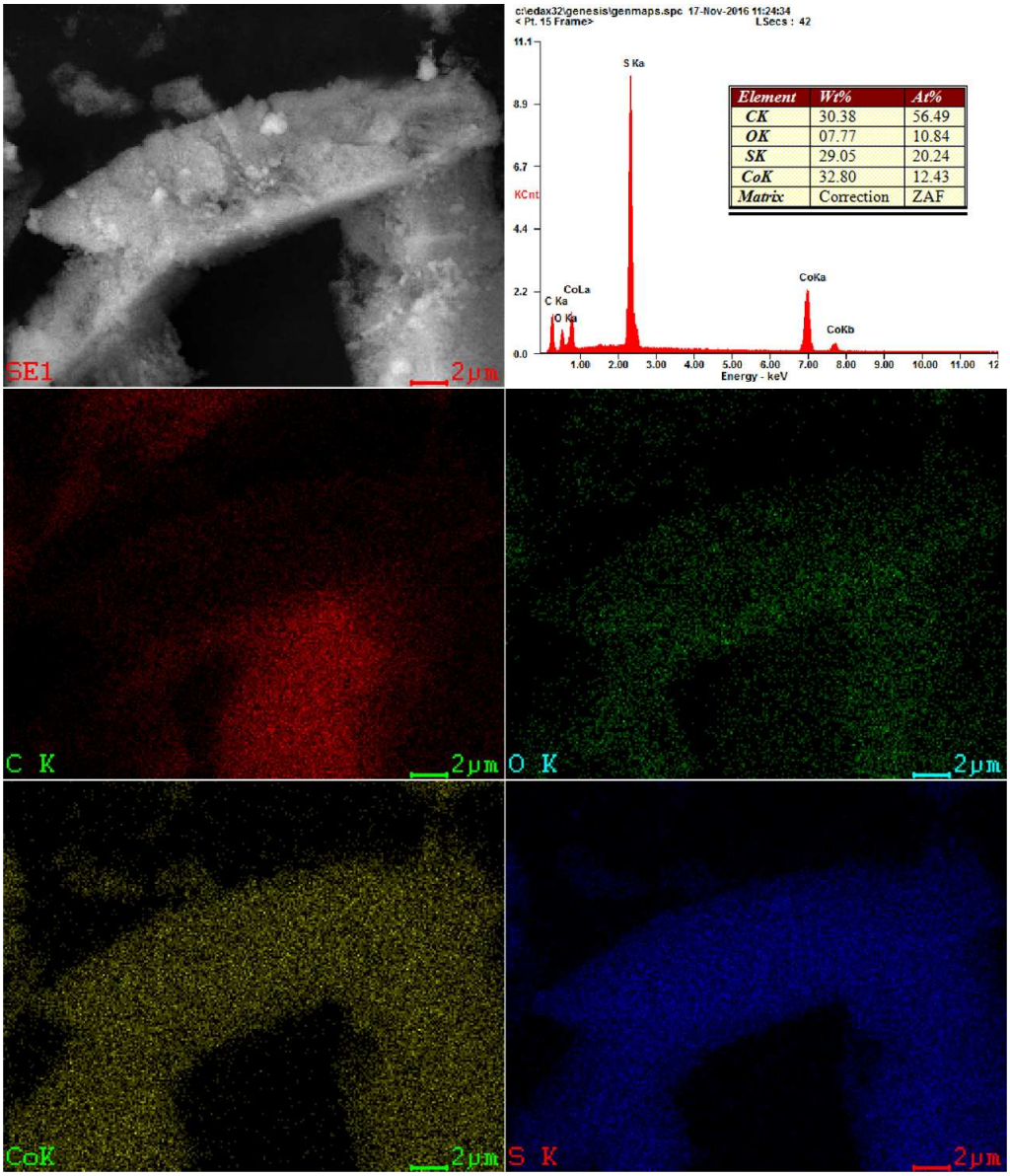

Fig. **S7** EDX results of (*m*)-**CoS_2@CNT**.

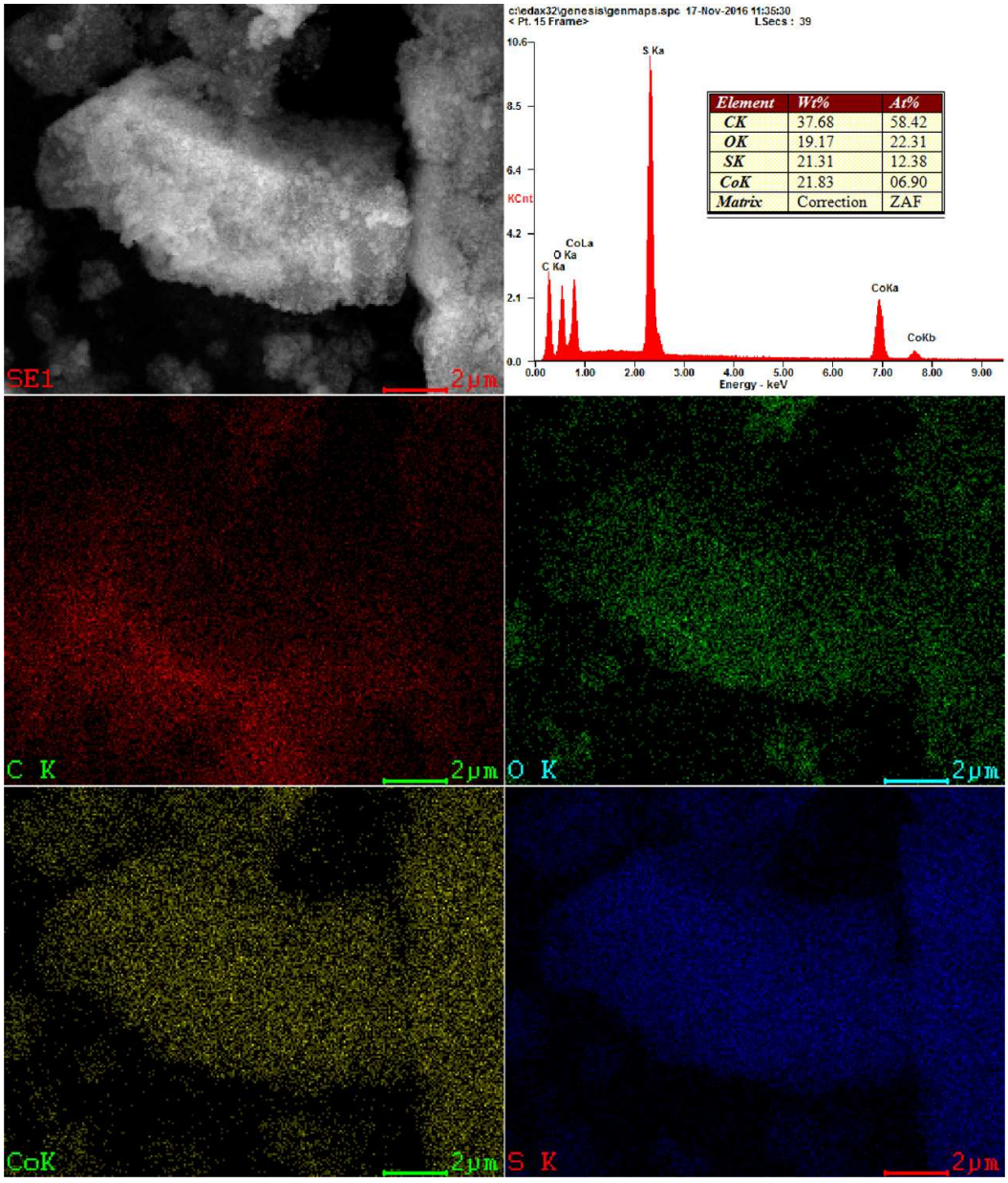

Fig. **S8** EDX results of (*p*)-**CoS_2@CNT**.

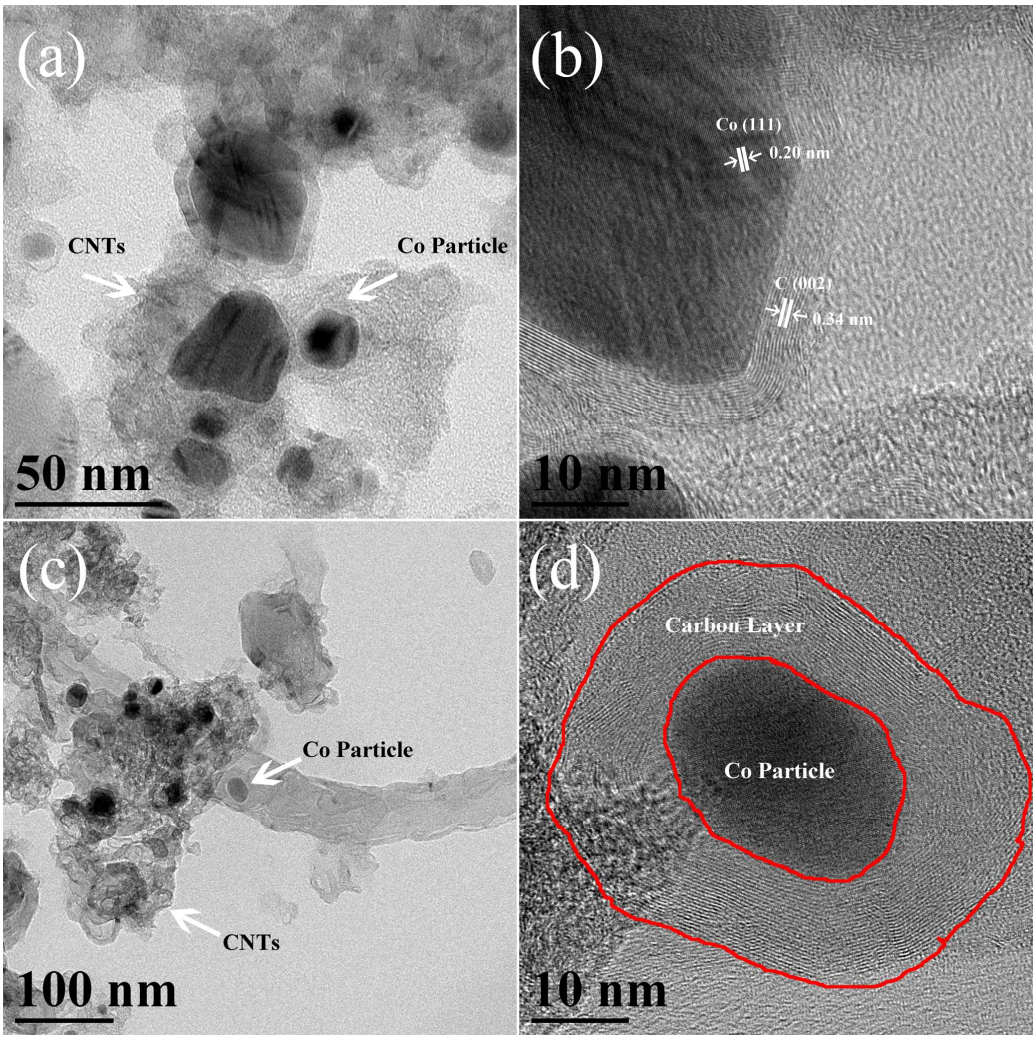

Fig. **S9** TEM and HRTEM images of (**a**, **b**) (*m*)-**Co@CNT**; (**c**, **d**) (*p*)-**Co@CNT**.

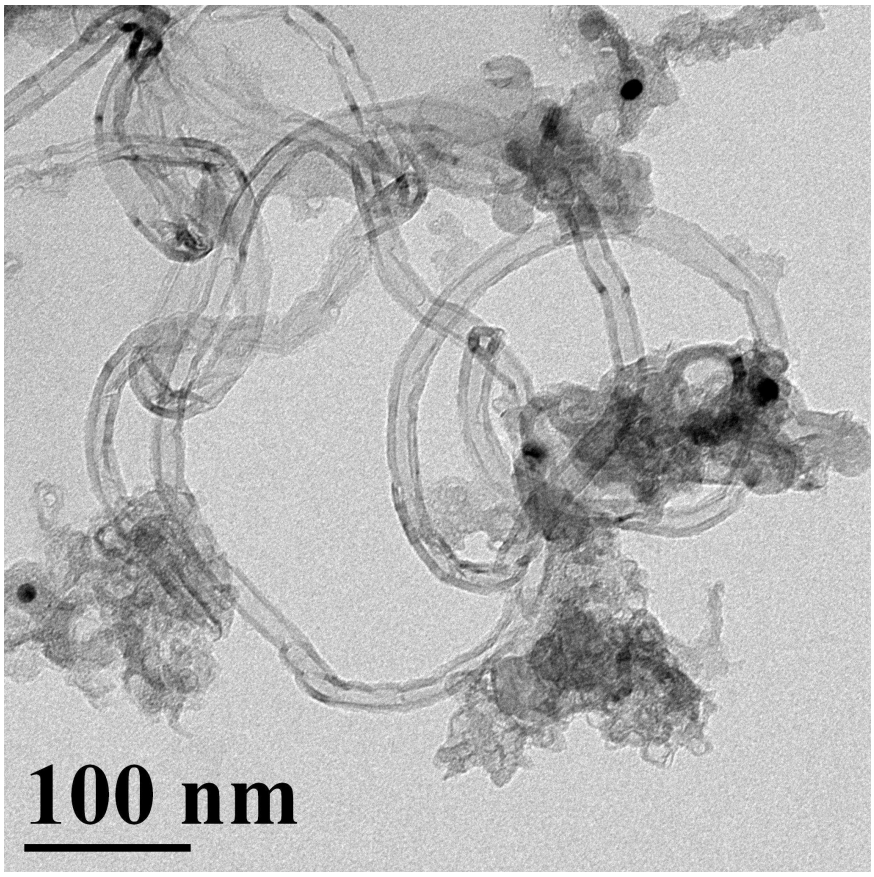

Fig. **S10** TEM images of long high-quality CNTs in (*p*)-**Co@CNT**.

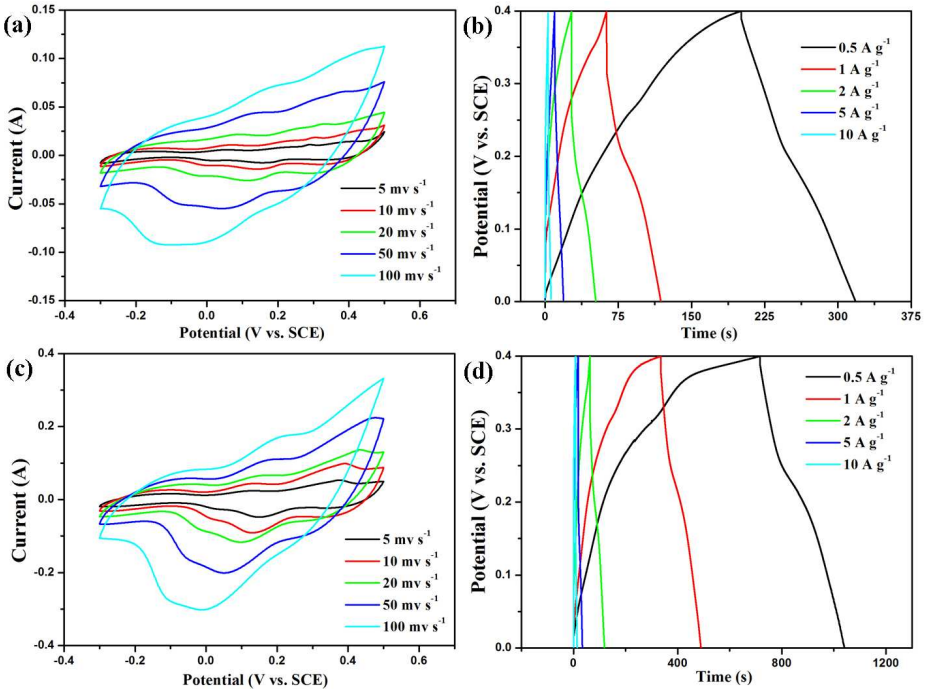

Fig. **S11** CV and GCD curves of (**a**, **b**) (*o*)-**CoS_2@CNT**; (**c**, **d**) (*m*)-**CoS_2@CNT**.

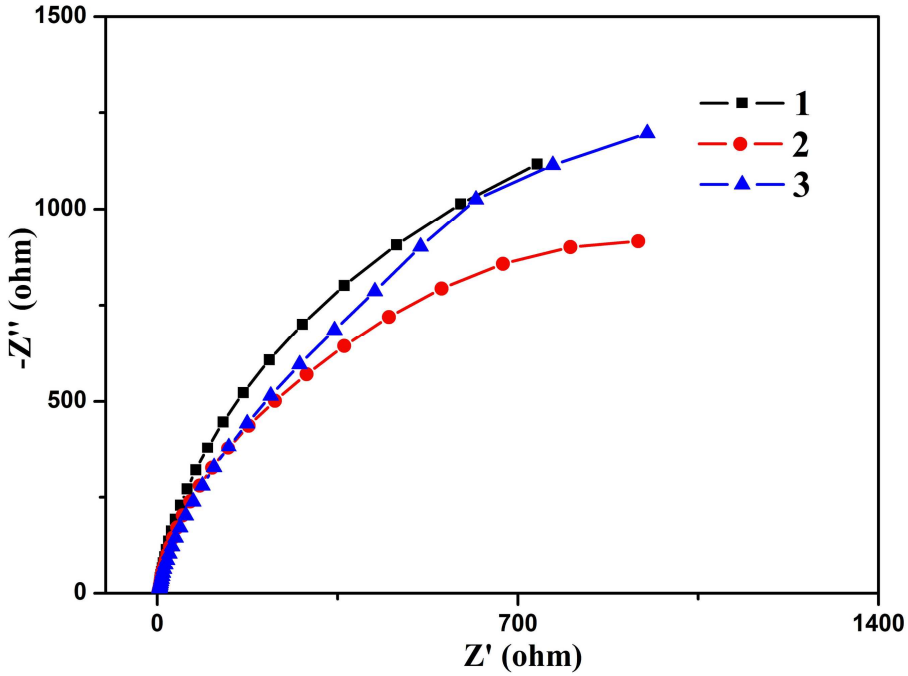

Fig. **S12** The Nyquist plots of Co-MOFs.

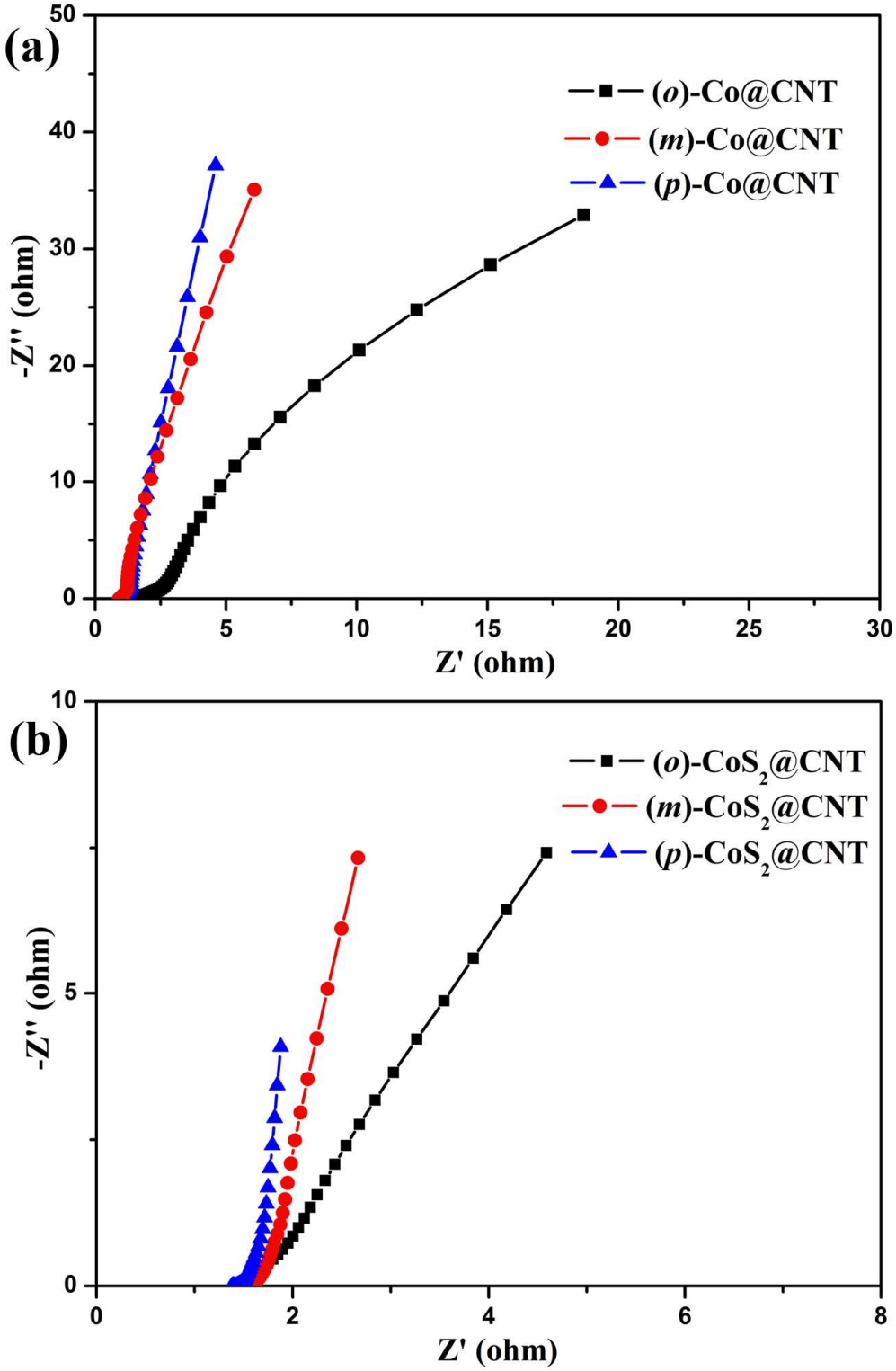

Fig. **S13** The Nyquist plots of (**a**) **Co@CNT**s; (**b**) **CoS_2@CNT**s.