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Supporting Information

Ni-Co-Mn complexed 3,4,9,10-perylene tetracarboxylic acid complexes as novel organic electrode material for lithium-ion batteries

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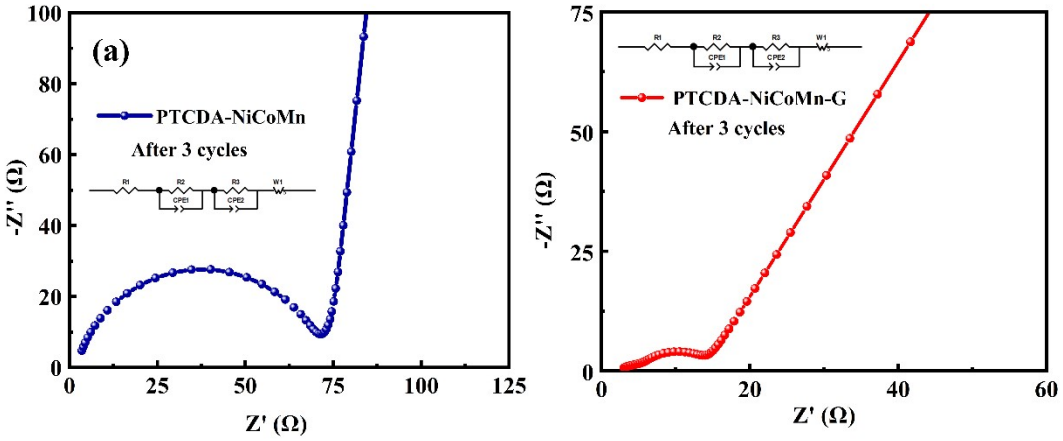

Fig. S1 (a) AC impedance curve of PTCDA-NiCoMn after 3 turns of polarization; (b) AC impedance curve of PTCDA-NiCoMn-G after 3 turns of polarization

Table S1 Impedance fitting data for materials

	Samples	R_1 (Ω)	R_2 (Ω)	R_3 (Ω)
3 Cycles	PTCDA-NiCoMn	4.257	3.501	42.86
	PTCDA-NiCoMn-G	2.376	3.889	7.545

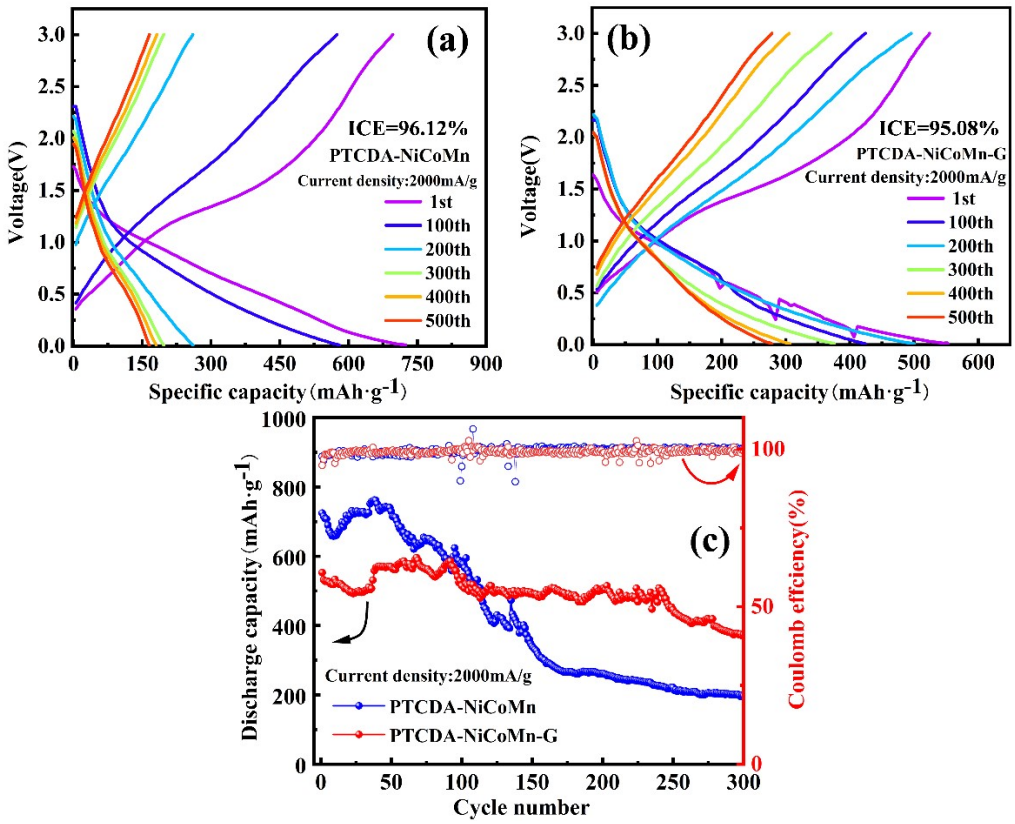

Fig. S2 (a) charge/discharge curves of **PTCDA-NiCoMn** electrode at 2000 mA g^{-1} current density; (b) charge/discharge curves of **PTCDA-NiCoMn-G** electrode at 2000mA g^{-1} current density; (c) cycling performance of **PTCDA-NiCoMn** and **PTCDA-NiCoMn-G** electrodes at 2000mA g^{-1} current density

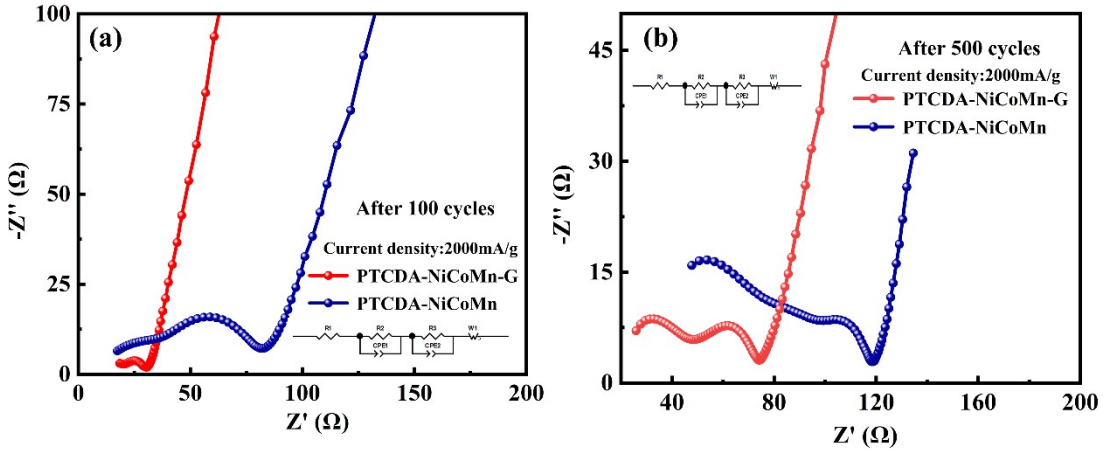

Fig. S3 (a) AC impedance curves of **PTCDA-NiCoMn** and **PTCDA-NiCoMn-G** electrodes after 100 cycles; (b) AC impedance curves of both electrodes after 500 cycles

Table S2 Impedance fitting data for **PTCDA-NiCoMn** and **PTCDA-NiCoMn-G** electrodes

	Samples	R_1 (Ω)	R_2 (Ω)	R_3 (Ω)
100 Cycles	**PTCDA-NiCoMn**	**15.98**	**19.68**	**46.06**
	PTCDA-NICoMn-G	**16.89**	**3.67**	**9.60**
500 Cycles	**PTCDA-NiCoMn**	**47.10**	**53.01**	**18.27**
	PTCDA-NiCoMn-G	**25.83**	**22.28**	**25.66**

Table S3 Discharge capacity contributed from **PTCDA-NiCoMn** at different potentials (The voltage window is 0.01-3 V at 0.1 V intervals, C: discharge capacity, mAh·g^{-1}, V: voltage, V)

PTCDA-NiCoMn							
4 th cycle		**50 th cycle**		**125 th cycle**		**200 th cycle**	
C	V	C	V	C	V	C	V
0	3.0	0	3.0	0	3.0	0	3.0
0	2.9	0	2.9	0	2.9	0	2.9
0	2.8	0	2.8	0	2.8	0	2.8
0	2.7	1.9	2.7	0	2.7	0	2.7
1.1	2.6	5.5	2.6	0.3	2.6	0.3	2.6
2.5	2.5	10.8	2.5	2.2	2.5	2.5	2.5
4.2	2.4	17.2	2.4	5.8	2.4	6.2	2.4
6.7	2.3	23.3	2.3	10.5	2.3	11.3	2.3
10	2.2	29.1	2.2	15.8	2.2	16.4	2.2
15	2.1	34.6	2.1	21.1	2.1	22.1	2.1
21.6	2.0	40.2	2.0	26.6	2.0	27.8	2.0
29.9	1.9	45.7	1.9	32.1	1.9	33.7	1.9
39.3	1.8	51.8	1.8	38.5	1.8	40.3	1.8
48.8	1.7	58.4	1.7	46	1.7	47.4	1.7
58.5	1.6	66.2	1.6	54	1.6	55.9	1.6
70.4	1.5	75.9	1.5	63.1	1.5	65.5	1.5
87.8	1.4	88.3	1.4	74.5	1.4	77.4	1.4
113.3	1.3	105.8	1.3	89.5	1.3	91.6	1.3
151	1.2	129.9	1.2	109.4	1.2	109.7	1.2
196.4	1.1	164.3	1.1	132.1	1.1	131	1.1
250.2	1.0	209.7	1.0	161.4	1.0	156.8	1.0
314.2	0.9	260.6	0.9	196.1	0.9	185.1	0.9
382	0.8	314.9	0.8	231.2	0.8	216.3	0.8
445.8	0.70	0.7	0.7	264.2	0.7	249	0.7
509.5	0.6	442.9	0.6	316.8	0.6	285.8	0.6
572.6	0.5	513.5	0.5	367.8	0.5	326.1	0.5
642.2	0.4	585.2	0.4	422.3	0.4	371.2	0.4
723.1	0.3	658.6	0.3	486.8	0.3	420.2	0.3

828.4	0.2	755.2	0.2	558.6	0.2	475.9	0.2
976.3	0.1	874.6	0.1	645.8	0.1	541.2	0.1
1218.8	0.01	1051.20	0.01	761	0.01	622.6	0.01

Table S4 Total capacity attenuation over different cyclic ranges and the attenuation ratio of C=O, C=C , benzene ring correspondence

Cycle range	**Total capacity attenuation, mAh·g^{-1}**	**Capacity attenuation (C=O), mAh·g^{-1}**	**Percentage**	**Capacity attenuation (C=C), mAh·g^{-1}**	**Percentage**	**Capacity attenuation (benzene ring), mAh·g^{-1}**	**Percentage**
20-50	167.6	51.52	30.74%	38.64	23.05%	77.3	46.21 %
50-125	290.2	89.28	30.76%	67.32	23.19%	133.92	46.14%
125-200	138.4	42.57	30.76%	31.59	22,82%	63.89	46.16%