

Supplementary Information

Facile Synthesis of P2-Type $\text{Na}_{0.4}\text{Mn}_{0.54}\text{Co}_{0.46}\text{O}_2$ as High Capacity Cathode Material for Sodium-Ion Batteries

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Table S1. The XRD peak list of P2-type Na_{0.4}Mn_{0.54}Co_{0.46}O₂ nanosheets.

No.	2-theta(deg)	d(ang.)	Height(cps)	FWHM(deg)	Size(ang.)
1	15.692(4)	5.6426(13)	11339(307)	0.198(5)	424(11)
2	31.787(14)	2.8127(12)	1011(92)	0.33(2)	262(17)
3	32.23(2)	2.775(2)	398(58)	0.28(3)	308(32)
4	33.42(5)	2.679(4)	133(33)	0.27(4)	323(45)
5	36.622(10)	2.4518(6)	2618(148)	0.146(9)	599(38)
6	37.79(7)	2.379(4)	115(31)	0.60(9)	145(23)
7	40.169(6)	2.2430(3)	3720(176)	0.220(6)	402(10)
8	44.214(17)	2.0468(8)	1094(95)	0.305(12)	294(12)
9	49.308(9)	1.8466(3)	2236(137)	0.428(6)	213(3)
10	62.310(13)	1.4889(3)	677(75)	0.671(15)	144(3)
11	66.013(14)	1.4140(3)	1474(111)	0.194(16)	510(41)
12	68.364(7)	1.37104(12)	1113(96)	0.163(9)	615(33)
13	75.30(4)	1.2610(6)	225(43)	0.41(4)	257(22)
14	78.20(3)	1.2214(4)	185(39)	0.81(5)	131(7)
15	80.186(12)	1.19603(14)	388(57)	0.187(16)	580(50)
16	82.94(3)	1.1632(3)	109(30)	0.13(4)	873(267)
17	86.809(18)	1.12099(18)	386(57)	0.28(3)	407(38)

To better understand the structure information of the layered Na_{0.4}Mn_{0.54}Co_{0.46}O₂, lattice constants of a=2.831 Å and c=11.286 Å were calculated by formula (1).

$$d_{(hkl)} = [4(h^2+hk+k^2)/3a^2+l^2/c^2]^{-1/2} \quad (1)$$

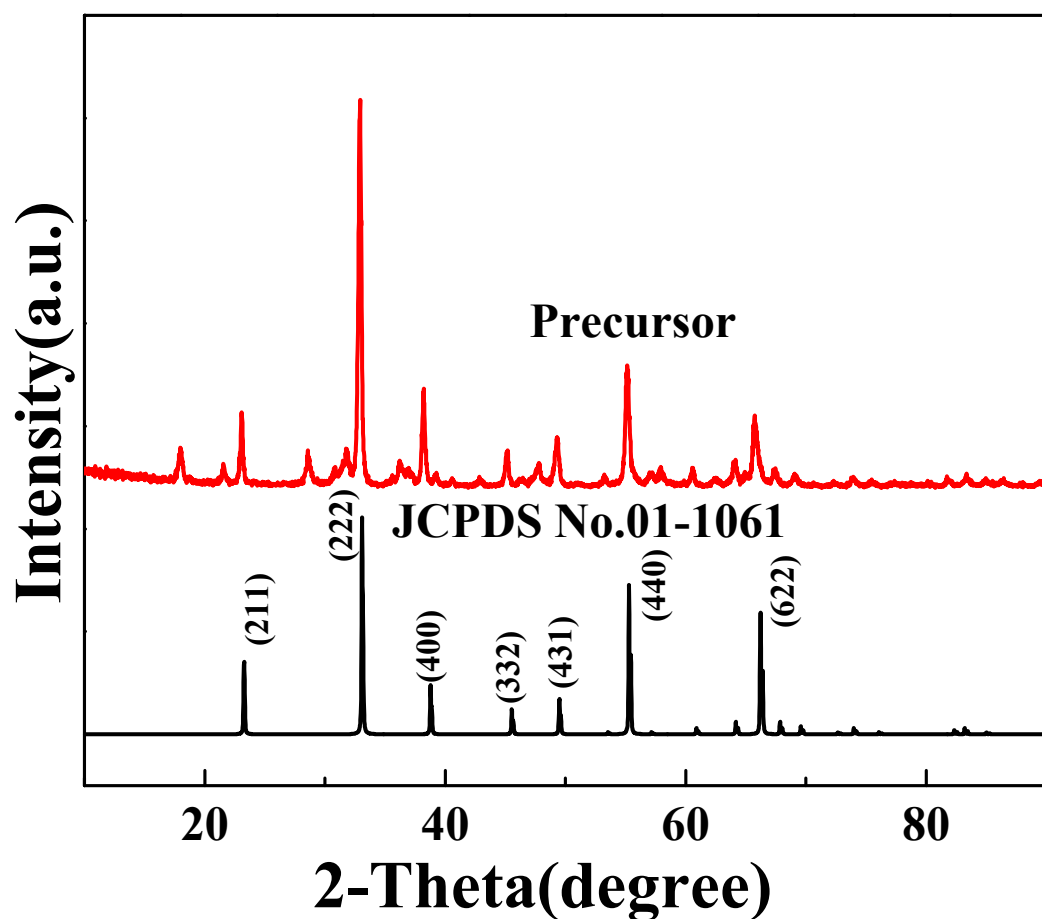
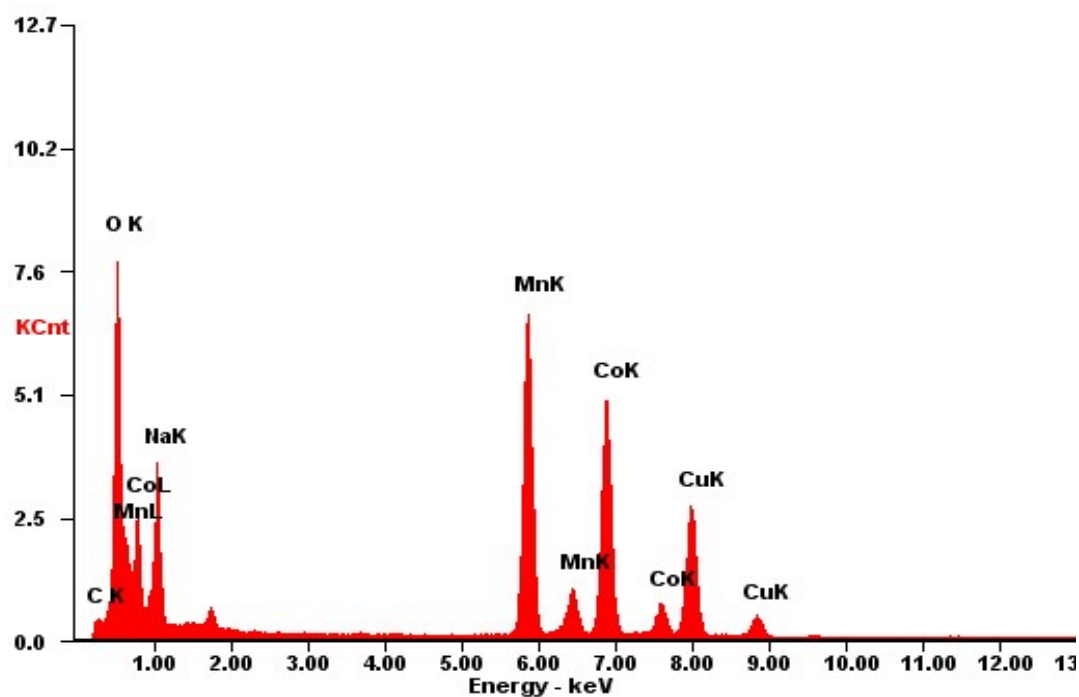


Figure S1. Typical XRD patterns of the Mn_2O_3 precursor and JCPDS No.01-1061.



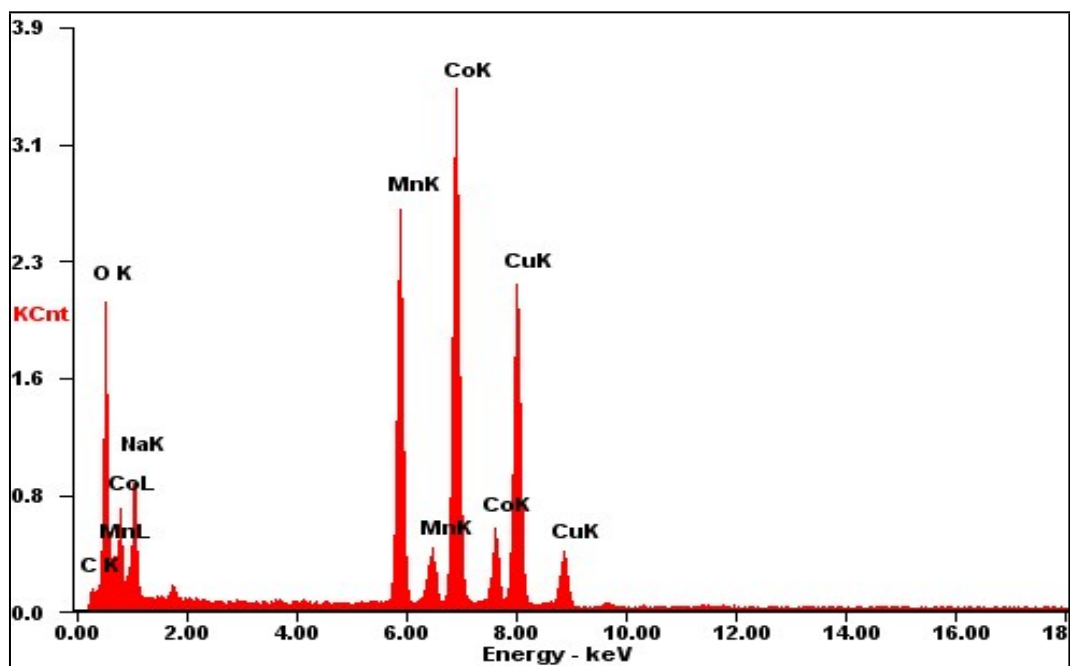
<i>Element</i>	<i>Weight%</i>	<i>Atom%</i>
<i>O K</i>	28.80	55.30
<i>NaK</i>	07.70	10.40
<i>MnK</i>	33.90	18.90
<i>CoK</i>	29.60	15.40

Figure S2. The EDS spectrum of the final P2-type $\text{Na}_{0.4}\text{Mn}_{0.54}\text{Co}_{0.46}\text{O}_2$ nanosheets.

Firstly, with the EDS data, we can calculate the proportion of cobalt and manganese.

Then combined with the initial and second charge capacities, the sodium content in the sample was also calculate. With this route, this oxide cathode we finally got was

$\text{Na}_{0.4}\text{Mn}_{0.54}\text{Co}_{0.46}\text{O}_2$.



<i>Element</i>	<i>Weight%</i>	<i>Atom%</i>
<i>O K</i>	18.00	41.90
<i>NaK</i>	04.90	07.90
<i>MnK</i>	30.00	20.30
<i>CoK</i>	47.20	29.80

Figure S3. The EDS spectrum of P2- $\text{Na}_{0.4}\text{Co}_{0.6}\text{Mn}_{0.4}\text{O}_2$ cathode.

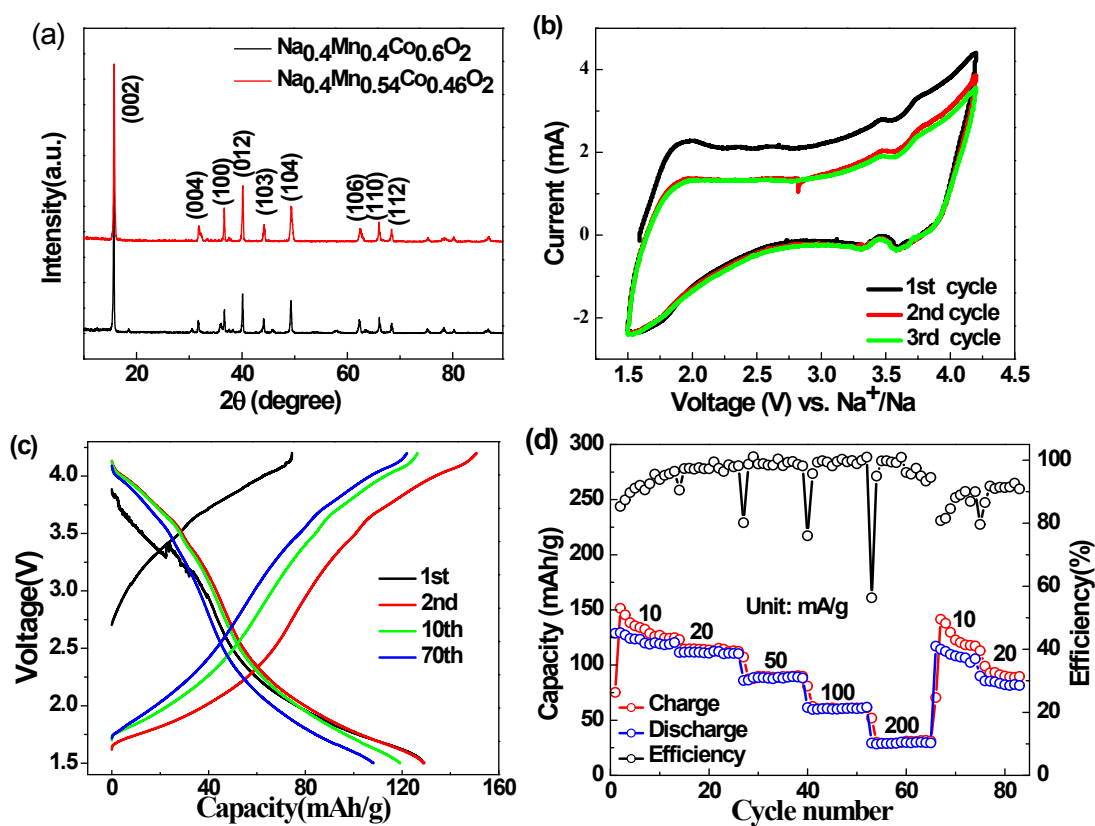


Figure S4. The typical XRD patterns (a) and electrochemical performance (b-d) of $\text{P2-Na}_{0.4}\text{Co}_{0.6}\text{Mn}_{0.4}\text{O}_2$ cathode: (a) the XRD patterns of $\text{Na}_{0.4}\text{Co}_{0.46}\text{Mn}_{0.54}\text{O}_2$ and $\text{Na}_{0.4}\text{Co}_{0.6}\text{Mn}_{0.4}\text{O}_2$; (b) the first three CV curves of $\text{Na}_{0.4}\text{Co}_{0.6}\text{Mn}_{0.4}\text{O}_2$; (c) the capacity-voltage curve of $\text{Na}_{0.4}\text{Co}_{0.6}\text{Mn}_{0.4}\text{O}_2$; (d) the rate capability of $\text{Na}_{0.4}\text{Co}_{0.6}\text{Mn}_{0.4}\text{O}_2$.