Electronic Supplementary Material (ESI) for RSC Advances.

Self-induce cobalt derive hollow structure Prussian blue as cathode for sodium-ion battery

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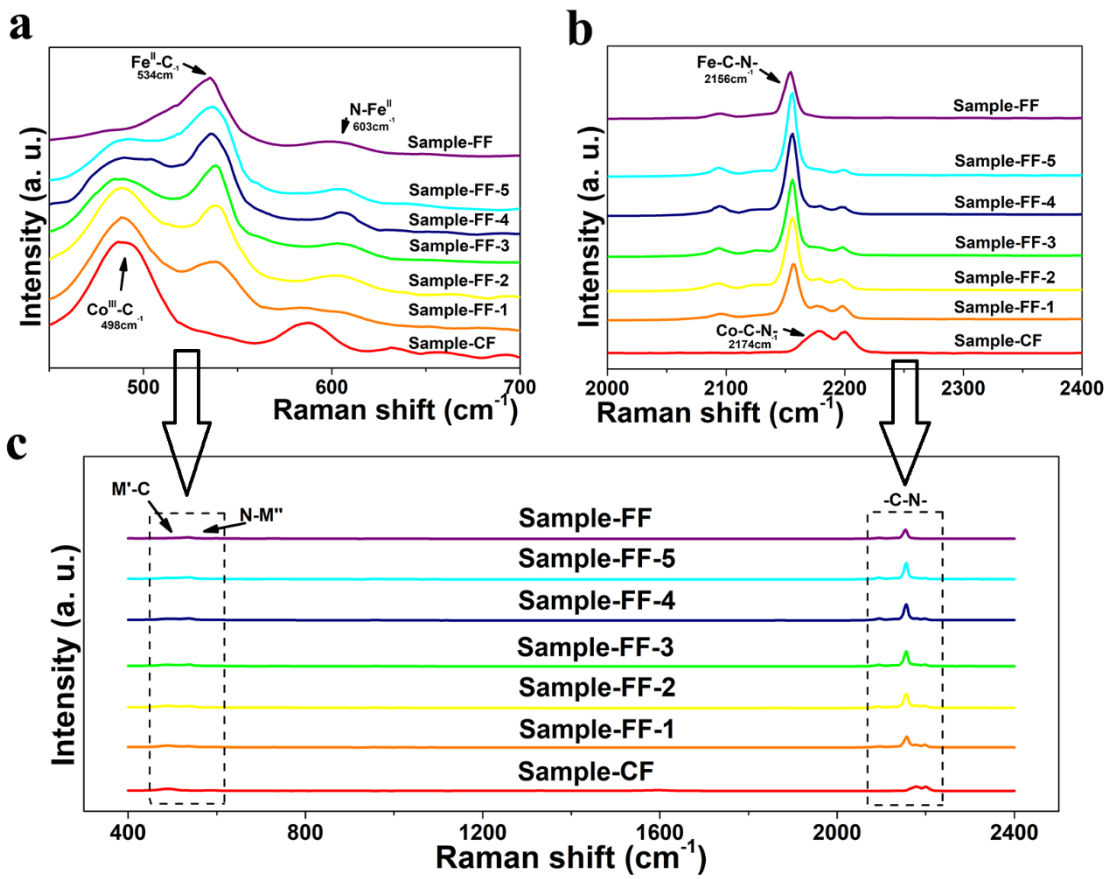

Figure S1. Ex situ Raman plots of the samples in different vibration interval ranges: (a) 400-700 cm^{-1}. (b) 2000-2400 cm^{-1}. (c) 400-2400 cm^{-1}.

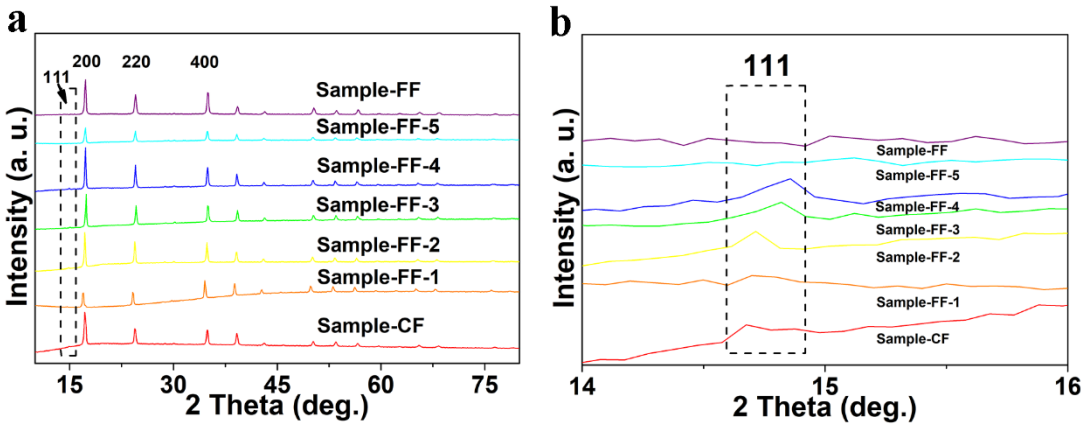

Figure S2. Ex XRD patterns of the samples in different interval ranges: (a) 10-80 degree. (b) 14-16 degree.

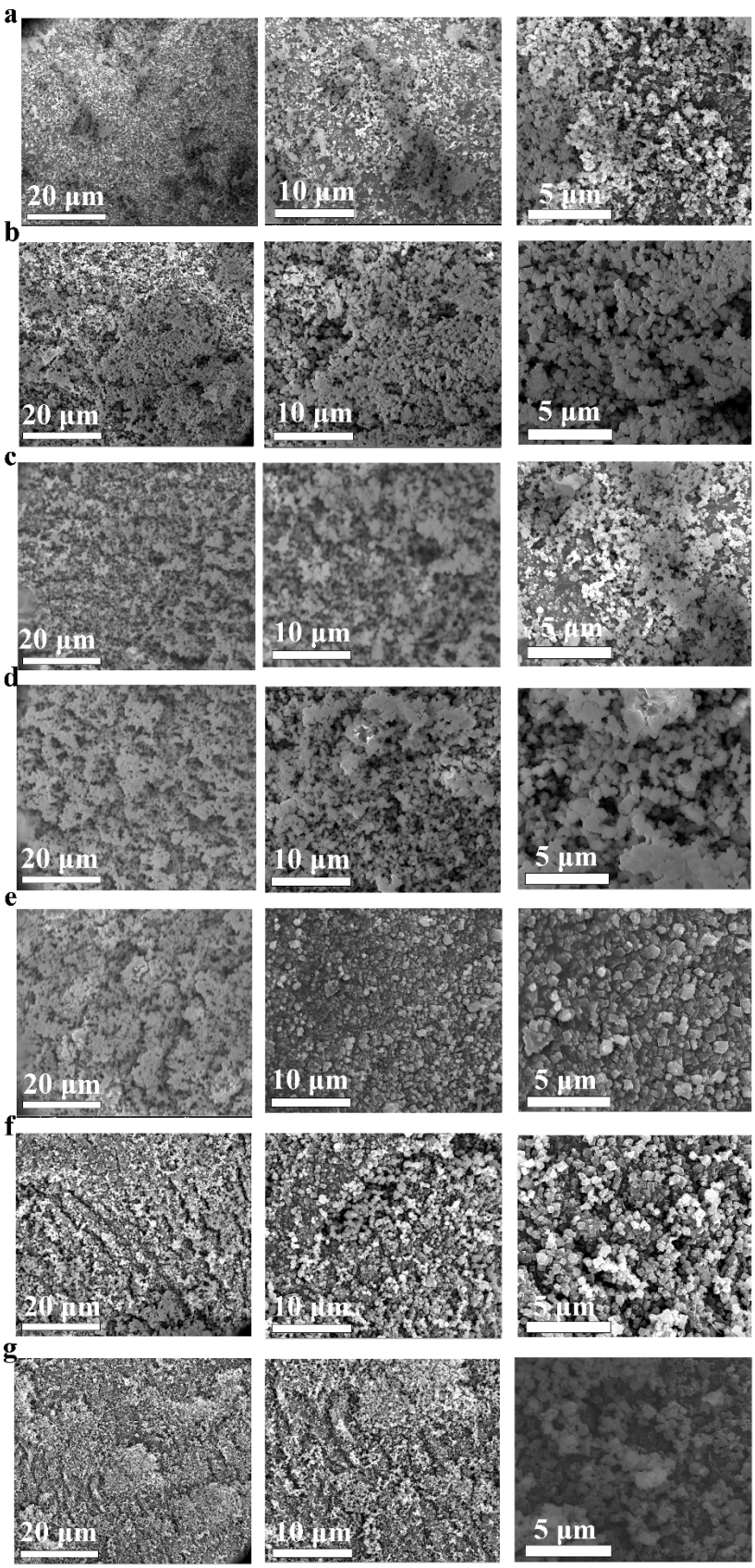

Figure S3. SEM images of (a) Sample-CF, (b) Sample-FF-1, (c) Sample-FF-2, (d) Sample-FF-3, (e) Sample-FF-4, (f) Sample-FF-5 and (g) Sample-FF.

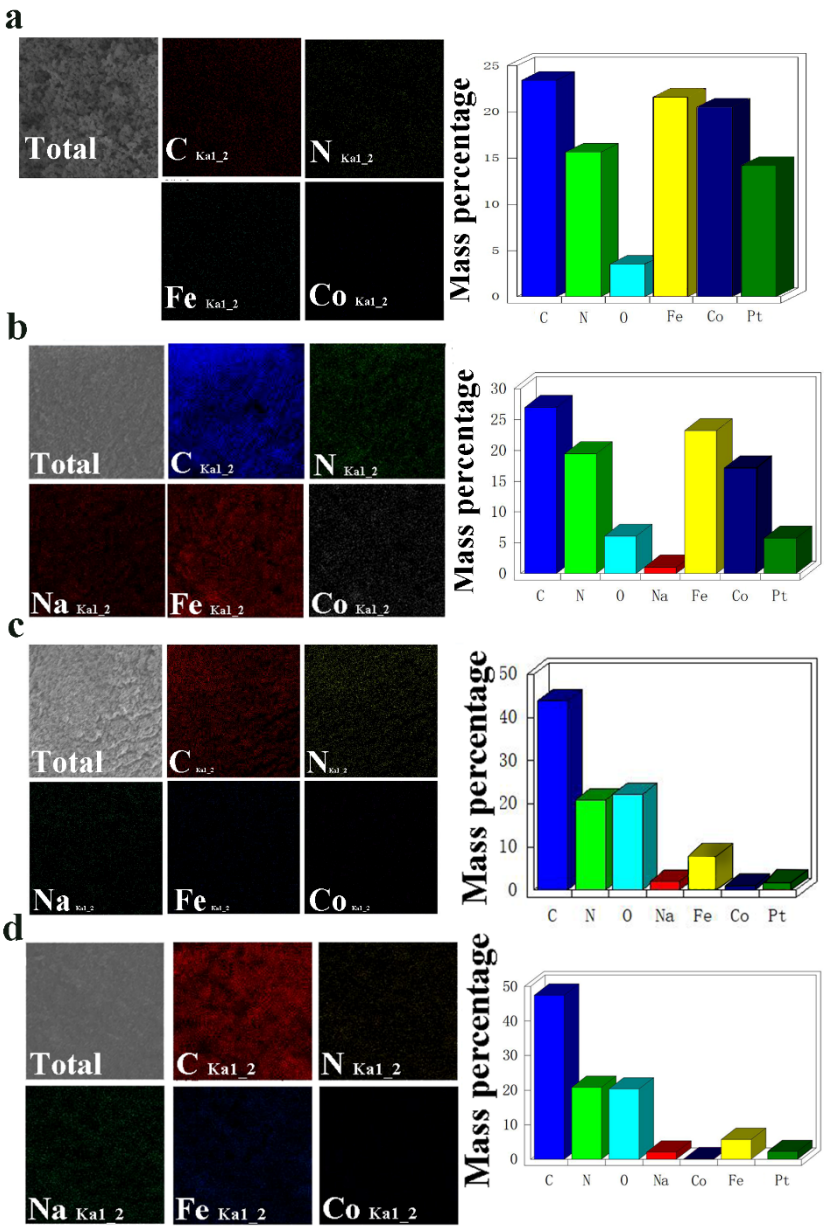

Figure S4. EDS analysis and the element mapping images of (a) Sample-CF, (b) Sample-FF-1, (c) Sample-FF-4 and (d) Sample-FF.

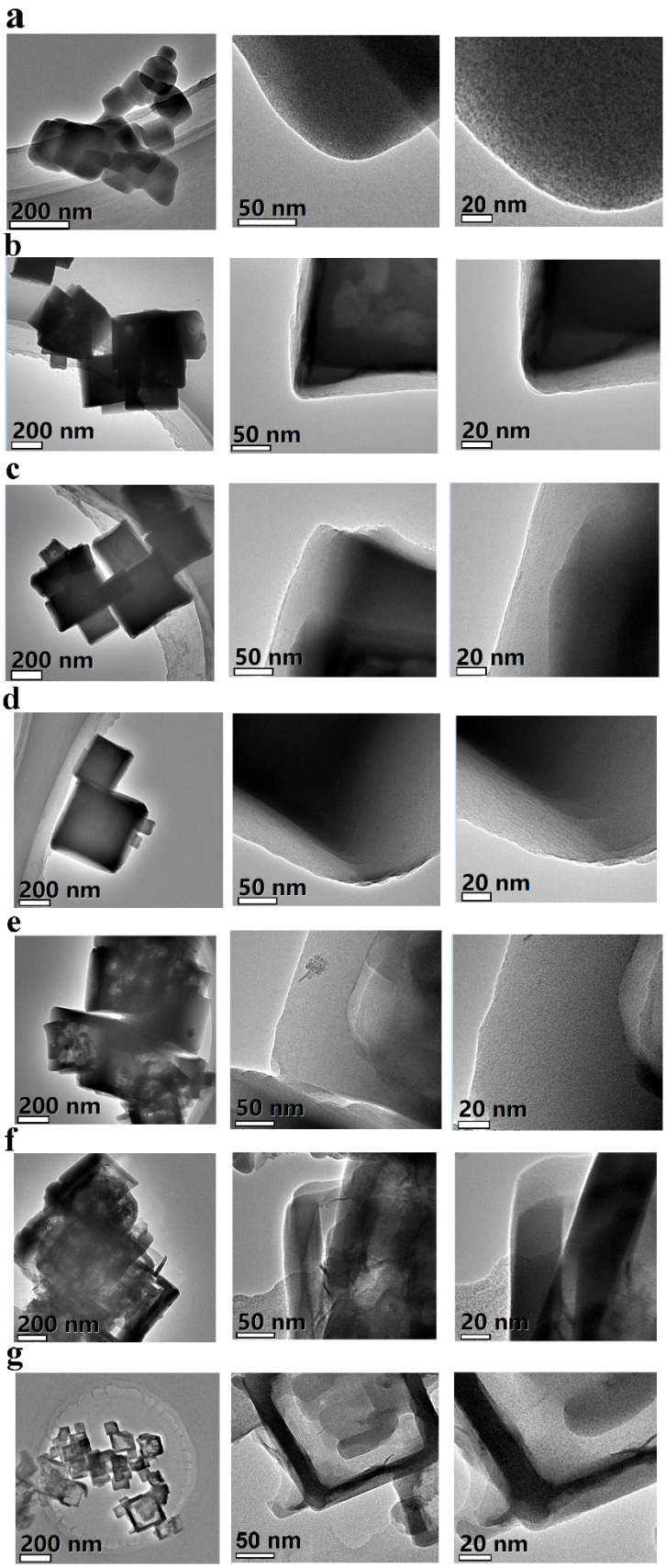

Figure S5. TEM images of (a) Sample-CF, (b) Sample-FF-1, (c) Sample-FF-2, (d) Sample-FF-3, (e) Sample-FF-4, (f) Sample-FF-5 and (g) Sample-FF.

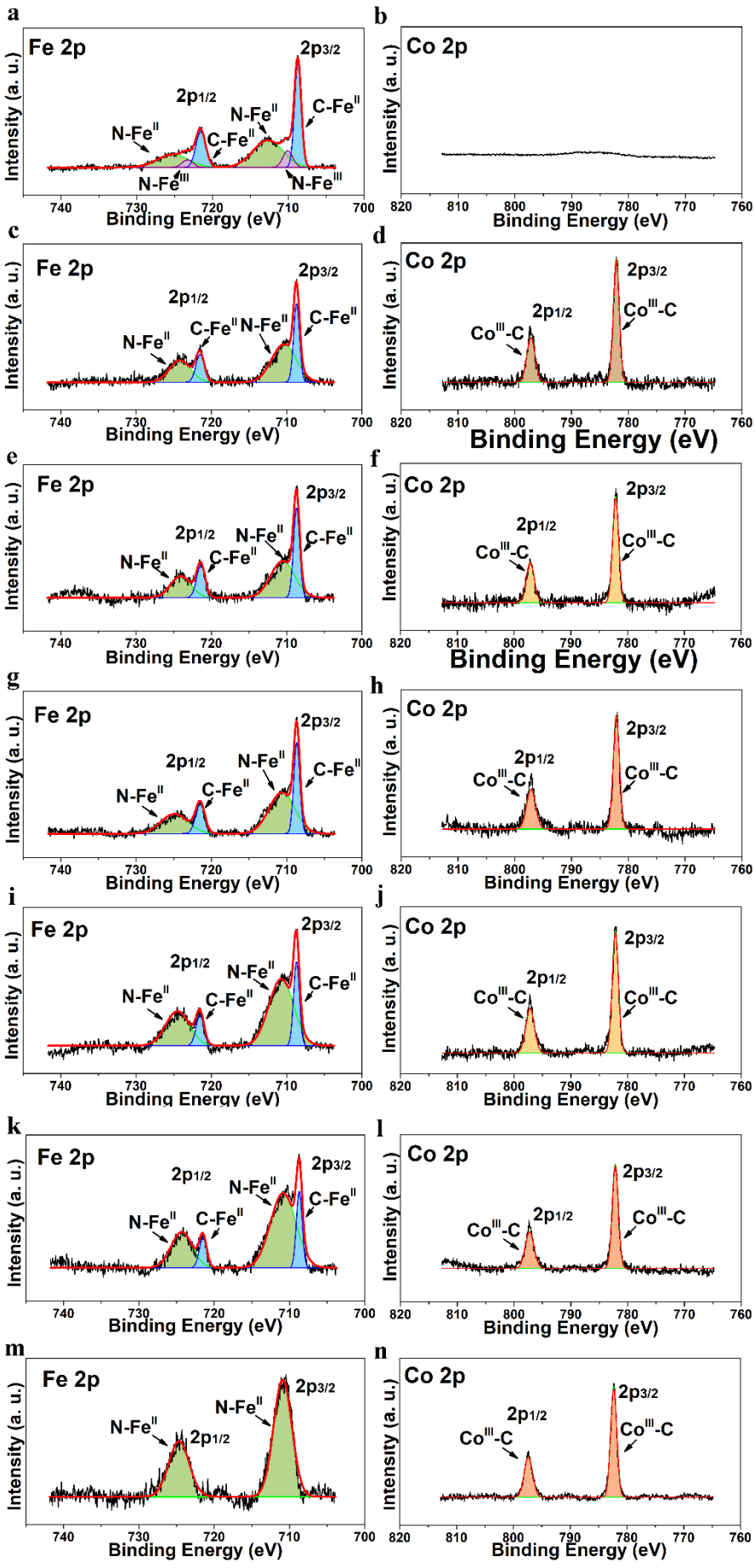
a
Fe 2p
2p3/2
2p1/2
N-Fe^II
C-Fe^II
N-Fe^III
Intensity (a. u.)
Binding Energy (eV)
b
Co 2p
Co^III-C
c
d
e
f
g
h
i
j
k
l
m
n

Figure S6. Ex situ XPS results of (a, b) Sample-CF, (c, d) Sample-FF-1, (e, f) Sample-FF-2, (g, h) Sample-FF-3, (i, j) Sample-FF-4, (k, l) Sample-FF-5 and (m, n) Sample-FF.

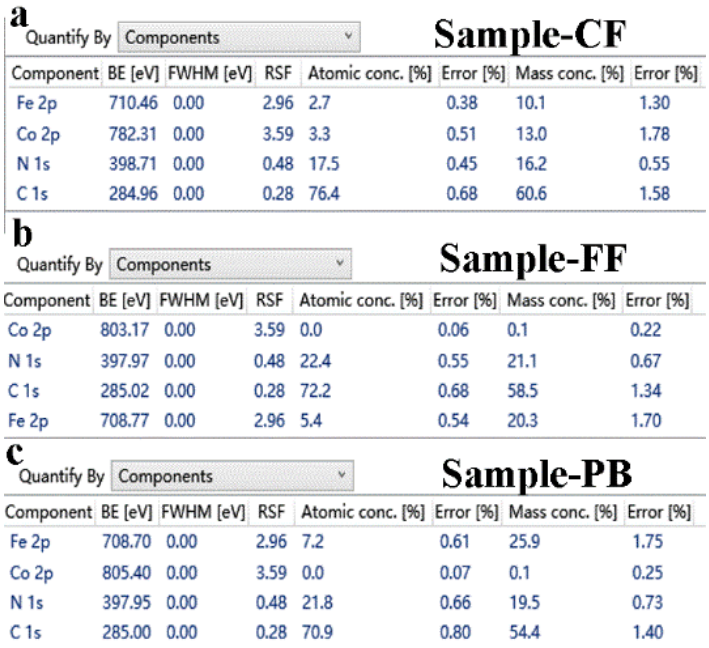

Figure S7. XPS element mass content test: (a) Sample-CF. (b) Sample-FF. (c) Sample-PB.

Table S1. ICP result

Sample ID	Sample-FF		Sample-PB	
Element	Na	Fe	Na	Fe
Mean	1.587	5.166	0.547	2.2
Units	mg/L	mg/L	mg/L	mg/L

EA result

Sample ID	Sample-FF		Sample-PB	
element	C	N	C	N
Weight ratio	20.535	23.958	17.744	20.701

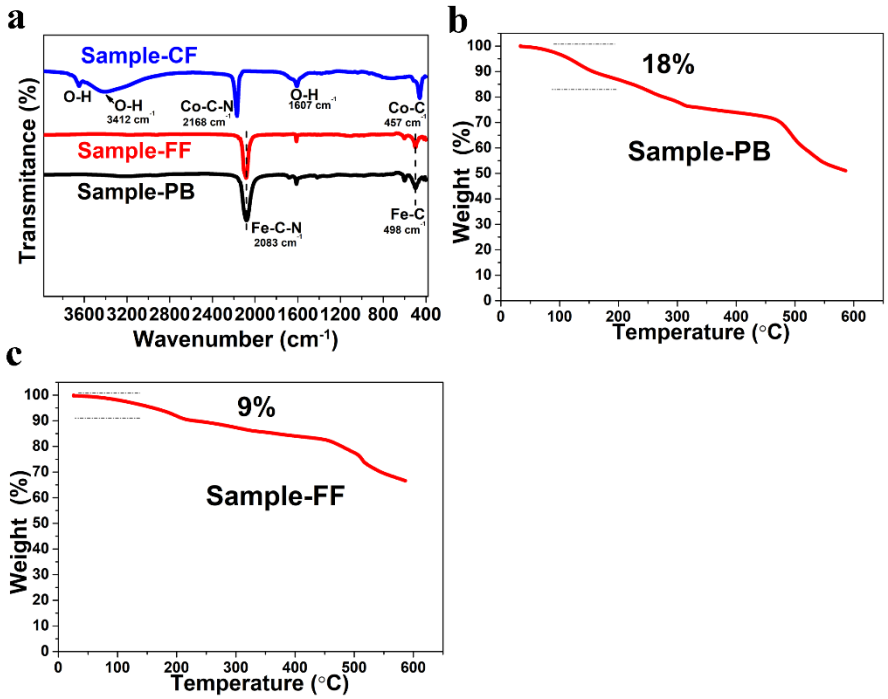

Figure S8. TG curves of (a) Sample-FF and (b) Sample-PB.

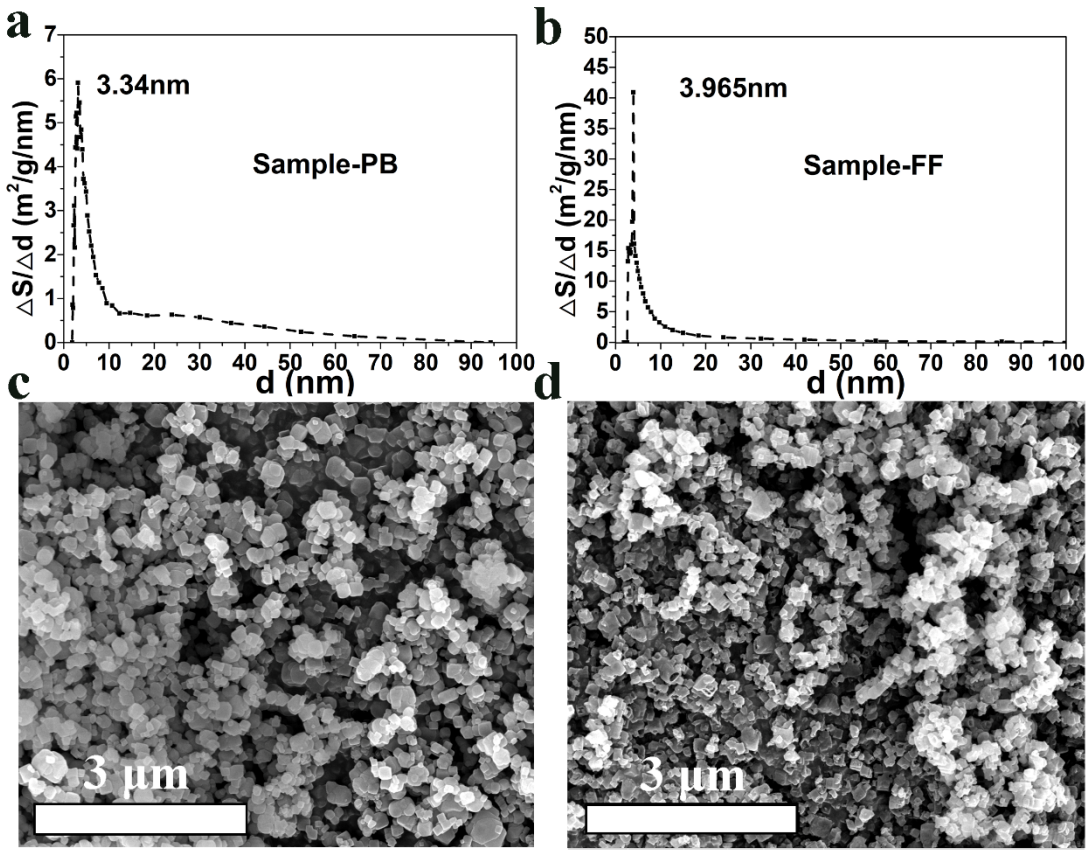

Figure S9. (a)The BJH pore-size distribution plot the Sample-PB. (b)The BJH pore-size distribution plot the Sample-FF. (c) The HR-FESEM image of the Sample-PB. (d) The HR-

FESEM image of the Sample-FF.

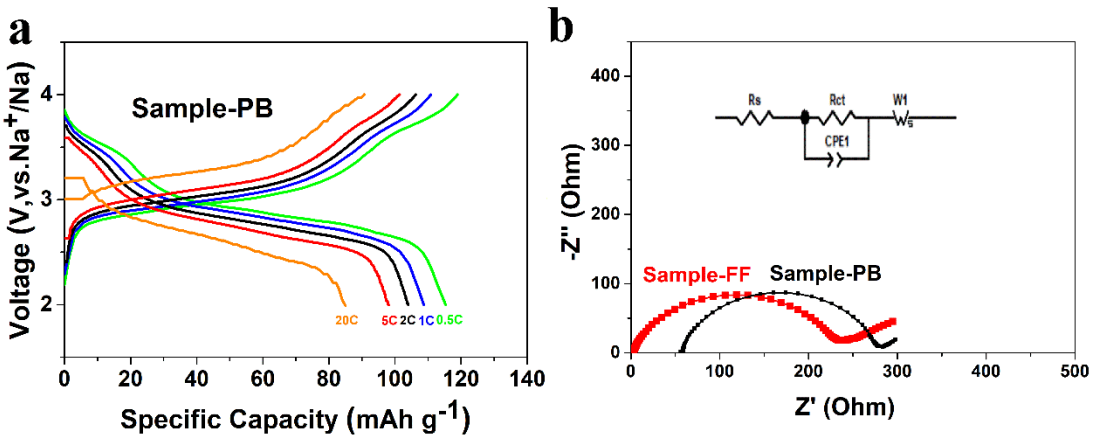

Figure S10. (a) charge/discharge curves of the Sample-PB at various current densities. (b) EIS plot and fitted result of both the samples.

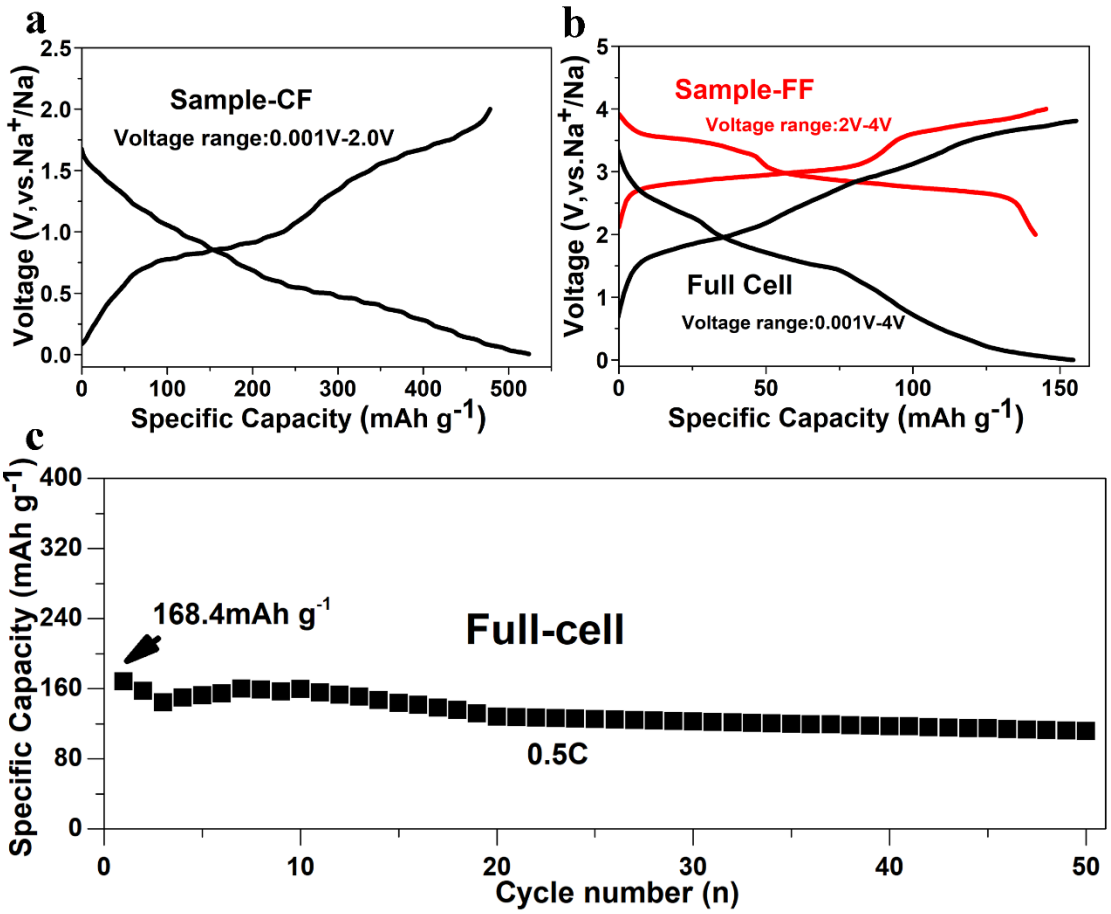

Figure S11. (a) Electrochemical charge and discharge plots of the Sample-CF at a current density of 100 mA g^{-1}. (b) The Sample-FF/the Sample-CF full-cell charge and discharge plots at a current density of 0.5C, 1 C=170 mA g^{-1}. (c) Full-cell electrochemical cycling performance at a current density of 0.5C, 1 C=170 mA g^{-1}.

title	Precursors	additive name	Need additive	Structures	Applications	Specific capacity	Year
Frontispiece: Synthesis of Monocrystalline Nanoframes of Prussian Blue Analogues by Controlled Preferential Etching	Ni–Fe cube	HCl	YES	Ni–Fe yolk@frame structure	Na+/Li+ storage	less than 100 mAh/g at 1C	2016
Potassium ions stabilized hollow Mn-based prussian blue analogue nanocubes as cathode for high performance sodium ions battery	Mn-Fe cube	sodium citrate assisted	YES	Mn-Fe Box	Na+ storage	128 mAh/g at 50mA/g	2020
Hierarchical sodium-rich Prussian blue hollow nanospheres as high-performance cathode for sodium-ion batteries	Fe-Fe cube	ascorbic acid, and NaCl	YES	hollow sphere	Na+ storage	142 mAh/g at 0.1C	2018
Metal-organic-framework-derived hollow polyhedrons of prussian	Co-Fe cube	cetyltrimethylammonium bromide	YES	CoHCF hollow dodecahedrons	Na+ storage	32.7–50 Wh/kg	2019
Hierarchical Hollow Prussian Blue Rods Synthesized via Self-Sacrifice Template as Cathode for High Performance Sodium Ion Battery	MnO2 nanosheet	tetramethylammonium hydroxide	YES	hollow rod-like structure	Na+ storage	117.3 mAh/g at 1C	2018
A Chemical Precipitation Method Preparing Hollow–Core–Shell Heterostructures Based on the Prussian Blue Analogs as Cathode for Sodium-Ion Batteries	PBA cube	3.0 g of PVP (K30, MW ≈ 40 000) and 4.38 g of sodium citrate	YES	hollow structure	Na+ storage	123 mA h/g at 1C	2018
This work	Fe-Co cube	NO	NO	hollow cube	Na+ storage	133.6mAh/g at 1C	

Figure S12. Comparison of other reported work and this work.

The calculation process of the exact formula:

The Sample-FF:

$Na_{\alpha1}Fe_{\beta1}[Fe(CN)_6]_{\gamma1}$, Set $\beta1=1$,

The formula changes into $Na_{x1}Fe_1[Fe(CN)_6]_{y1}$

1. $x_1:(y_1+1)= (1.587/23): (5.166/56)$ ------atom ratio
2. $x_1+2=4y_1$ ------electron balance

Result: $x_1=1.38$, $y_1=0.845$.

Water content:

$Na_{1.38}Fe[Fe(CN)_6]_{0.845}\cdot\delta H_2O$,

$18\delta:(157.03+18\delta)=9:100$ -------weight ratio

Result: $\delta=0.86$

The Sample-PB:

$Na_{\alpha2}Fe_{\beta2}[Fe(CN)_6]_{\gamma2}$, Set $\beta2=1$,

The formula changes into $Na_{x2}Fe_1[Fe(CN)_6]_{y2}$

3. $x_2:(y_2+1)= (0.547/23): (2.2/56)$ ------atom ratio
4. $x_2+2=4y_2$ ------electron balance

Result: $x_2=1.07$, $y_2=0.768$.

Water content:

$Na_{1.07}Fe[Fe(CN)_6]_{0.768}\cdot\delta H_2O$,

$18\delta:(143.51+18\delta)=18:100$ -------weight ratio

Result: $\delta=1.75$