Supporting Information

Single-crystal sodium nickel phosphate nanoparticles as ultra-high capacitance and rate-performance cathode of supercapacitor

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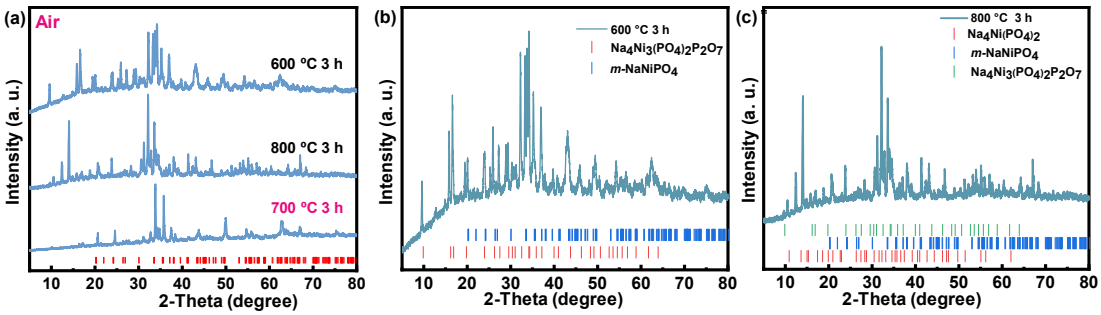

Figure S1. XRD patterns of prepared products at different calcination temperatures

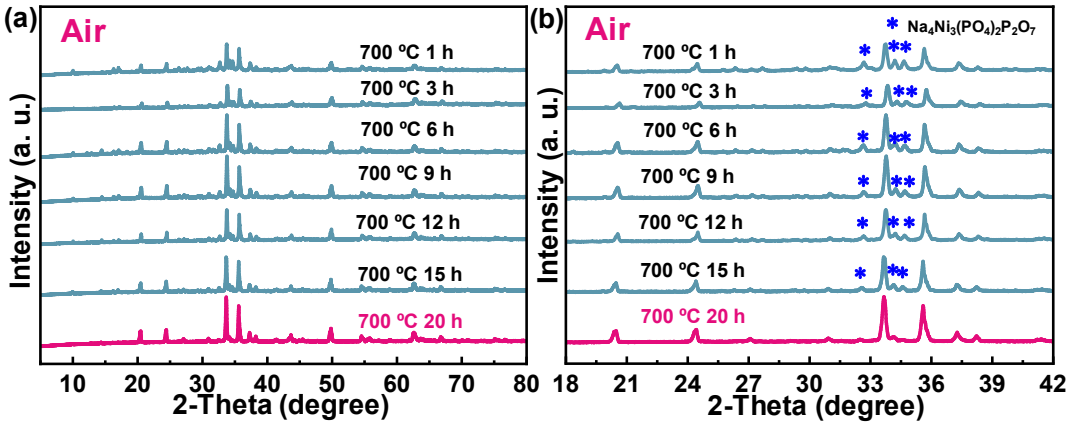

Figure S2. XRD patterns of prepared products at different calcination time

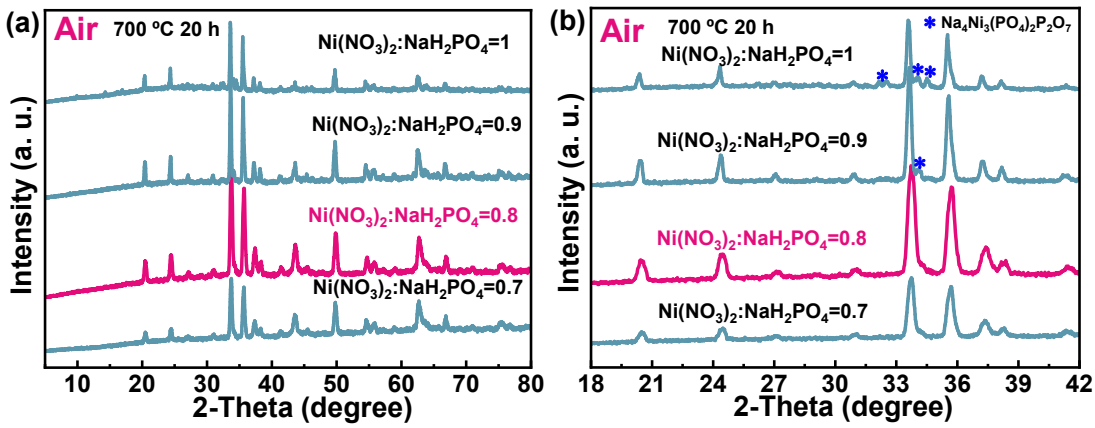

Figure S3. XRD patterns of prepared products with different precursor proportions

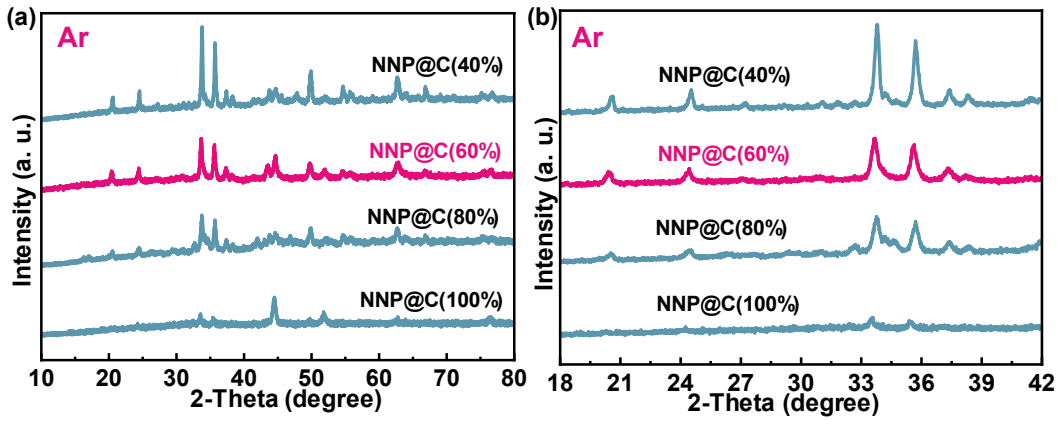

Figure S4. XRD patterns of prepared NNP@C composites with different carbon source

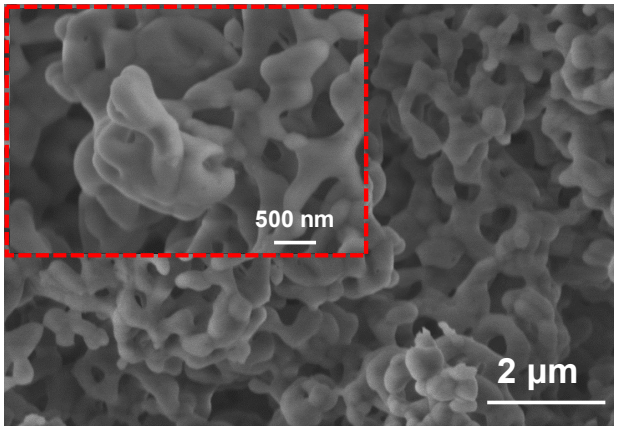

Figure S5. SEM images of NNP product pellet after calcination

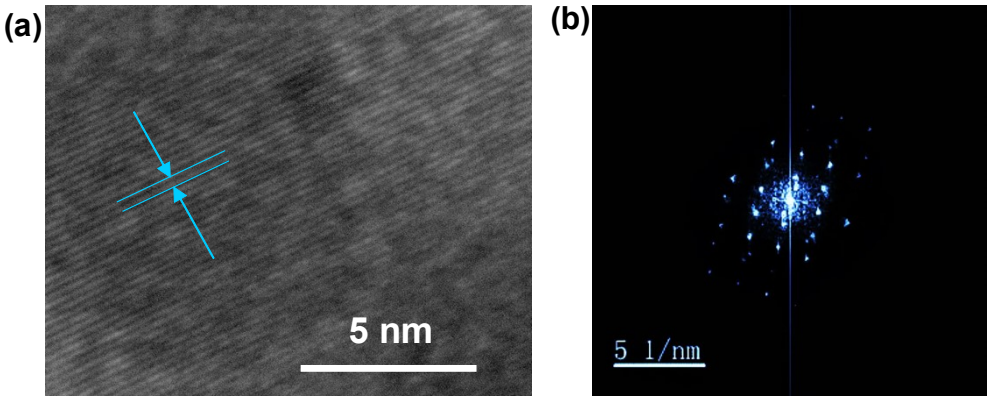

Figure S6. (a) High-resolution transmission electron microscopy (HRTEM) images (b) Fast Fourier Transform (FFT) of NNP

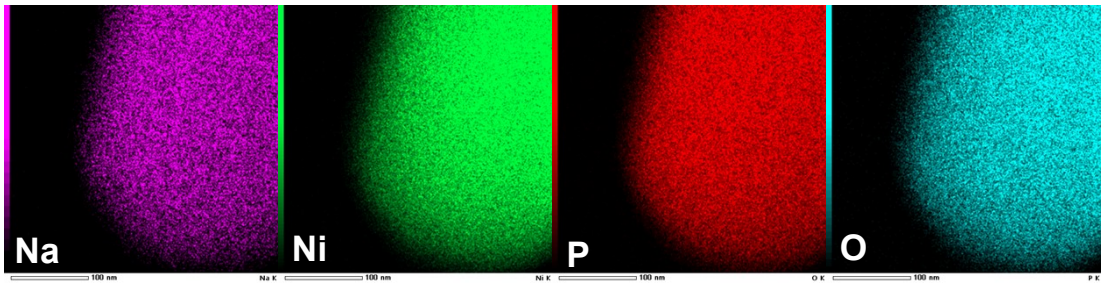

Figure S7. TEM-EDS mapping of prepared NNP sample

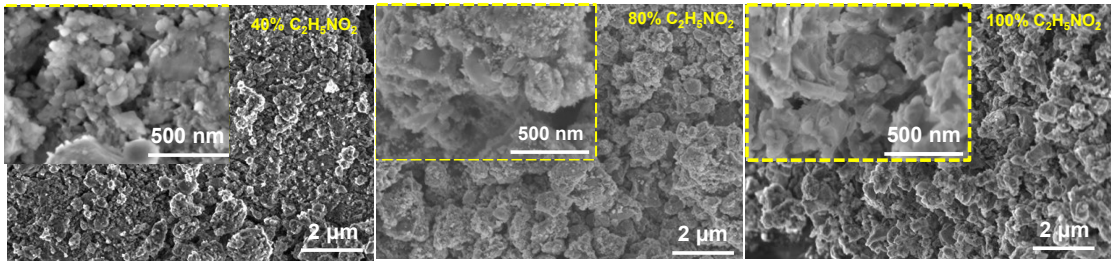

Figure S8. SEM images of prepared NNP@C composites obtained by the different carbon source contents

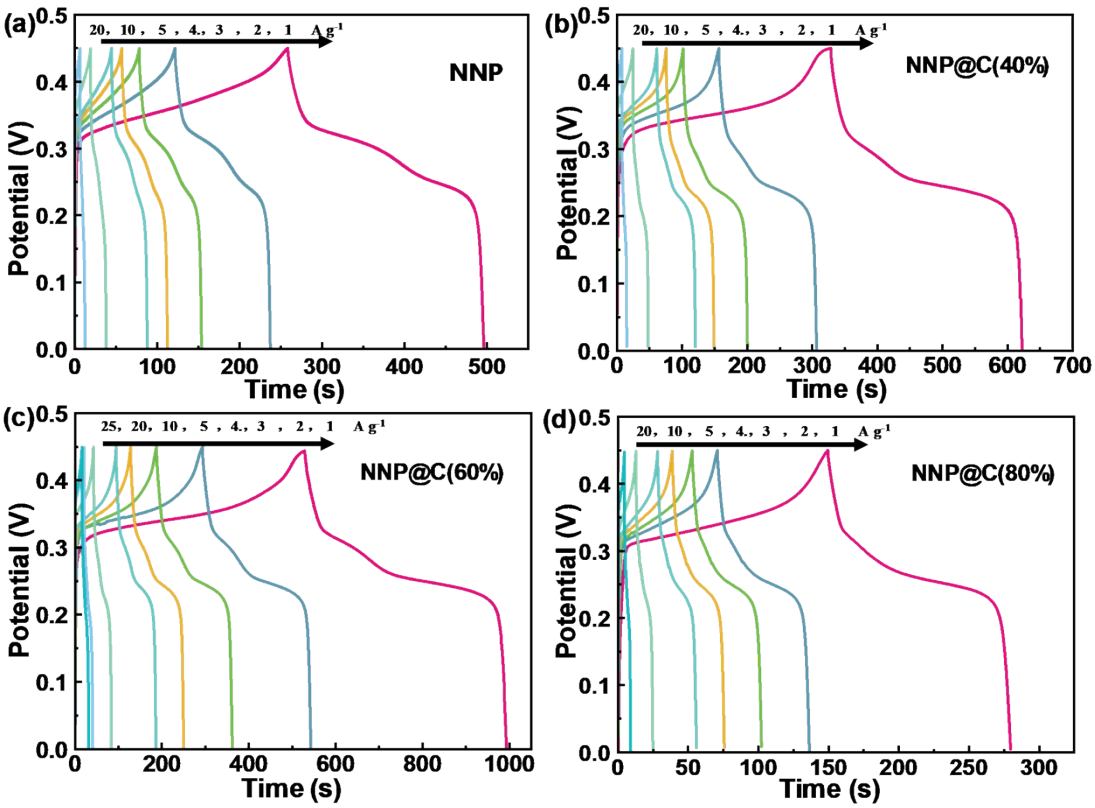

Figure S9. GCD curves of NNP@C composite electrodes obtained by the different carbon source contents

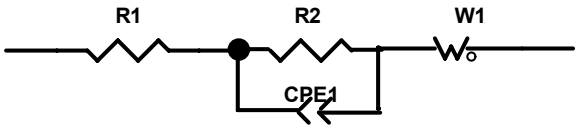

Figure S10. the electrical equivalent circuit used for fitting the impedance spectra.

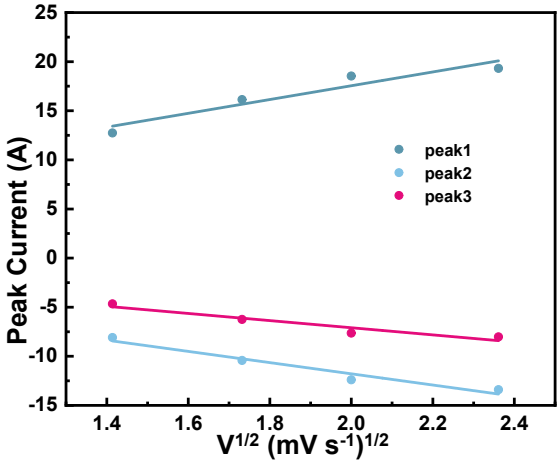

Figure S11. linear relationship between peak current and the square root of scan rate.

Table S1 Rietveld XRD refinements results of NNP sample

Chemical Formula	**$NaNiPO_4$**
Space group	Pmnb
a(Å)	6.730332
b(Å)	8.76944
c(Å)	5.027296
V($Å^3$)	29.747
$R_p/R_{wp}/R_{exp}$	2.82/4.14/3.551

Table S2 Fractional coordinates and site occupancies in refined XRD pattern of NNP sample

atom	x	y	z	Occ.
Na1	0.25	0.8508	0.5305	0.01327
Ni1	0	0	0	0.01027
P1	0.25	0.176	0.464	0.01127
O1	0.25	0.1164	0.7521	0.01109
O2	0.25	0.3492	0.4557	0.01109
O3	0.0692	0.1213	0.3174	0.01109

Table S3 Electrochemical performances of this work compared with the reported NNP electrodes

Cathode Material	specific capacitance ($F\ g^{-1}$)	Rate capacitance	Cyclic performance	Refs
t-NNP/*m*-NNP//AC	125/70 (1 A g^{-1})	———	99% (2000)/ (50)	1
t-NNP//AC	90 (1 A g^{-1})	52 (20 A g^{-1})	100% (2000)	2
m-NNP@NNPP	368 (1 mA cm^{-2})	200(20 mA cm^{-2})	90% (1000)	3
m-NNP@C	1045 (1 A g^{-1})	861 (25 A g^{-1})	93.4% (5000)	This work
m-NNP	528 (1 A g^{-1})	345 (20 A g^{-1})	_____	This work
m-NNP@C//AC	114 (1 A g^{-1})	79 (100 A g^{-1})	93.5%(5000)	This work

Supporting References:

1 M. Minakshi, D. Mitchell, R. Jones, F. Alenazey, T. Watcharatharapong, S. Chakraborty, R. Ahuja, *Nanoscale* 2016**, 8** (21), 11291-11305.

2 M. Minakshi Sundaram, D. R. G. Mitchell, *Dalton Trans.* 2017**, 46**, 13704-13713.

3 B. Senthilkumar, K. V. Sankar, L. Vasylechko, Y.-S. Lee, R. K. Selvan, *RSC Advances.* 2014**, 4** (95), 53192-53200.