Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

Diatomic-doped carbon layers decorated $Na_3V_2(PO_4)_2F_3$ as a durable ultrahigh-stability cathode for sodium ion batteries

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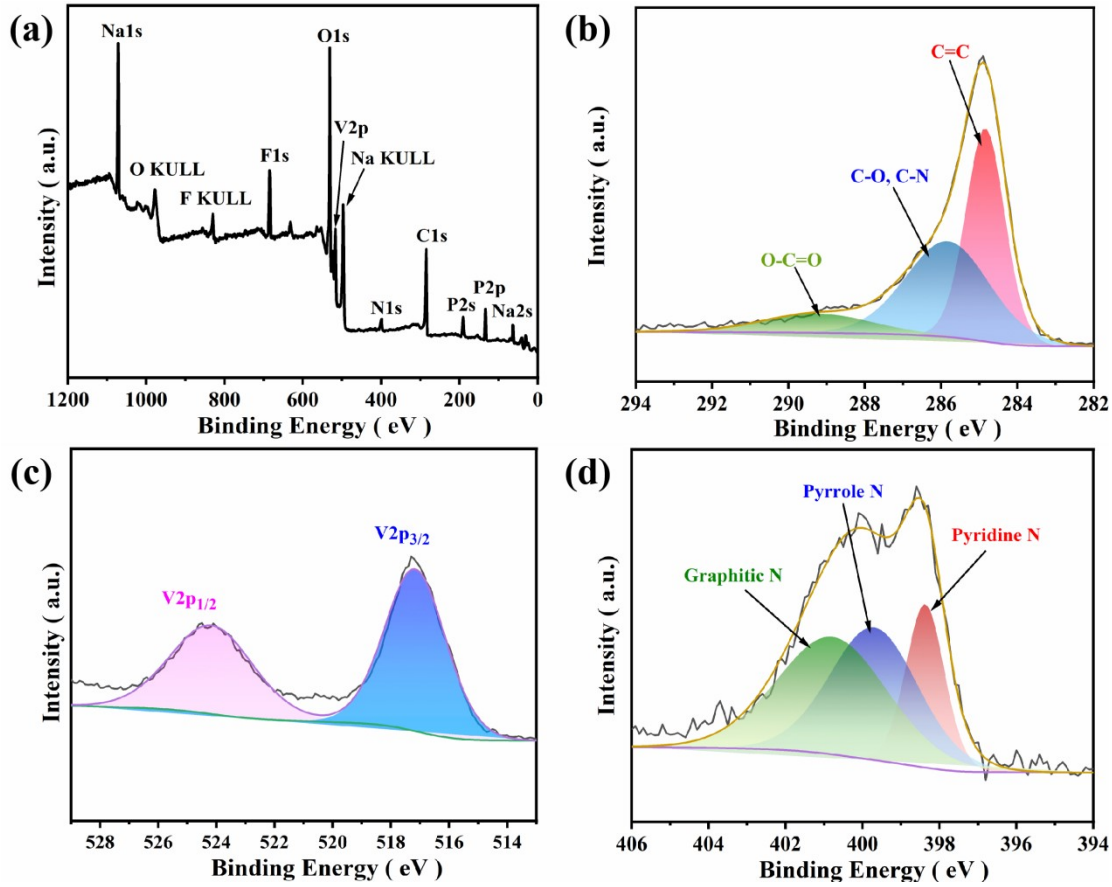

Fig. S1 XPS photoelectron spectra of NVPF@NC: the spectrum of (a) full XPS, (b) C 1s, (c) V 2p and (d) N 1s.

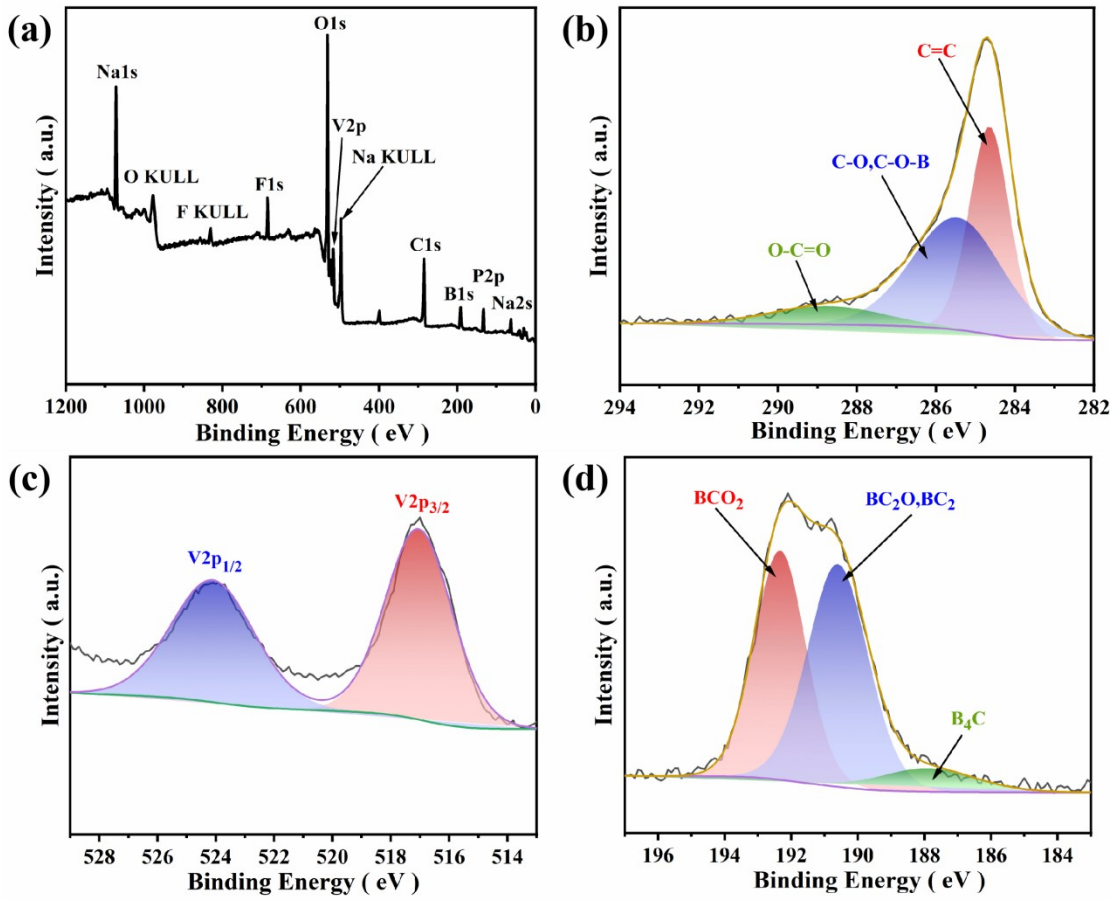

Fig. S2 XPS photoelectron spectra of NVPF@BC: the spectrum of (a) full XPS, (b) C 1s, (c) V 2p and (d) B 1s.

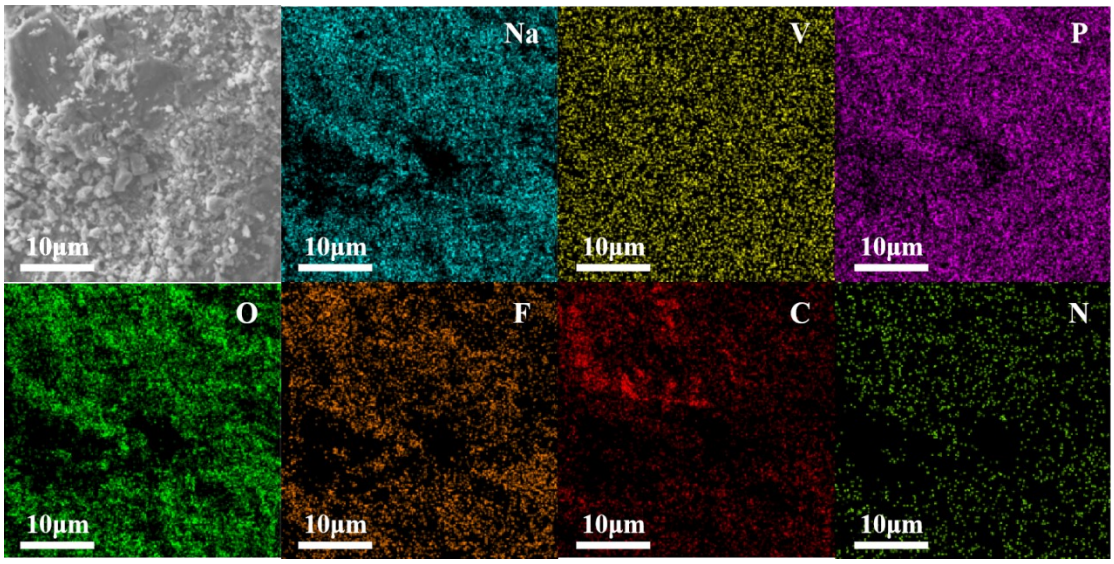

Fig. S3 EDS mapping images of NVPF@NC composite.

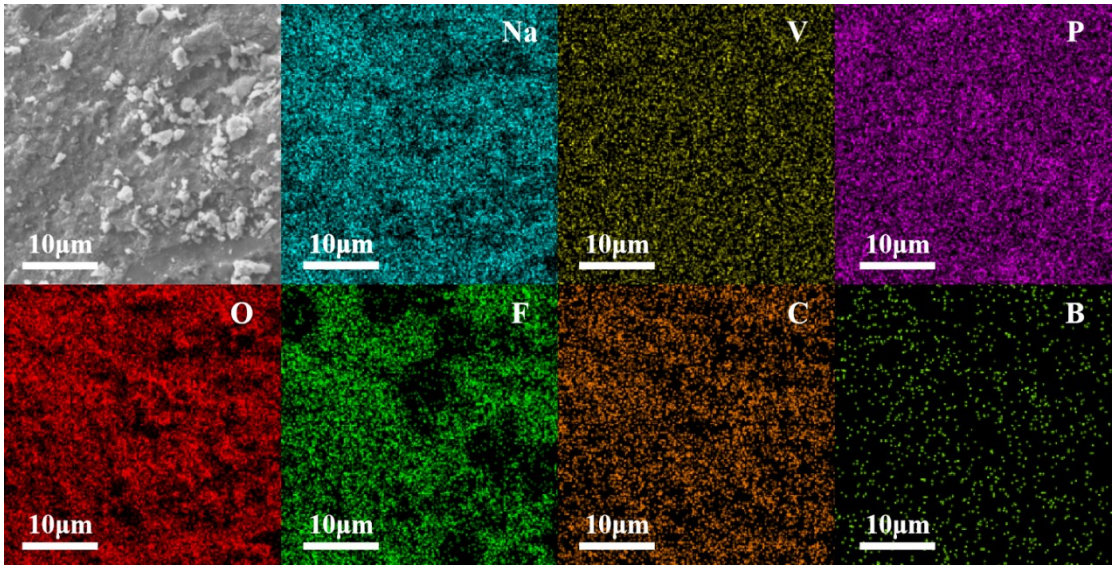

Fig. S4 EDS mapping images of NVPF@BC composite.

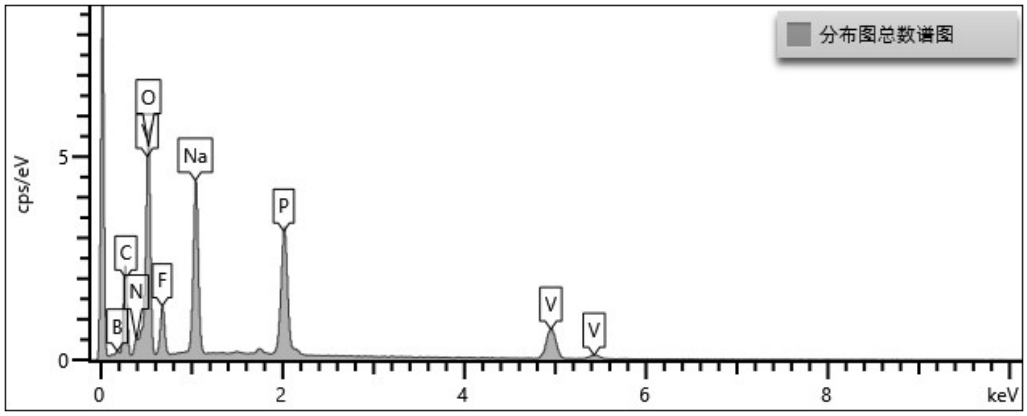

Fig. S5 Total number spectrum of distribution diagram of each atom in NVPF@NBC.

Table. S1 Mass fraction table of each atom in NVPF@NBC.

Elements	B	C	N	O	F	Na	P	V	Total mass
wt%	2.21	15.68	2.42	27.38	6.98	11.13	11.39	22.81	100
Wt% sigma	0.64	0.26	0.26	0.34	0.15	0.13	0.14	0.33	1

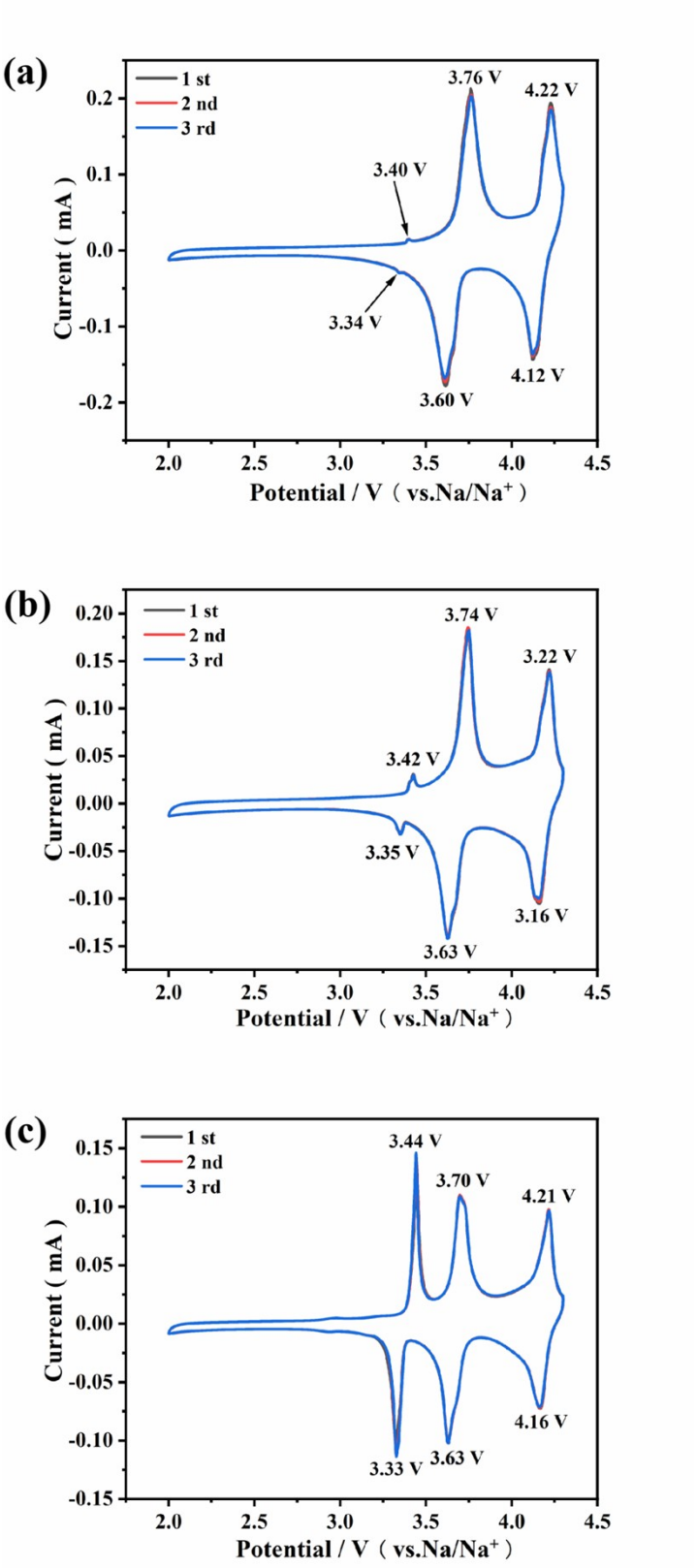

Fig. S6 CV curves of the four cycles of (a) NVPF, (b) NVPF@NC and (c) NVPF@BC at 0.5 mV s^{-1} between 2.0 and 4.3 V

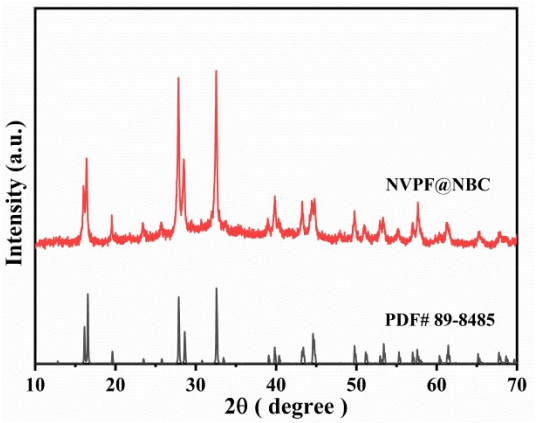

Fig. S7 XRD pattern of the NVPF@NBC electrode after 100 cycles at 0.2 C.

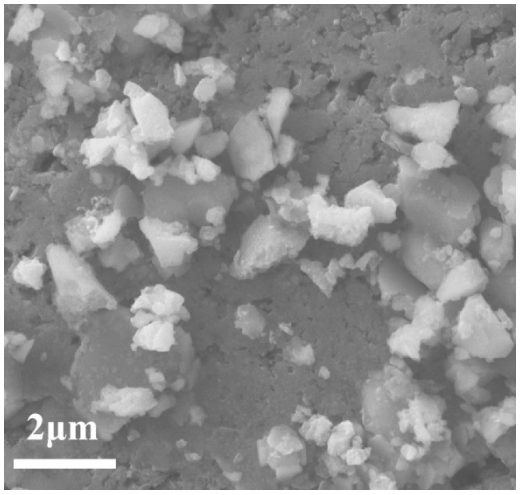

Fig. S8 SEM image of the NVPF@NBC electrode after 100 cycles at 0.2C.

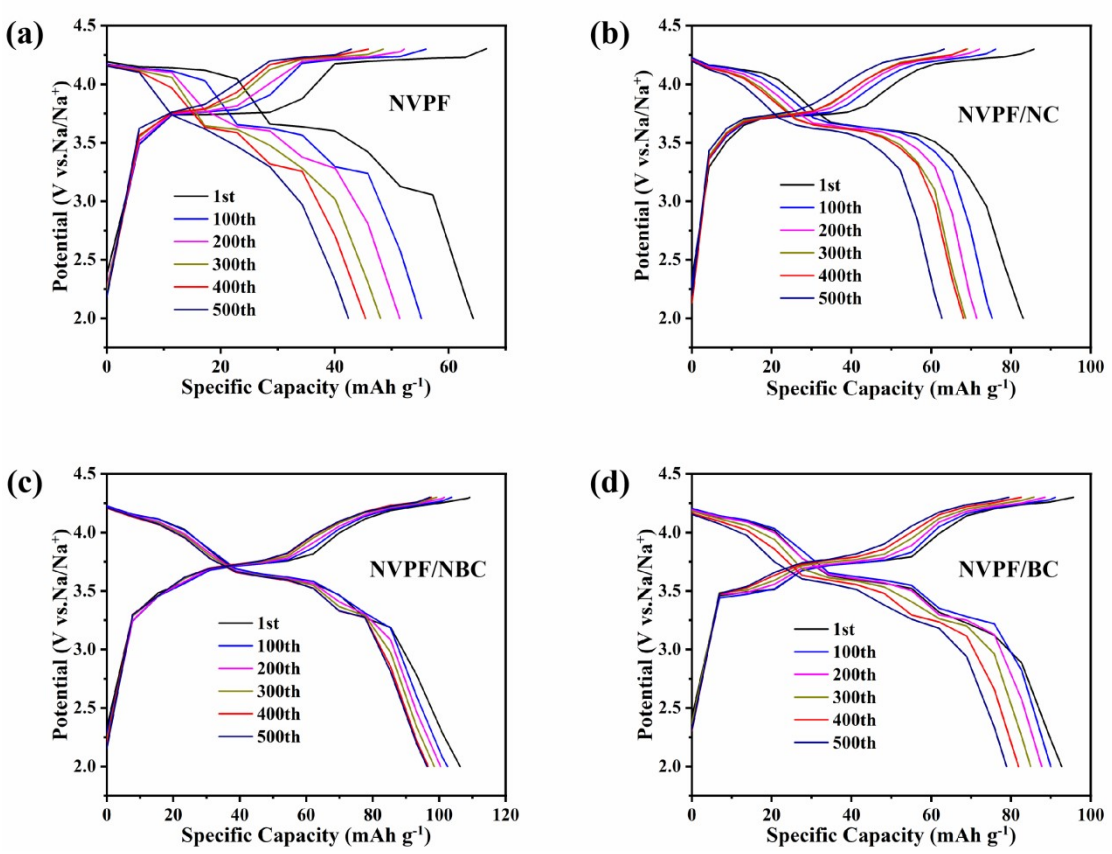

Fig. S9 Charge discharge curves of (a) NVPF (b) NVPF@NC (c) NVPF@NBC (d) NVPF@BC at different cycle periods at 5C.

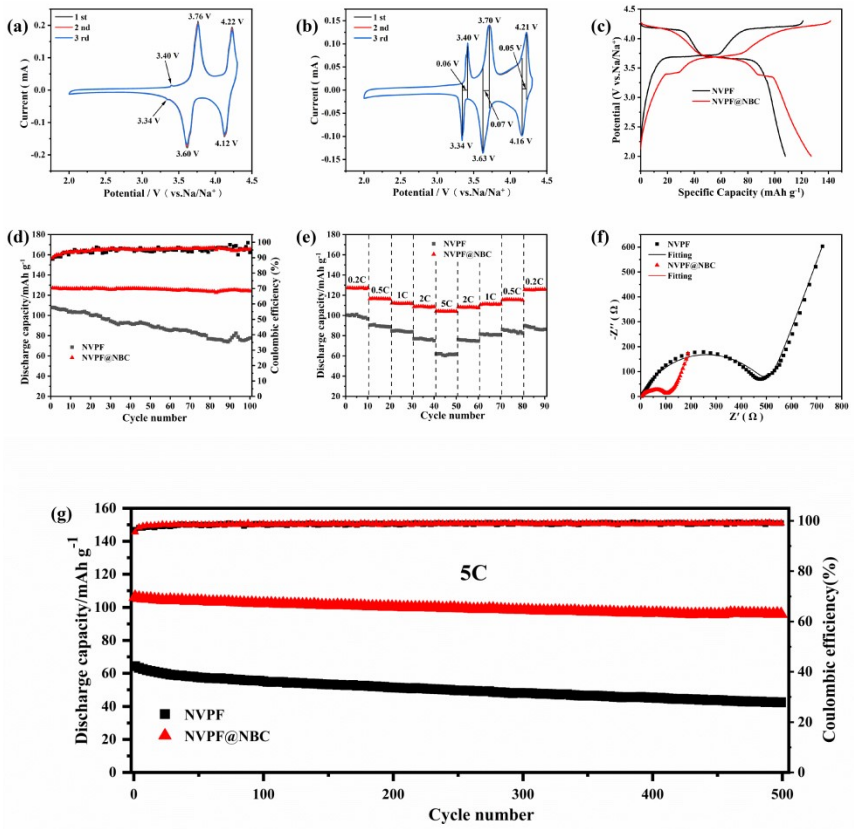

Fig. S10 Cyclic voltammetry (a) of NVPF, (b) of NVPF@NBC, (c) first charge and discharge curves of NVPF and NVPF@NBC, (d) cyclic performance diagram of NVPF and NVPF@NBC at 0.2C, (e) rate performance of NVPF and NVPF@NBC at different rates, (f) AC impedance plots of NVPF and NVPF@NBC (g) cycling performance of NVPF and NVPF@NBC at 5 C.

Table. S2 Comparison of rate capability of NVPF@NBC in this work with polyanionic compounds of others reported in the literatures.

Sample	Low-rate Capacity (mA h g^{-1})	High-rate Capacity (mA h g^{-1})	Capacity retention ratio (%)	Voltage Window (V)	References
NVPF@C-4	121.5 (0.1C)	99.2 (10C)	(1000cycles, 90.1% at 10C)	2.5-4.5	1
$Na_3V_2(PO_4)_2F_3$/C	106.4 (0.2C)	94.1 (5C)	(500cycles, 92.4% at 1C)	2.5-4.2	2
NVPF-H@cPAN	116.2 (0.2C)	84.4 (5C)	(2000cycles, 85% at 5C)	2.0-4.5	3

NVPF-Zr-0.02/NC	119.2 (0.5C)	98.1 (20C)	(1000cycles, 90.2% at 20C)	2.0-4.5	4
NVPF@C	109.5 (0.1C)	78.9 (30C)	(1000cycles, 87.8% at 20C)	2.0-4.3	5
BG-$Na_3V_2(PO_4)_3$@C	111.6 (0.1C)	94.7 (10C)	(100cycles, 96.4% at 10C)	2.5-3.8	6
NVPF/C-PDPA	113.8 (0.5C)	98.0 (10C)	(800cycles, 95.8% at 10C)	3.0-4.6	7
$Na_3V_2(PO_4)_3$/C+B	95.8 (0.2C)	90.3 (5C)	(40cycles, 98.3% at 0.2C)	2.7-4.0	8
$Na_3V_2(PO_4)_2F_3$–SWCNT	117 (0.2C)	104.7 (5C)	(100cycles, 92.4% at 0.2C)	2.5-4.3	9
NVPF@NBC	127.2 (0.2C)	106.3 (5C)	(100cycles, 97.6% at 0.2C)	2.5-4.3	This work

References

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