Supporting Information

Melamine-assisted Synthesis of Fe_3N Featuring Highly Reversible Crystalline-Phase Transformation for Ultrastable Sodium Ion Storage

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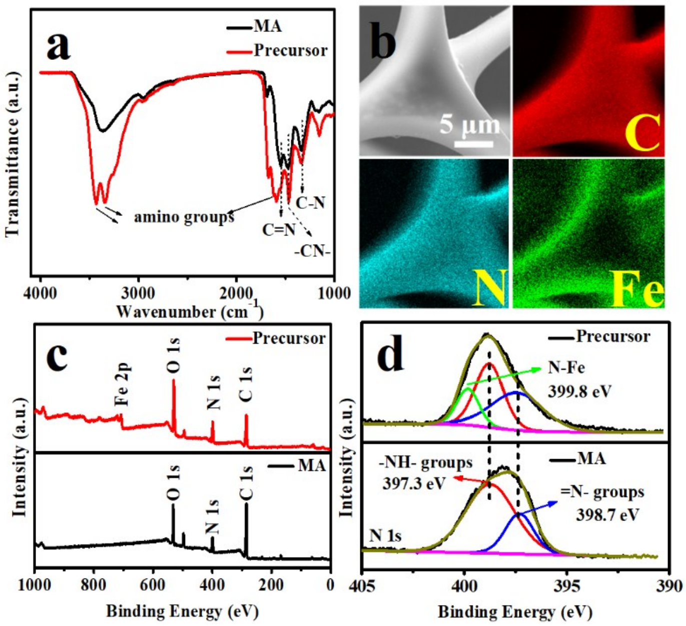

Fig. S1 (a) FTIR spectrum, (c) XPS survey spectrum and (d) high-resolution N 1s XPS spectrum of MA sponge and the precursor; (b) EDS mapping of the precursor.

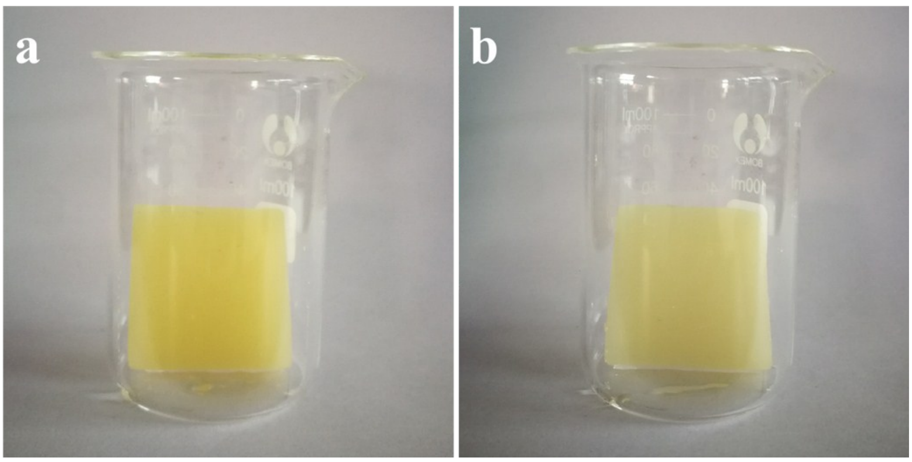

Fig. S2 Digital photos of the precursors before (a) and after (b) extensive sonication in deionized water.

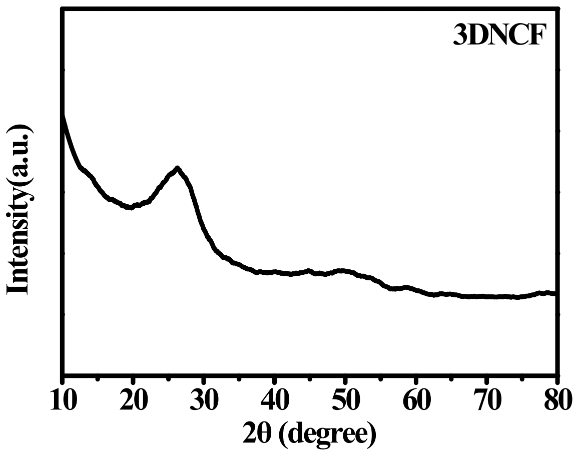

Fig. S3 XRD patterns of the 3DNCF.

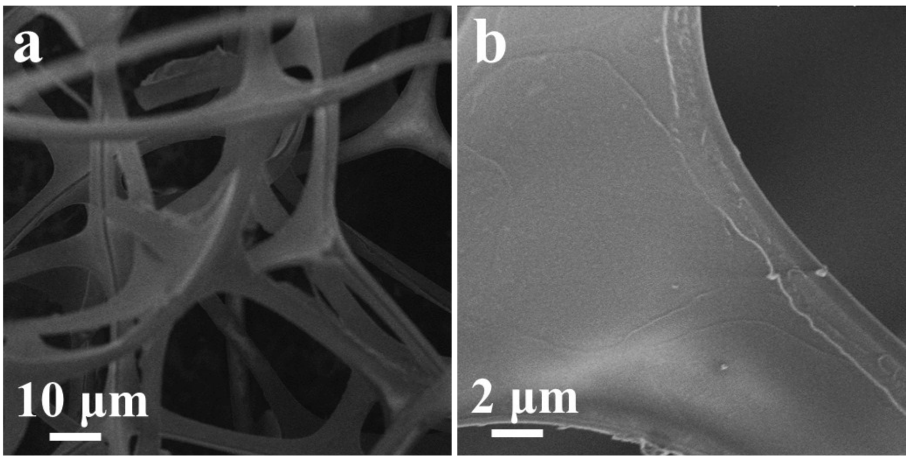

Fig. S4 SEM images of the 3DNCF.

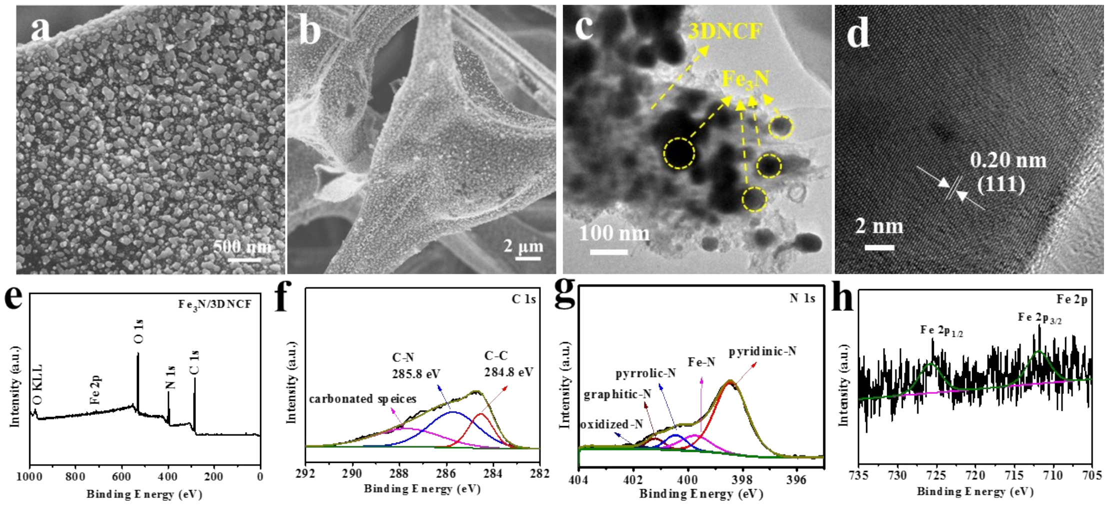

Fig. S5 SEM (a-b), TEM (c-d) images and (e) XPS survey spectrum and high-resolution elemental (f) C 1s, (g) N 1s and (h) Fe 2p spectra of Fe_3N/3DNCF composite without adding glucose.

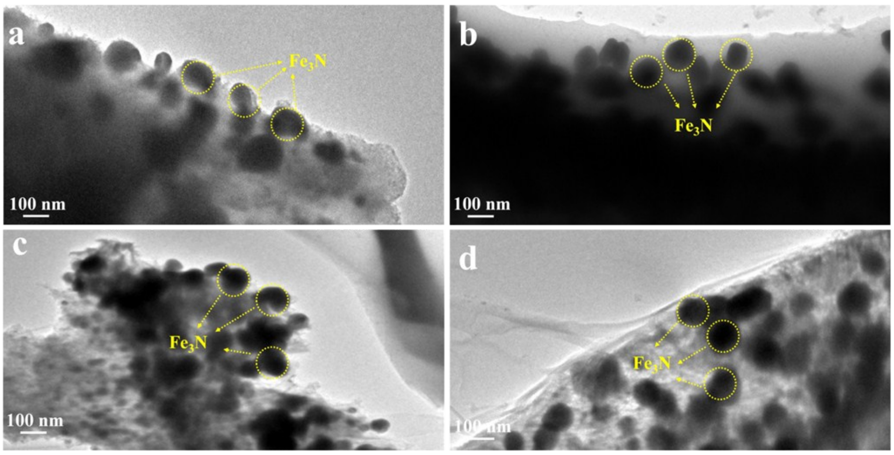

Fig. S6 *Ex situ* TEM images of Fe_3N@C/3DNCF anode for the first cycle at a discharged state of a) 0.55 V and b) 0.01 V, and at a charged state of c) 1.0 V and d) 3.0 V.

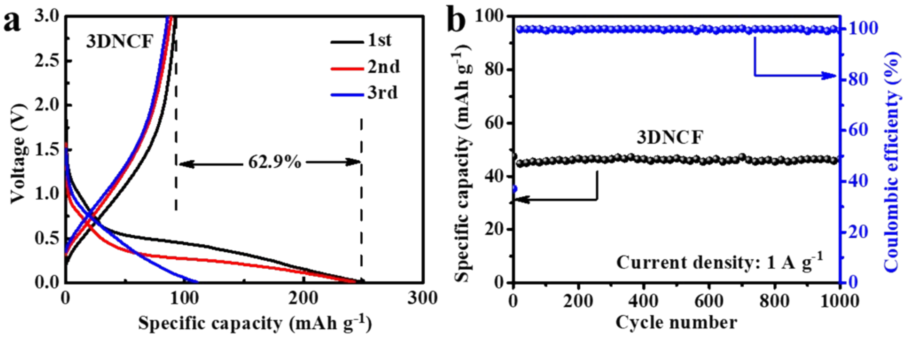

Fig. S7 (a) The galvanostatic charge and discharge voltage profile at 0.1 A g^{-1}, (b) cycle performances of 3DNCF at 1 A g^{-1}.

Table S1. ICP result of the Fe_3N@C/3DNCF and Fe_3N/3DNCF composites

Material	Analyte	Conc.Units	Fe (wt. %)	Fe_3N (wt. %)
Fe_3N@C/3DNCF	Fe	1.4 mg/L	25.38	27.5
Fe_3N/3DNCF	Fe	1.35 mg/L	24.37	26.4

Table S2 Comparison of synthesis approach and cycling performance of Fe_3N@C/3DNCF with previously reported metal nitrides anodes for SIBs.

	Materials	Synthesis approach	Capacity Retention	Reference
Ref. S2	G-VNQD-500	Hydrothermal and annealing at NH_3 atmosphere	280 mA h g^{-1} after 800 cycles at 240 mA g^{-1}	Adv. Energy Mater. 2016, 6(6): 1502067
Ref. S4	Fe_3N@C	Electrospinning and two step annealing	280 mA h g^{-1} after 300 cycles at 400 mA g^{-1}	Adv. Mater. 2018, 1800525
Ref. S6	Mo_2N	Hydrothermal and annealing at NH_3 atmosphere	180 mA h g^{-1} after 300 cycles at 500 mA g^{-1}	Energy Storage Materials, 2019, doi: 10.1016/j.ensm.2019.04.007
Ref. S1	VNQD@NC HSs	Hydrothermal and annealing at NH_3 atmosphere	306 mAh g^{-1} after 1400 cycles at 1000 mA g^{-1}	J. Mater. Chem. A, 2019, 7(15): 9289-9296
Ref. S3	Sn_3N_4	two step ammonolysis process and annealing at NH_3 atmosphere	152 mA h g^{-1} after 50 cycles at 200 mA g^{-1}	J. Mater. Chem. A, 2016, 4, 5081
Ref. S5	Ni_3N	Solution-based method and annealing at NH_3 atmosphere	80 mA h g^{-1} after 20 cycles at 423 mA g^{-1}	J. Mater. Chem. A, 2013, 1, 6441–6445
	Fe_3N@C/3DNCF	Solution-based method and one step annealing	375 mA h g^{-1} after 2000 cycles at 1000 mA g^{-1}	Our work

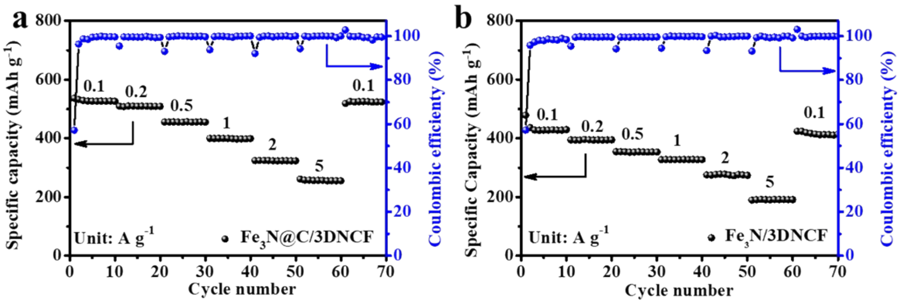

Fig. S8 The rate performance of (a) $Fe_3N@C/3DNCF$ and (b) $Fe_3N/3DNCF$.

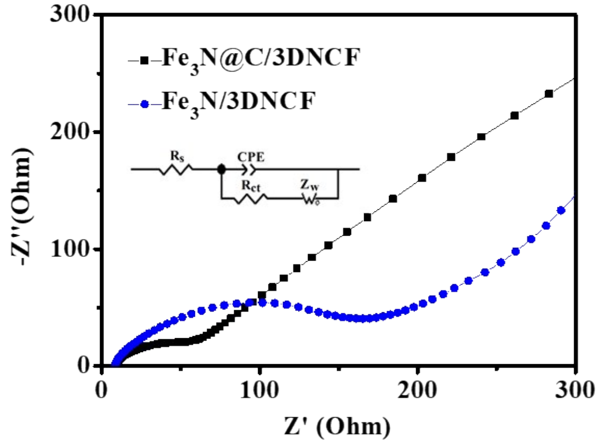

Fig. S9 Recorded electrochemical impedance spectra of $Fe_3N@C/3DNCF$ and $Fe_3N/3DNCF$. The inset is the corresponding equivalent circuit.

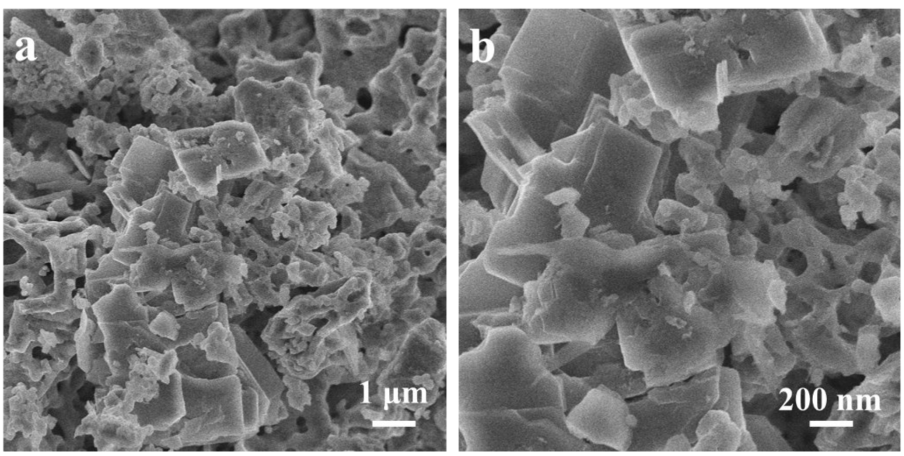

Fig. S10 SEM images of $Na_3V_2(PO_4)_3@C$ composites.

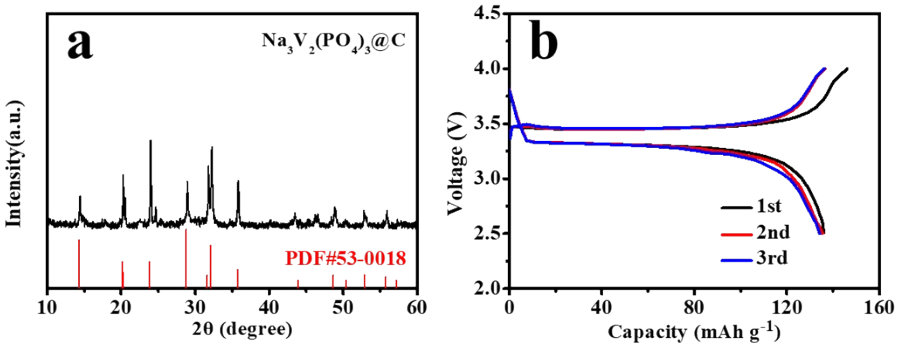

Fig. S11 (a) Typical XRD and (b) charge-discharge profiles of the $Na_3V_2(PO_4)_3$@C at 0.1 A g^{-1}.

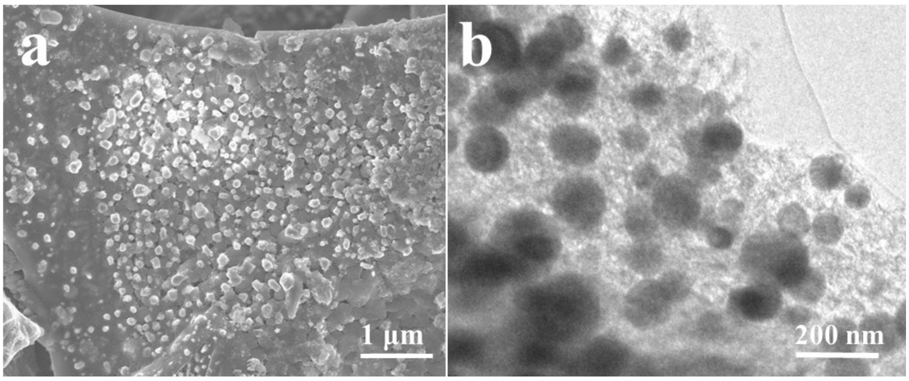

Fig. S12 The SEM and TEM images of Fe_3N@C/3DNCF after 2000 cycles.

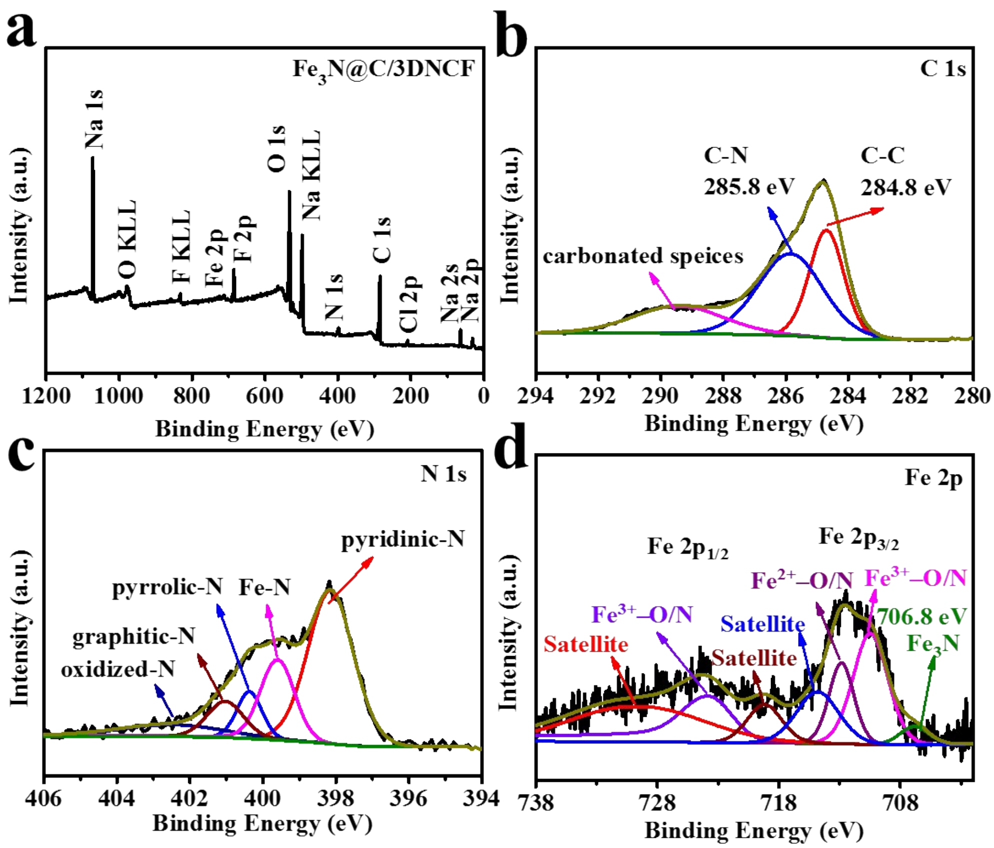

Fig. S13 High-resolution XPS spectra of Fe_3N@C/3DNCF after 2000 cycles. (a) Survey XPS spectra. High-resolution XPS spectra: (b) C 1s; (c) N 1s and (d) Fe 2p spectrum of Fe_3N@C/3DNCF.