

Supporting Information

Highly Compressible Nitrogen-doped Carbon Foam Electrode with Excellent Rate Capability via a Smart Etching and Catalytic Process

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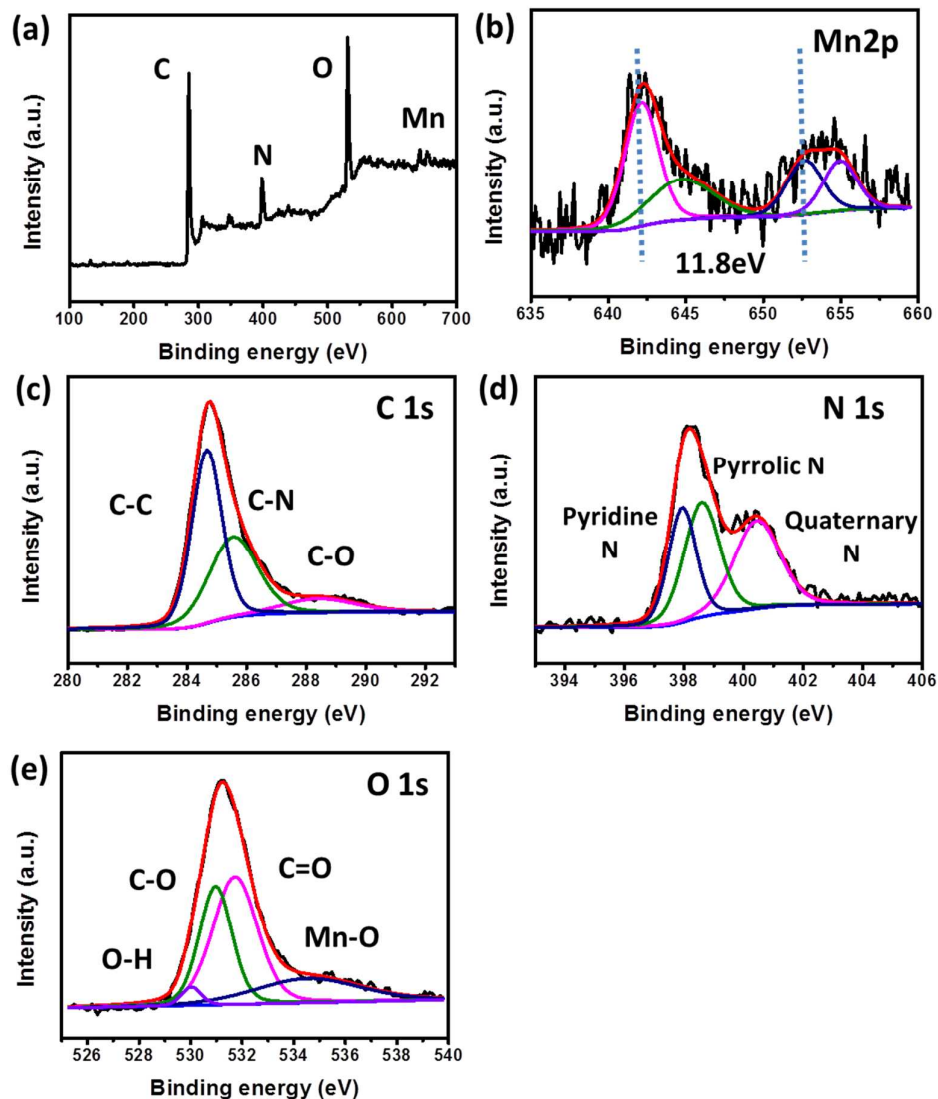


Figure S1. The survey XPS spectrum (a) and high-resolution XPS of Mn 2p, (b) C 1s, (c) N 1s (d) and O 1s (e) spectrum of ENCF.

The C1s spectrum of the ENCF can be deconvoluted into three peaks corresponds to the C-C, C-N and C-O, respectively (Fig. S1c). The N1s spectrum was also deconvoluted into three peaks at 398, 398.8, and 400.8 eV, indicating that pyridine N, pyrrolic N and quaternary N are existing in the ENCF (Fig. S1d). In addition, the O1s spectrum can be deconvoluted into four peaks, which are respectively attributed to the O-H, C-O, C=O and Mn-O configurations (Fig. S1e).¹

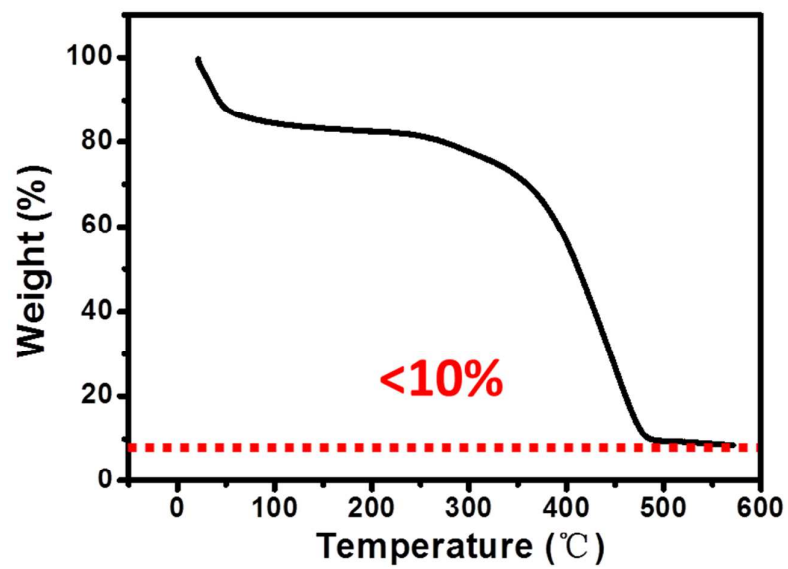


Figure S2. Thermogravimetry (TG) curve of ENCF.

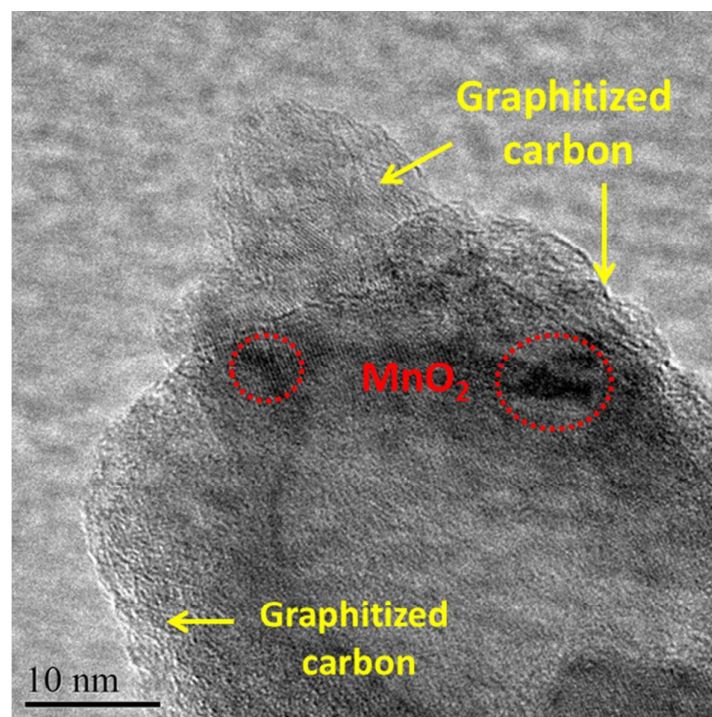


Figure S3. HRTEM image of the ENCF.

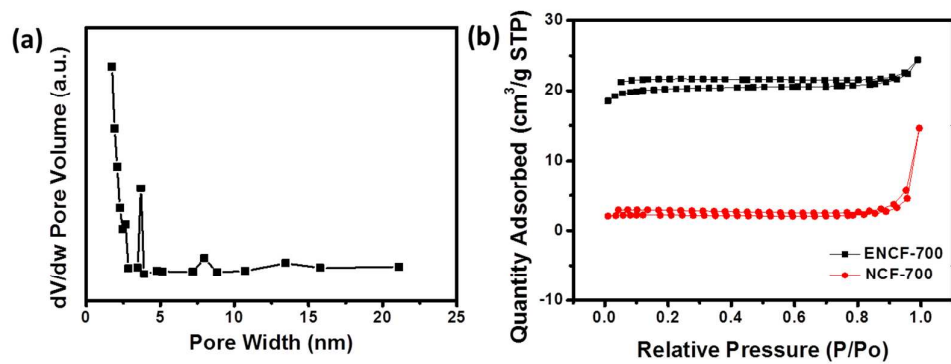


Figure S4. (a) Pore-size distribution curve of ENCF. (b) N₂ adsorption/desorption isotherm curves of ENCF and NCF.

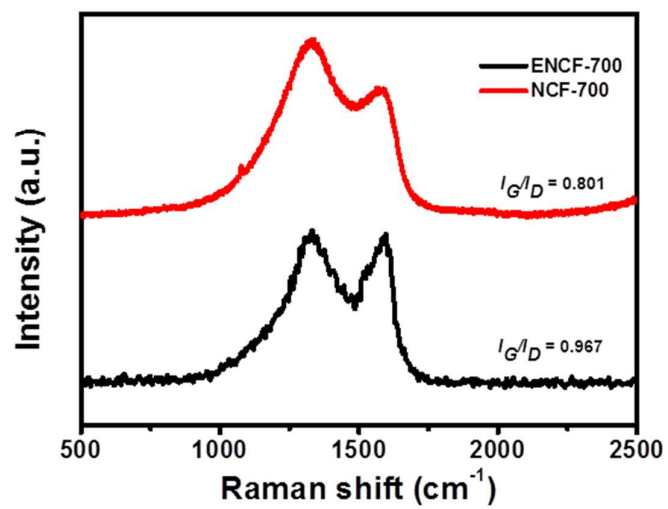


Figure S5. Raman spectra of ENCF and NCF.

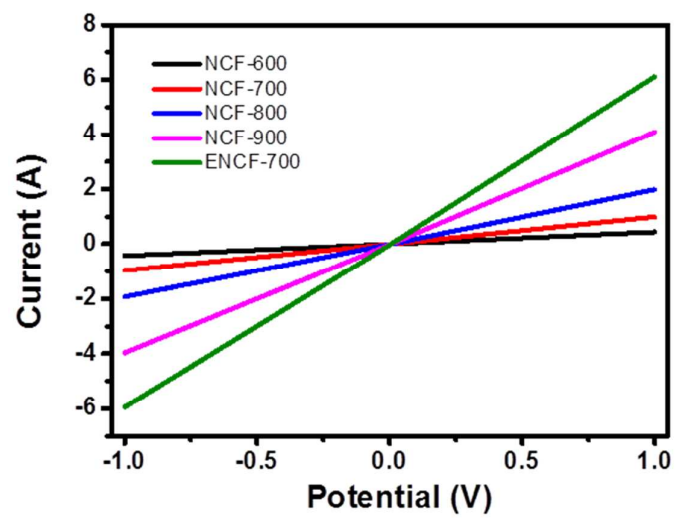


Figure S6. *I-V* curves of ENCF and NCF prepared at various temperatures.

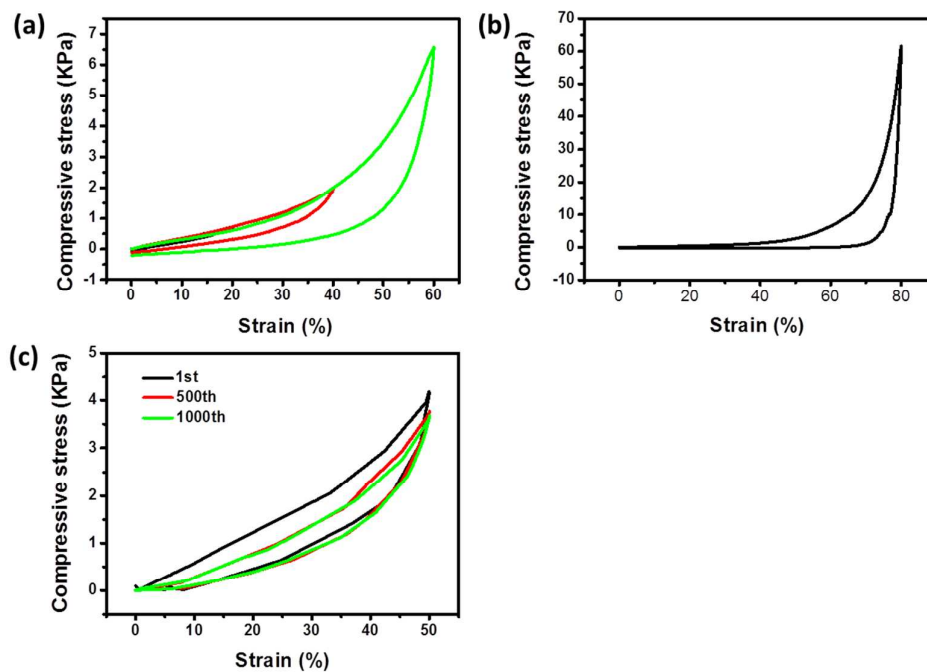


Figure S7. (a-b) The stress-strain curves of ENCF at different strain of 20%, 40%, 60%, and 80%, respectively. (c) The stress-strain curves of ENCF at the maximum strain of 50% for 1000 cycles.

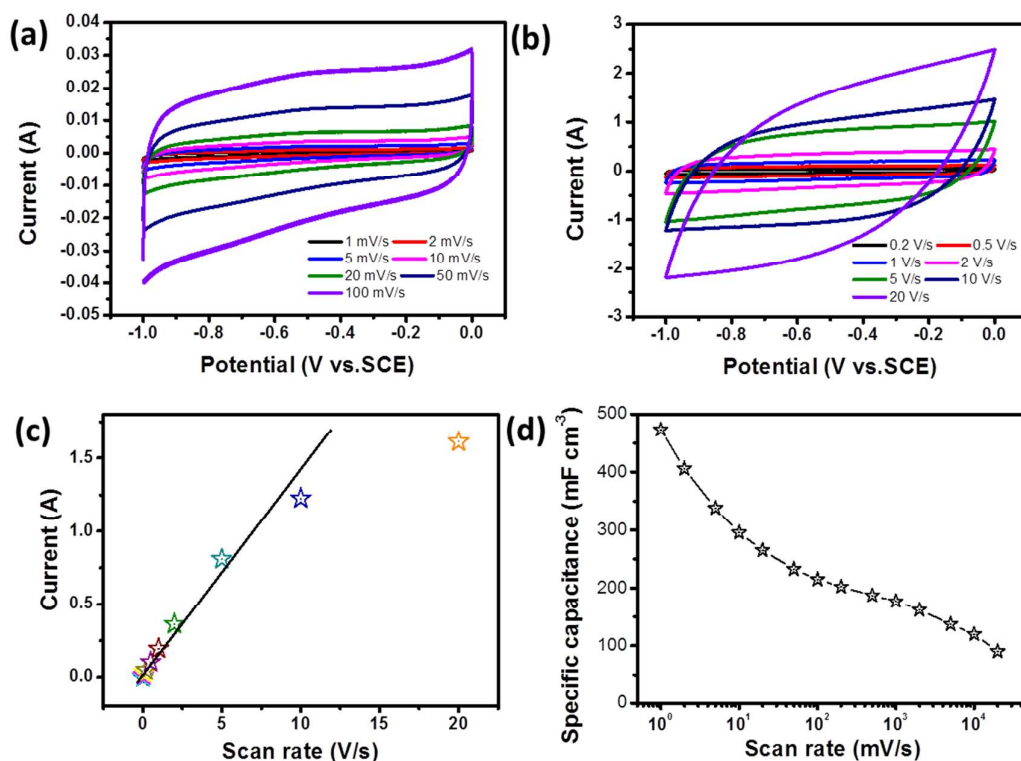


Figure S8. (a) CV curves of the ENCF electrode at low scan rates from 1 mV s⁻¹ to 100 mV s⁻¹, and (b) at high scan rates from 0.2 V s⁻¹ to 20 V s⁻¹. (c) A linear dependence of the discharge current versus scan rates. (d) The specific capacitance of ENCF electrode at various scan rates.

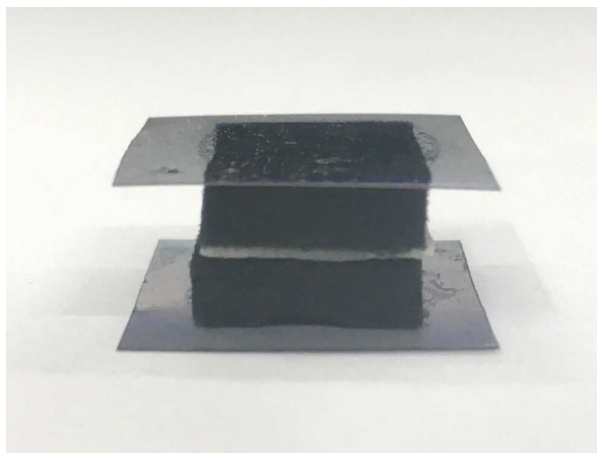


Figure S9. A digital photograph of an ENCF-SSC device.

Table S1. Specific capacitance of compressible electrode.

Electrode	Capacitance		Ref.
	Aqueous electrolyte	All solid state device (strain)	
Carbon nanotube sponges	1.1 F g^{-1}	No report	2
PPy/Graphene	350 F g^{-1}	No report	3
Graphene/polypyrrole aerogel	253 F g^{-1}	No report	4
N-doped graphene	30 mF cm^{-2}	No report	5
NCF	332 mF cm^{-2}	36.4 mF cm^{-3} (60%)	6
ENCF	473 mF cm^{-3}	56 mF cm^{-3} (60%)	This work

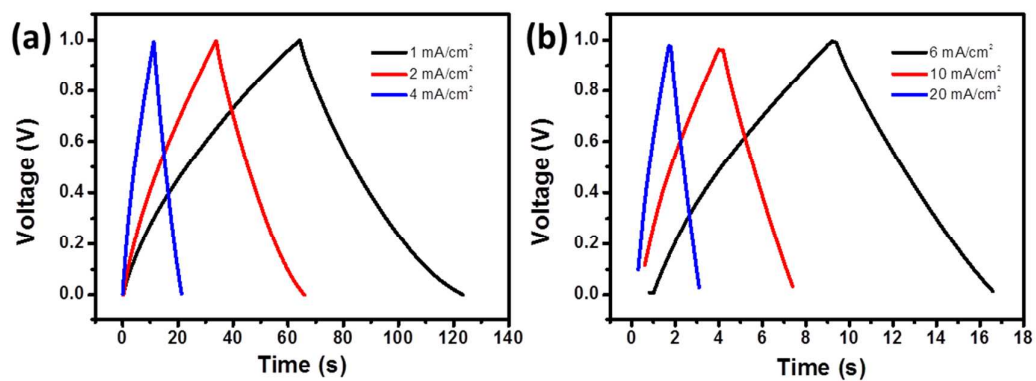


Figure S10. (a) GCD curves of the ENCF SSC device at low current density from 1 mA cm⁻² to 4 mA cm⁻², and (b) at high current density from 6 mA cm⁻² to 20 mA cm⁻².

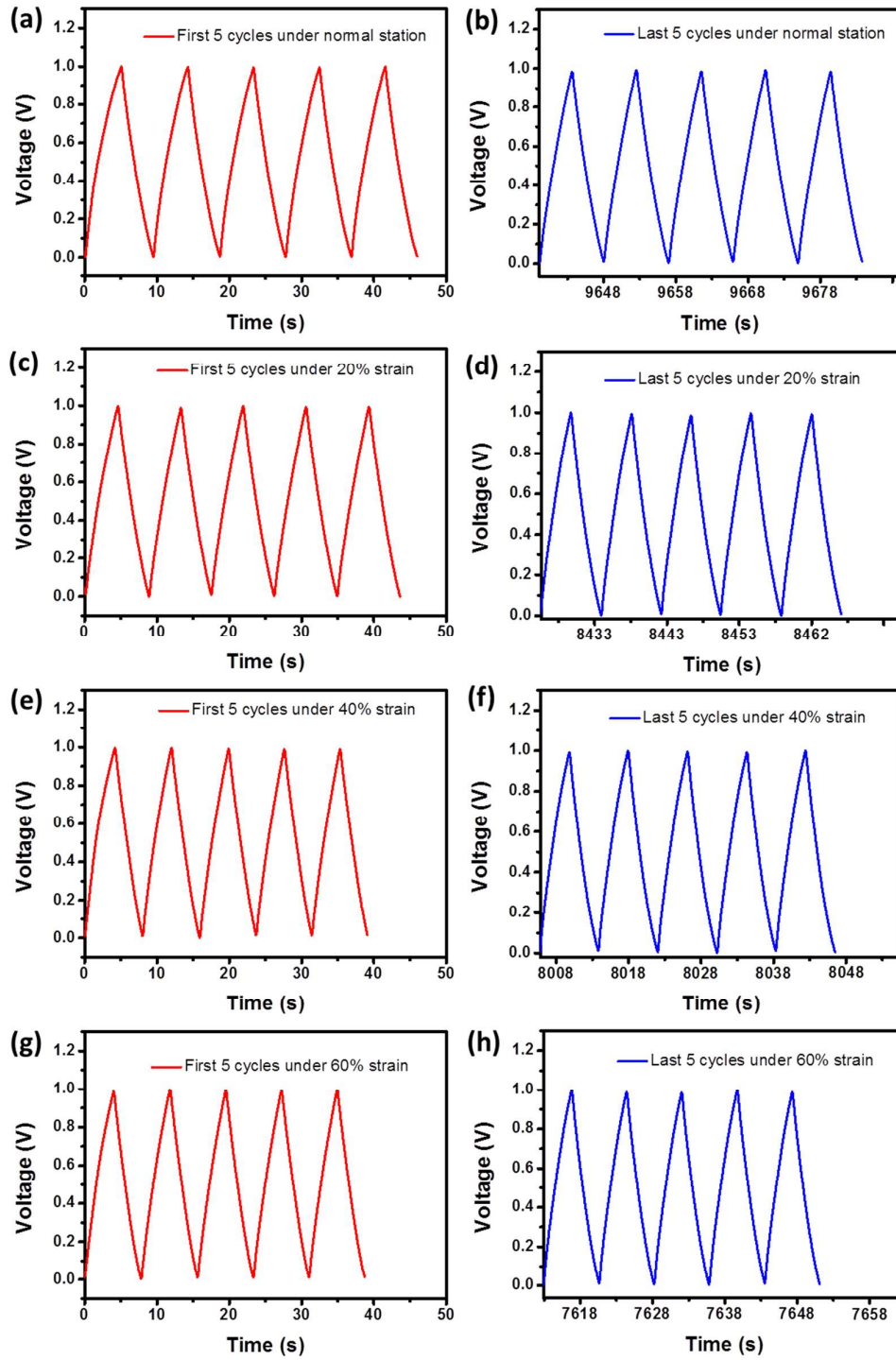


Figure S11. The first 5 cycles under different strains, (a) normal station, (c) 20%, (e) 40%, (g) 60% and the last 5 cycles GCD curves of ENCF-SSC device under different strains, (b) normal station, (d) 20%, (f) 40%, (h) 60%.

Reference

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