

Supplementary Materials

Moisture-engineered reed-derived hard carbon for sodium-ion batteries

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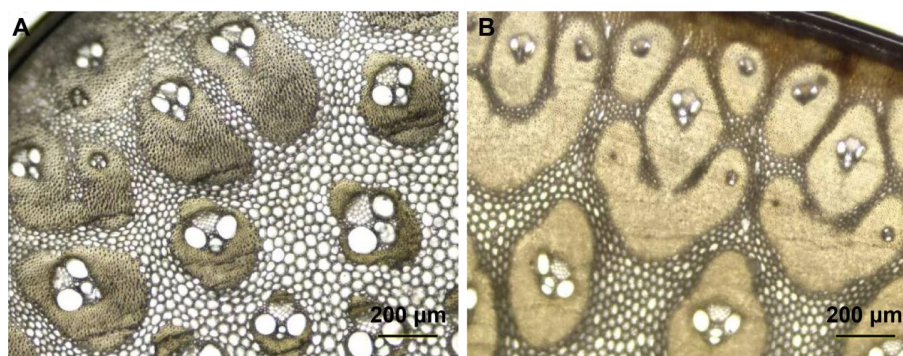
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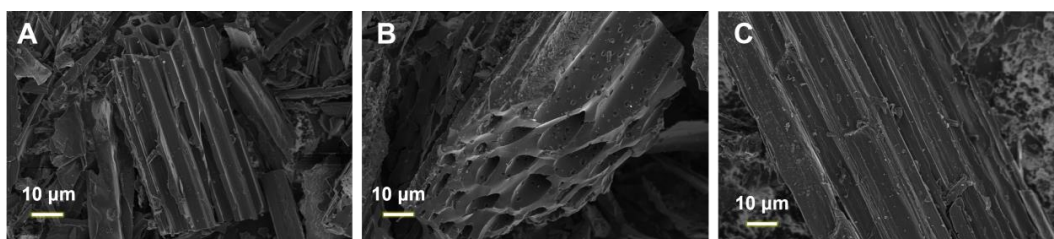
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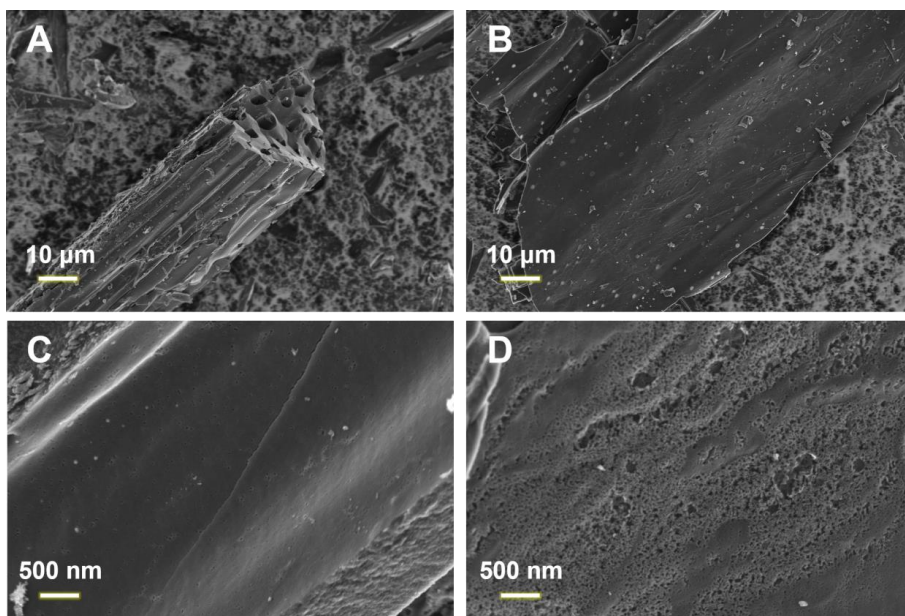
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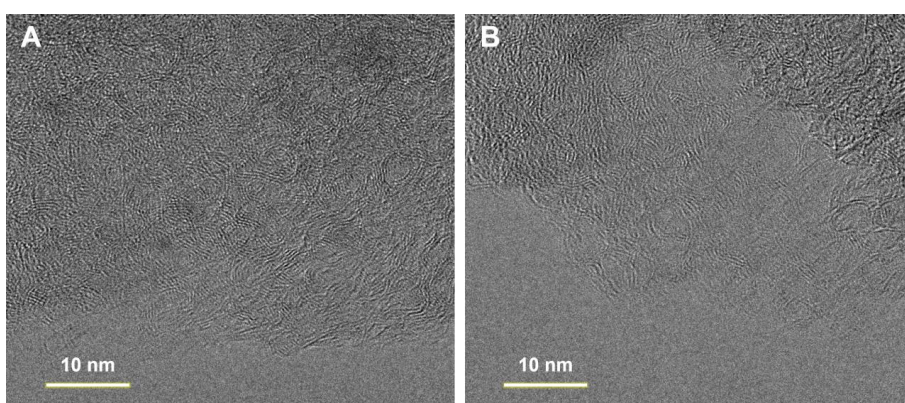
Supplementary Figure 1. Optical microscope images of dried reeds (R-0) (A) and fresh reeds (FR) (B).



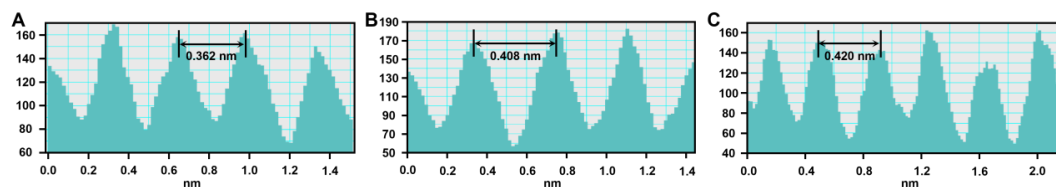
Supplementary Figure 2. SEM images of R-HC-0 (A), FR-HC (B) and R-HC-20 (C).



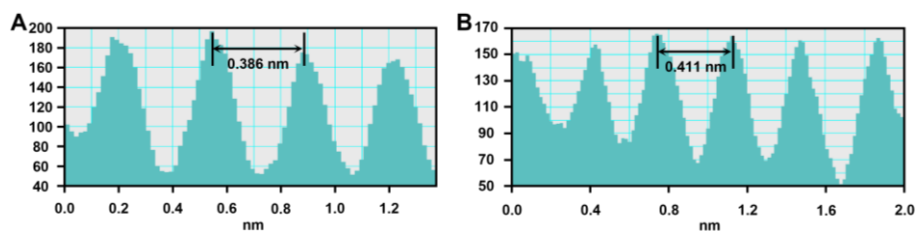
Supplementary Figure 3. SEM images of R-HC-10 (A and C) and R-HC-30 (B and D).



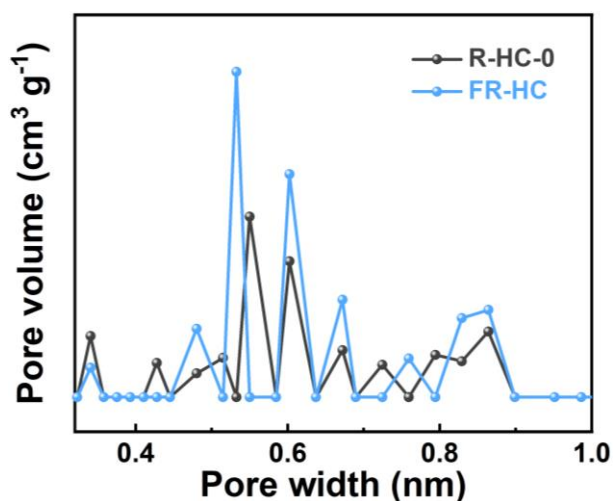
Supplementary Figure 4. HRTEM images of R-HC-10 (A) and R-HC-30 (B).



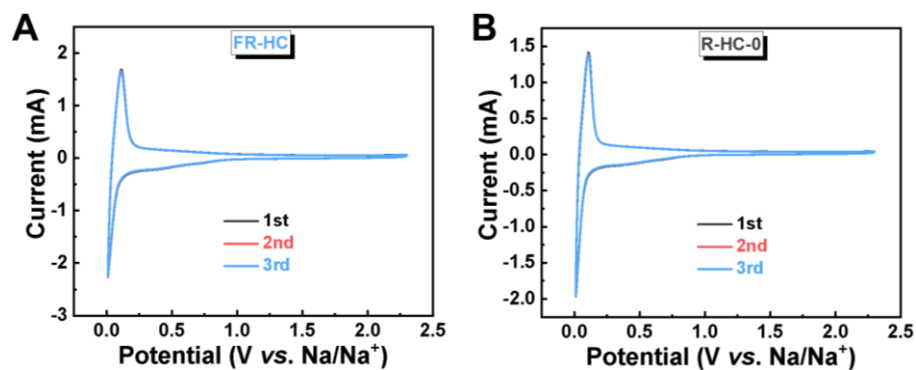
Supplementary Figure 5. The interlayer distances of R-HC-0 (A), FR-HC (B), and R-HC-20 (C).



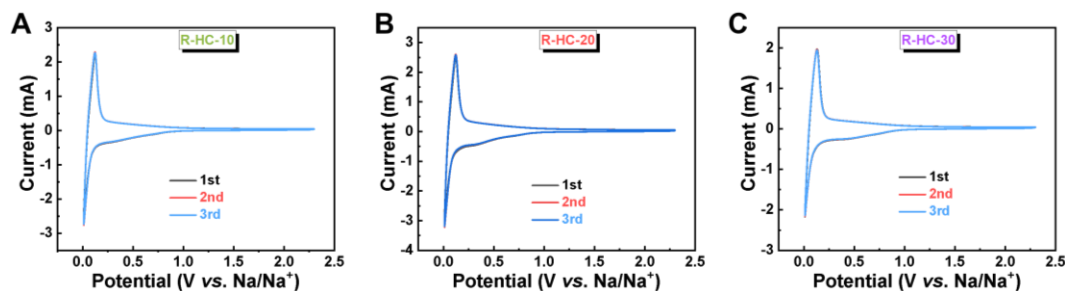
Supplementary Figure 6. The interlayer distances of R-HC-10 (A) and R-HC-30 (B).



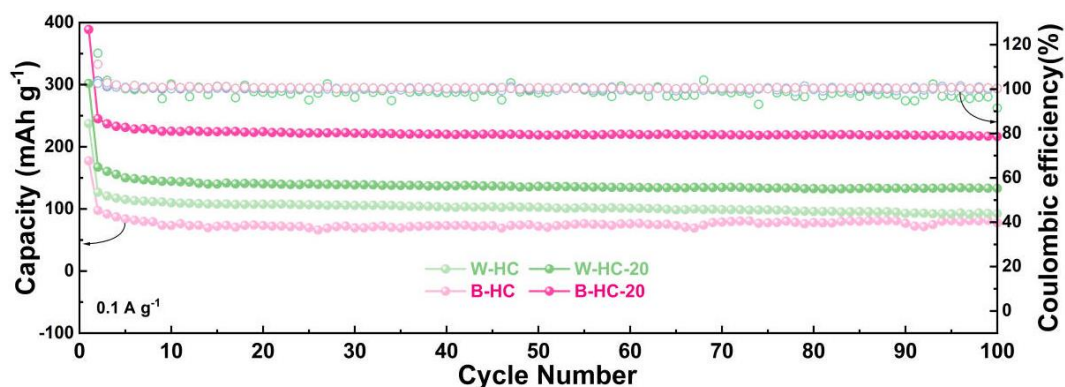
Supplementary Figure 7. Pore distribution curves of R-HC-0 and FR-HC.



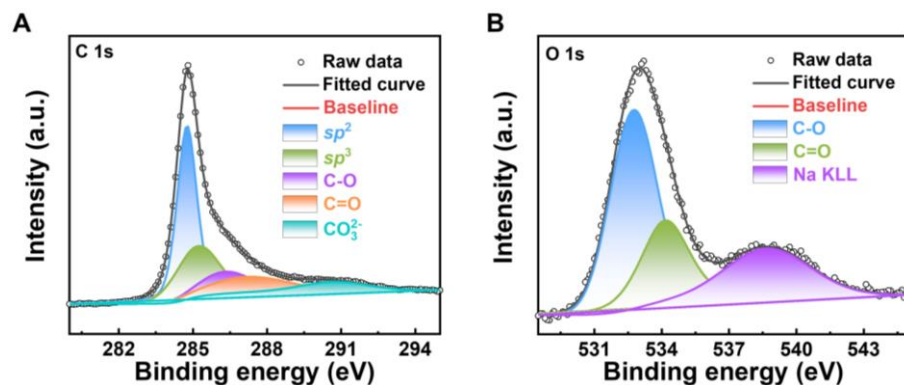
Supplementary Figure 8. Cyclic voltammetry profiles of the first three cycles for FR-HC (A) and R-HC-0 (B) electrodes, respectively.



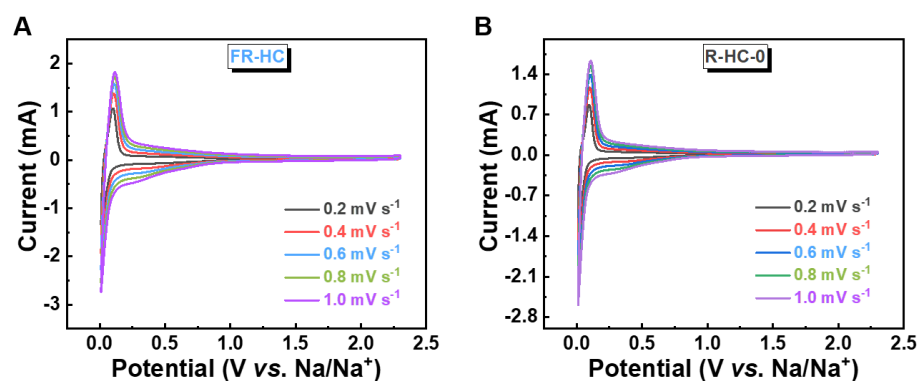
Supplementary Figure 9. Cyclic voltammetry profiles of the first three cycles for R-HC-10 (A), R-HC-20 (B) and R-HC-30 (C) electrodes, respectively.



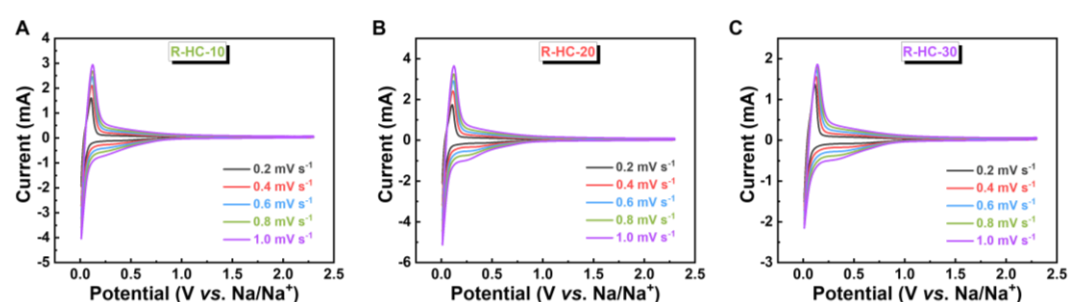
Supplementary Figure 10. Cycling performance of W-HC, W-HC-20, B-HC, and B-HC-20 at the current density of 0.1 A g⁻¹.



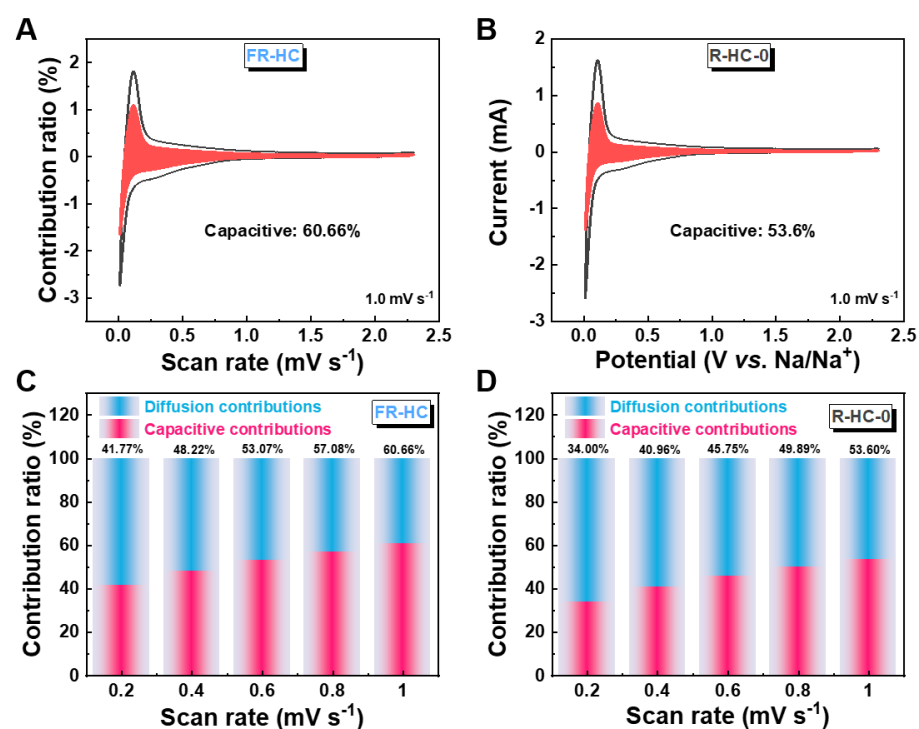
Supplementary Figure 11. C 1s (A) and O 1s (B) XPS high-resolution spectra of R-HC-20 electrode after cycling.



Supplementary Figure 12. Cyclic voltammetry curves of FR-HC (A) and R-HC-0 (B) electrodes with scan rates from 0.2 to 1.0 mV s^{-1} .

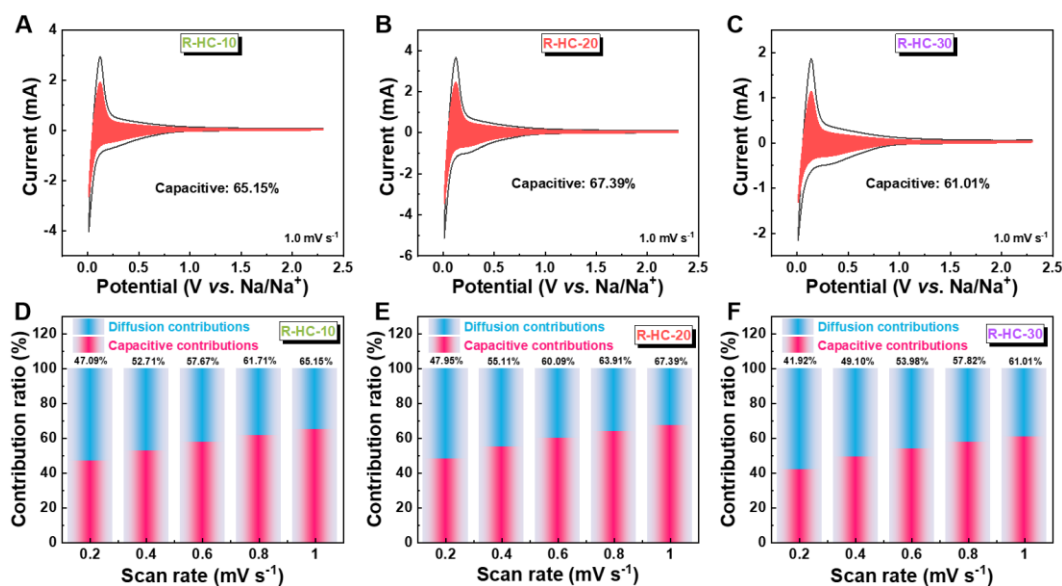


Supplementary Figure 13. Cyclic voltammetry curves of R-HC-10 (A), R-HC-20 (B) and R-HC-30 (C) electrodes with scan rates from 0.2 to 1.0 mV s^{-1} .

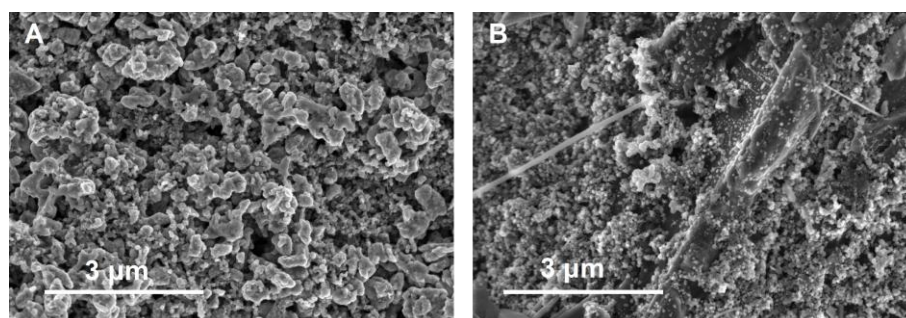


Supplementary Figure 14. The distribution of capacitive behaviors of FR-HC (A) and R-HC-0 (B) measured at 1.0 mV s^{-1} . The contribution ratio of the capacitive

capacity of FR-HC (C) and R-HC-0 (D) electrodes at various scan rates.



Supplementary Figure 15. The distribution of capacitive behaviors of R-HC-10 (A), R-HC-20 (B), and R-HC-30 (C) measured at 1.0 mV s⁻¹. The contribution ratio of the capacitive capacity of R-HC-10 (D), R-HC-20 (E), and R-HC-30 (F) electrodes at various scan rates.



Supplementary Figure 16. SEM images of the anode (A) and cathode (B) after cycling of the R-HC-20/NVP full cell.

Supplementary Table 1. Summary of instrument names, manufacturers, and manufacturing factories

Instrument Name	manufacturer, manufacture factory
Scanning electron microscopy	Hitachi Limited, Japan
Transmission electron microscopy	JEOL Ltd., Japan
X-ray diffraction	Rigaku Corporation, Japan
Raman spectroscopy	HORIBA Jobin Yvon, France

X-ray photoelectron spectroscopy	Thermo Fisher Scientific, USA
Fourier transform infrared spectroscopy	Bruker Corporation, Germany
Thermogravimetric analysis	PerkinElmer, Inc., USA
BET Physical Adsorption Analyzer	Micromeritics Instrument Corporation, USA
Small-angle X-ray scattering	Anton Paar GmbH, Austria

Supplementary Table 2. The XPS result of FR-HC and R-HC-*x*

Samples	C (at. %)	O (at. %)
FR-HC	87.99	12.01
R-HC-0	92.46	7.54
R-HC-10	91.51	8.49
R-HC-20	90.02	9.98
R-HC-30	89.38	10.62

Supplementary Table 3. Percentages of various C configurations in FR-HC and R-HC-*x*

Samples	C distributions/%			
	sp^2	sp^3	C-O	C=O
FR-HC	37.50	32.13	21.56	8.81
R-HC-0	53.83	18.27	13.68	14.22
R-HC-10	48.20	23.06	15.22	13.52
R-HC-20	45.19	25.88	14.91	14.02
R-HC-30	43.98	30.05	20.61	5.36