Electronic Supplementary Information for

A defective carbonized wood membrane as a free-standing three-dimensional anode host for high-performance Zn-ion batteries

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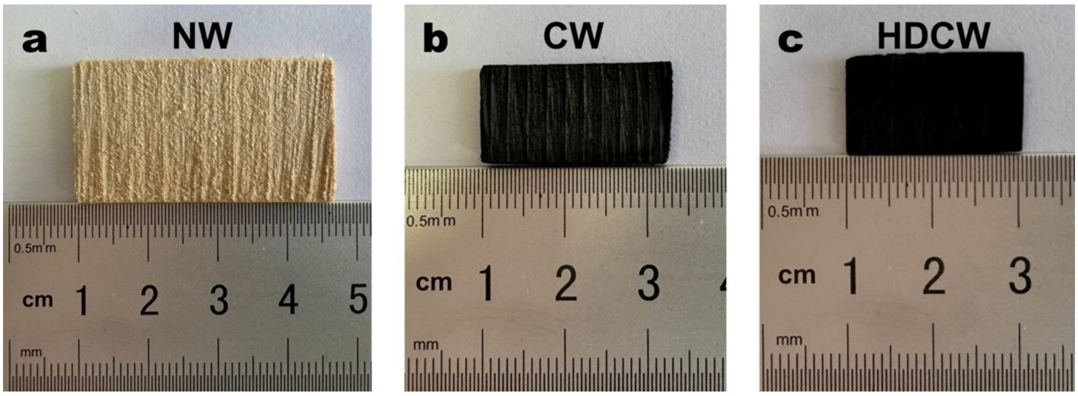

Fig. S1 Optical images of (a) NW, (b) CW, and (c) HDCW.

Table S1 EDX elemental quantitative analysis of CW.

Element	Atomic Fraction (%)	Atomic Error (%)
C	97.67	9.23
N	0.00	0.10
O	2.33	0.50

Table S2 EDX elemental quantitative analysis of HDCW.

Element	Atomic Fraction (%)	Atomic Error (%)
C	97.22	9.74
N	0.00	0.04
O	2.78	0.61

Table S3 Textural properties of CW and HDCW.

Electrode	S_{BET} (m^2 g^{-1})[a]	Pore volume (cm^3 g^{-1})[b]	Pore size (nm)[c]
CW	297.85	0.08	2.58
HDCW	581.40	0.18	2.60

[a] BET surface area (S_{BET}) is calculated from the linear part of the BET plot.

[b] Single point total pore volume of the pores at P/P_0=0.99.

[c] Adsorption average pore width (4 V A^{-1} by BET).

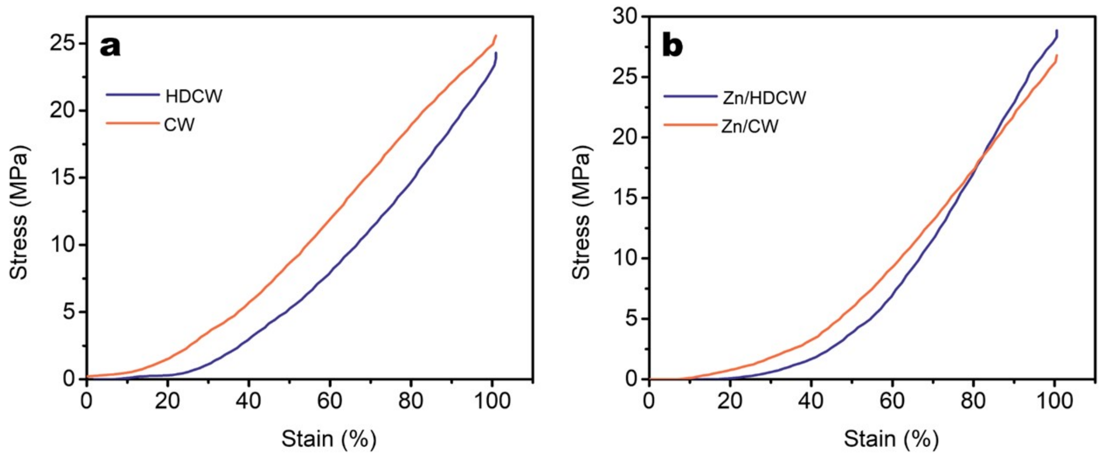

Fig. S2 Stress-strain curves of (a) CW and HDCW and (b) Zn/CW and Zn/HDCW.

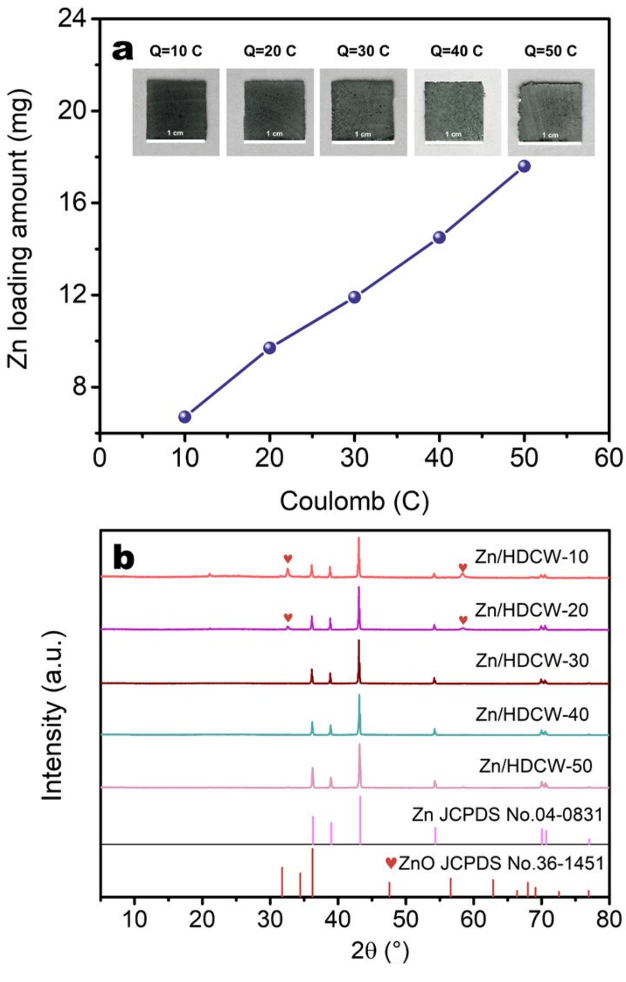

Fig. S3 (a) Dependence of Zn loading amount on HDCW with deposition charge passed (10-50 C). The insets showing the optical images of the obtained Zn/HDCW anodes. (b) XRD patterns of the Zn/HDCW anodes prepared with 10, 20, 30, 40, and 50 C of charge passed.

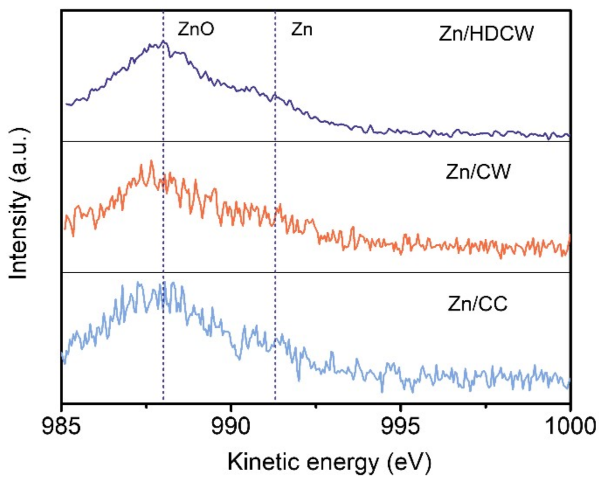

Fig. S4 Zn LMM XPS spectra of Zn/HDCW, Zn/CW, and Zn/CC anodes.

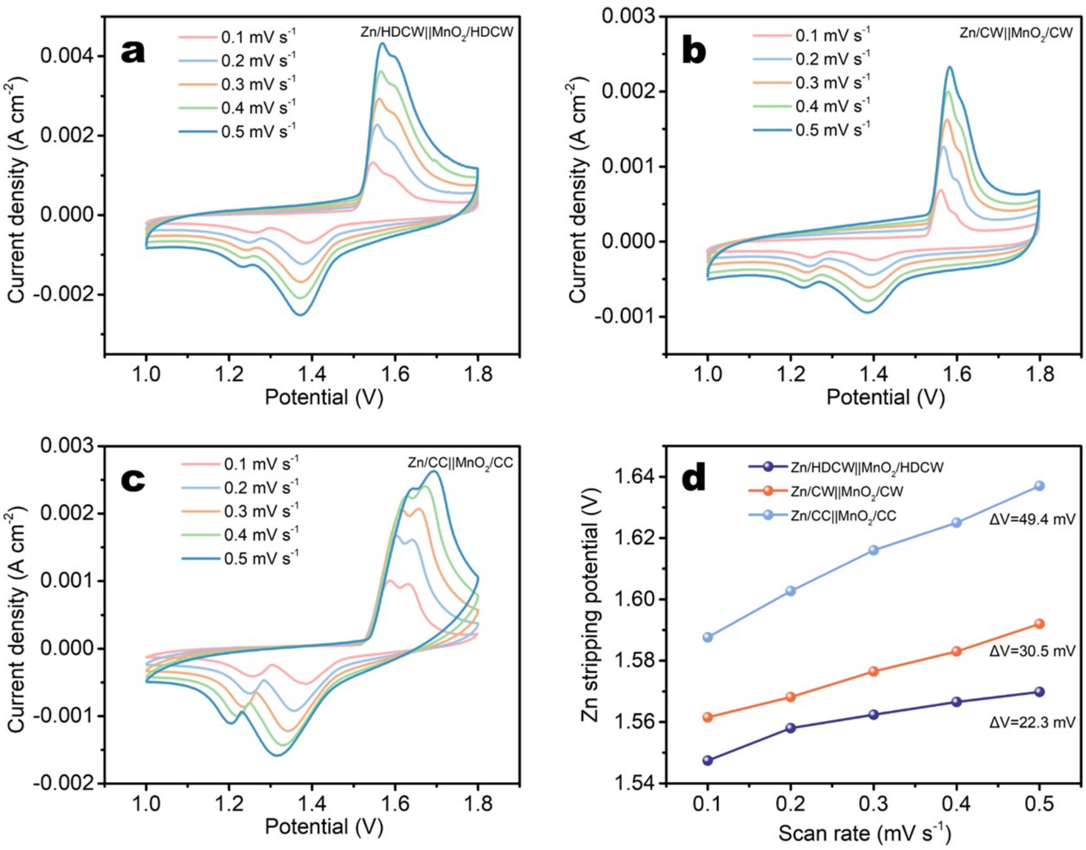

Fig. S5 CV curves of (a) Zn/HDCW-, (b) Zn/CW-, and (c) Zn/CC-based full ZIBs at different scan rates. (d) The Zn stripping potential of the full ZIBs at different scan rates.

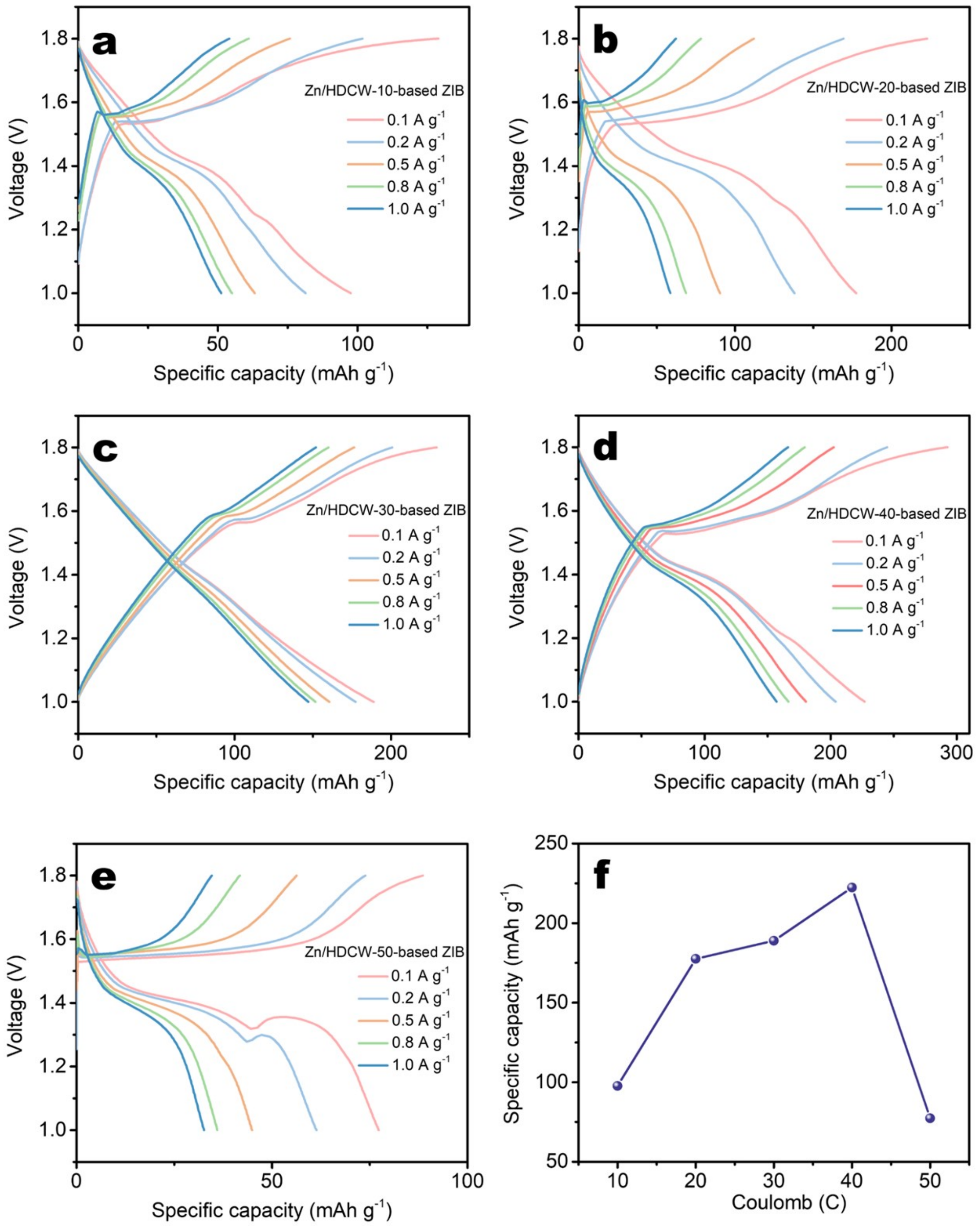

Fig. S6 GCD curves of (a) Zn/HDCW-10-, (b) Zn/HDCW-20-, (c) Zn/HDCW-30-, (d) Zn/HDCW-40-, and (e) Zn/HDCW-50-based full ZIBs at different current densities. (f) The specific capacitances of the full ZIBs assembled with different Zn/HDCW anodes at 0.1 A g^{-1}.

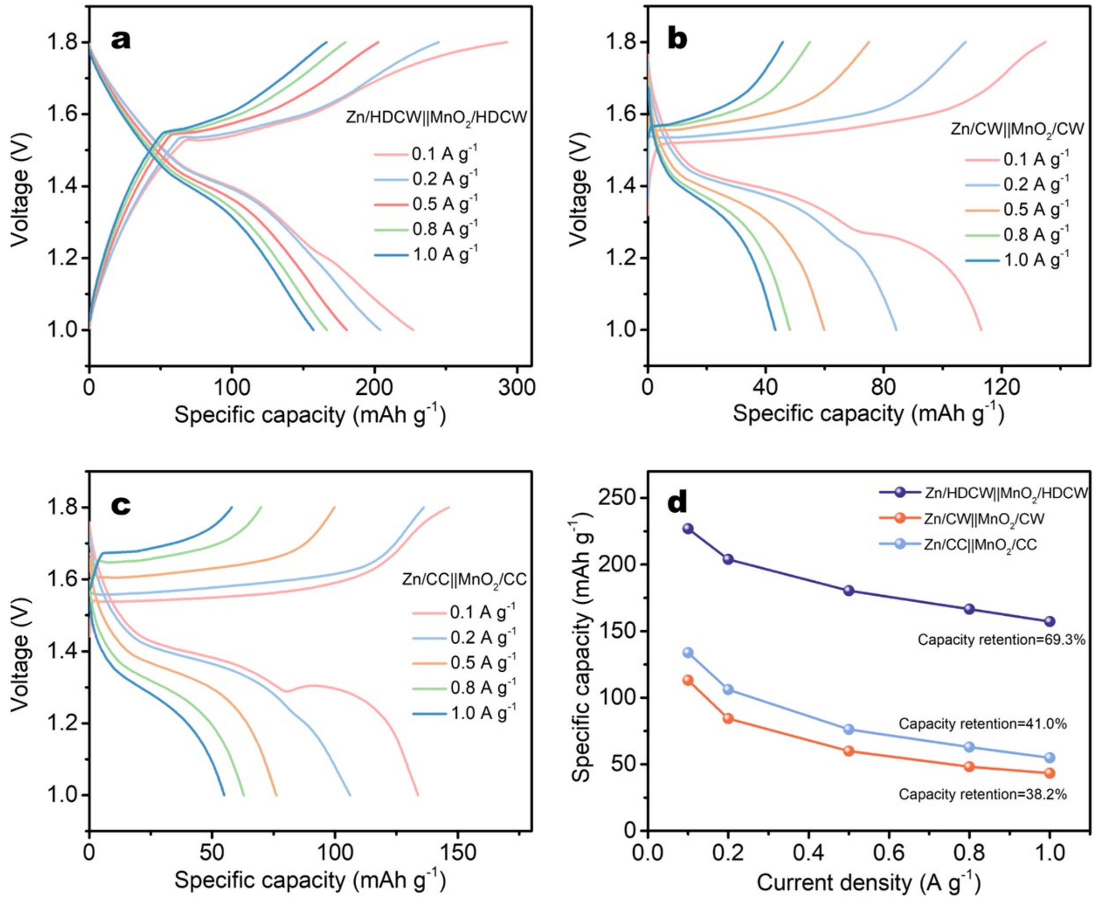

Fig. S7 GCD curves of (a) Zn/HDCW-, (b) Zn/CW-, (c) Zn/CC-based full ZIBs at different current densities. (d) The specific capacitances of Zn/HDCW-, Zn/CW- and Zn/CC-based full ZIBs at different current densities.

Table S4 Comparison of electrochemical performance of Zn/HDCW-based full ZIB with previously reported full cells using other Zn anodes.

Anode	Cathode	Electrolyte	Current density ($A\ g^{-1}$)	Initial capacity ($mAh\ g^{-1}$)	Retention (%)	Ref.
Zn@CC-CNF	MnO_2	2.0 M $ZnSO_4$	1.0	201.2	49.7 after 300 cycles	1
FZn@Cu	MnO_2	2.0 M $ZnSO_4$	1.0	207.3	64.6 after 1000 cycles	2
Zn/rGO@CC	MnO_2	2.0 M $ZnSO_4$ and 0.1M $MnSO_4$	1.5	217.8	136.3 after 1000 cycles	3
ZnP/CF	MnO_2	2.0 M $ZnSO_4$ and 0.1M $MnSO_4$	1.6	75.0	93.2 after 7000 cycles	4
CNF-Zn@Zn	$NaV_3O_8\cdot1.5H_2O$	2.0 M $ZnSO_4$ and 1.0 M Na_2SO_4	2.0	103.0	125.9 after 300 cycles	5
Zn@Cu nanosheets @ACC	MnO_2	1.0 M $ZnSO_4$	1.0	287.8	94.8 after 1000 cycles	6
Zn@C-5	MnO_2	2.0 M $ZnSO_4$ and 0.1M $MnSO_4$	0.5	187.5	75.0 after 800 cycles	7
Zn@CFs	MnO_2	2.0 M $ZnSO_4$ and 0.1M $MnSO_4$	0.3	275.8	86.8 after 140 cycles	8
c-PLA@Zn	V_2O_5	1.0 M $ZnSO_4$	1.0	263.2	76.0 after 1000 cycles	9
Zn@CNS	MnO_2	2.0 M $ZnSO_4$	1.0	142.6	74.0 after 1200 cycles	10
Zn/HDCW	MnO_2	2.0 M $ZnSO_4$ and 0.1M $MnSO_4$	1.0	170.8	100 after 300 cycles	**This work**

Supplementary references

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