

Supporting Information

Carbon-Enveloped Pea-Shaped Vanadium Nitride Nanorods for Aqueous Zinc Ion Batteries

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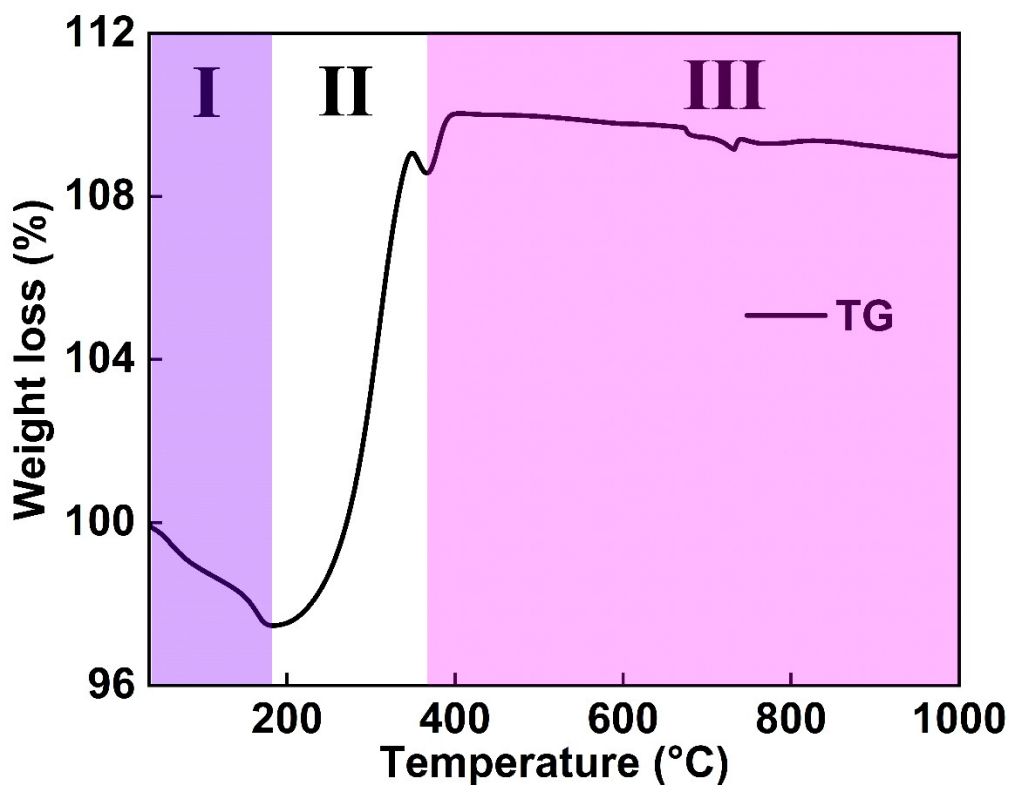


Figure S1. TG curve of the VNC.

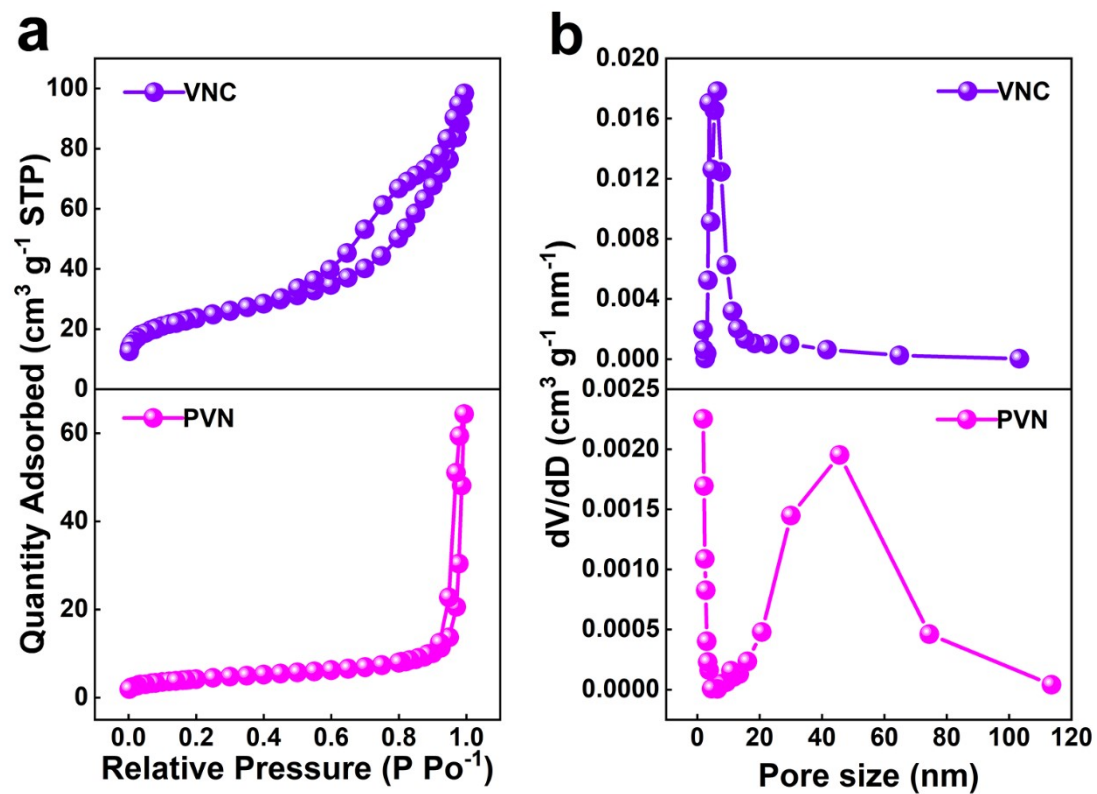


Figure S2. N_2 adsorption-desorption isotherms of (a) VNC and PVN, the corresponding pore size distribution profiles of (b) VNC and PVN

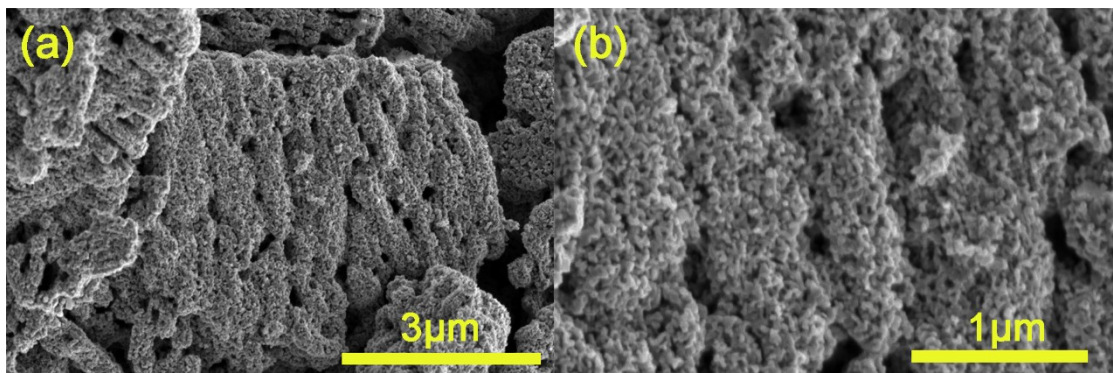


Figure S3. SEM images of the PVN.

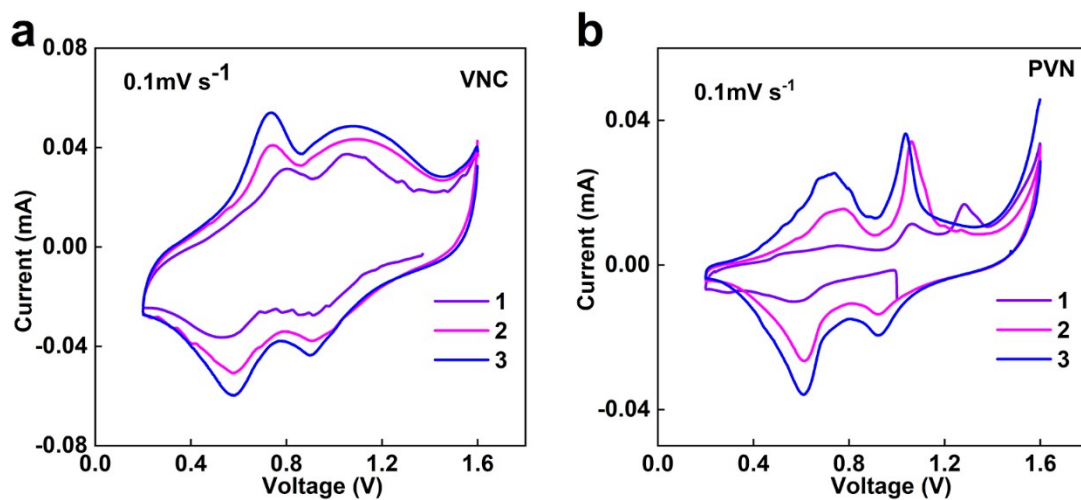


Figure S4. (a, b) CV curves of the initial three cycles for VNC and PVN electrodes at 0.1 mV s⁻¹.

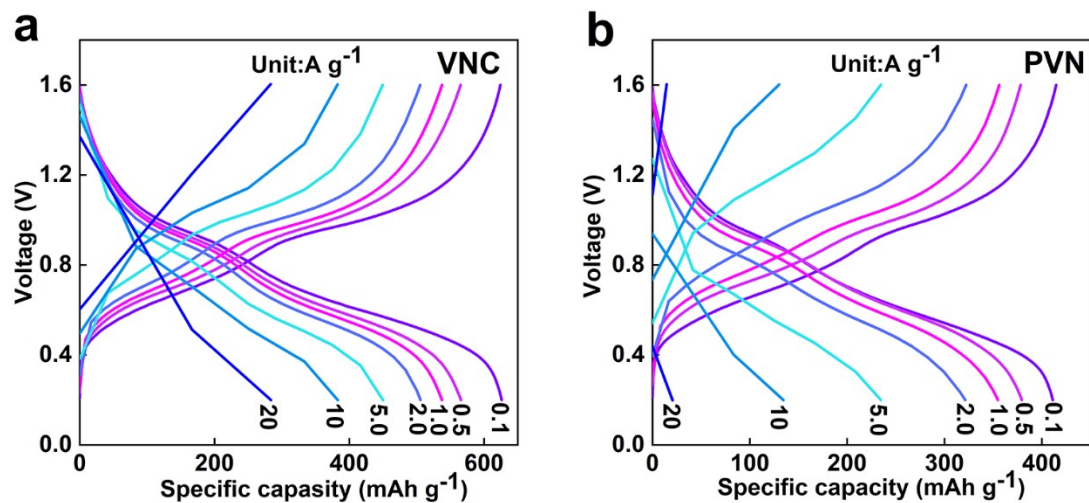


Figure S5. (a, b) GCD curves of the VNC and PVN electrodes at different current densities at 0.1, 0.5, 1, 2, 5, 10 and 20 A g⁻¹.

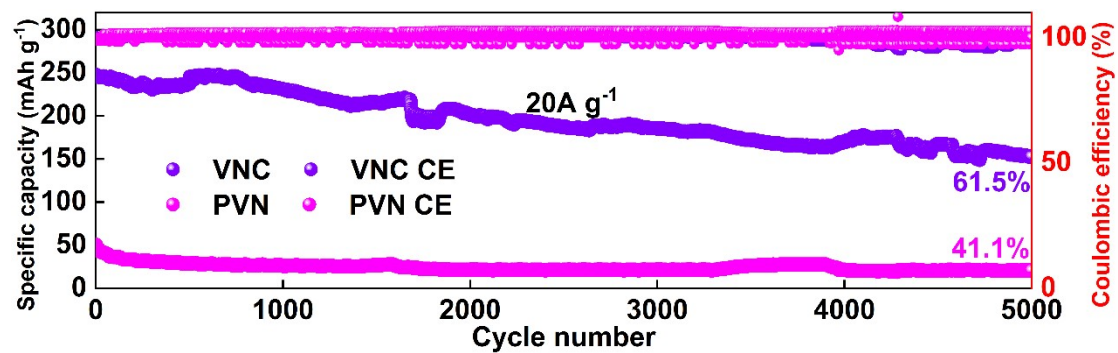


Figure S6. Cycling performance of the VNC and PVN electrode at 20 A g⁻¹.

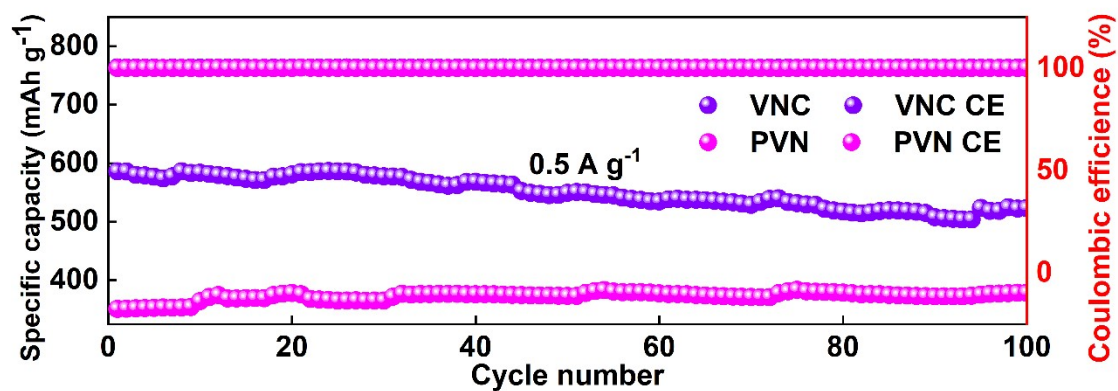


Figure S7. Cycling performance of the VNC and PVN electrode at 0.5 A g⁻¹.

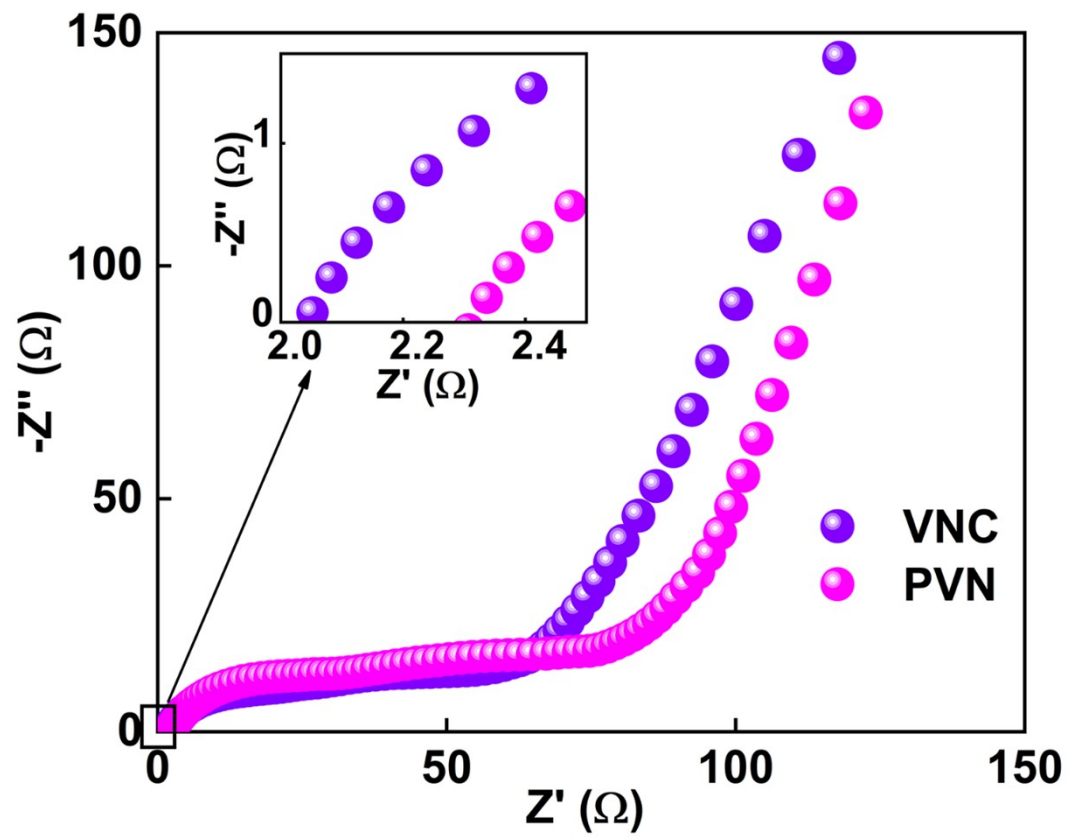


Figure S8. EIS plots of VNC and PVN electrode after 10 cycles.

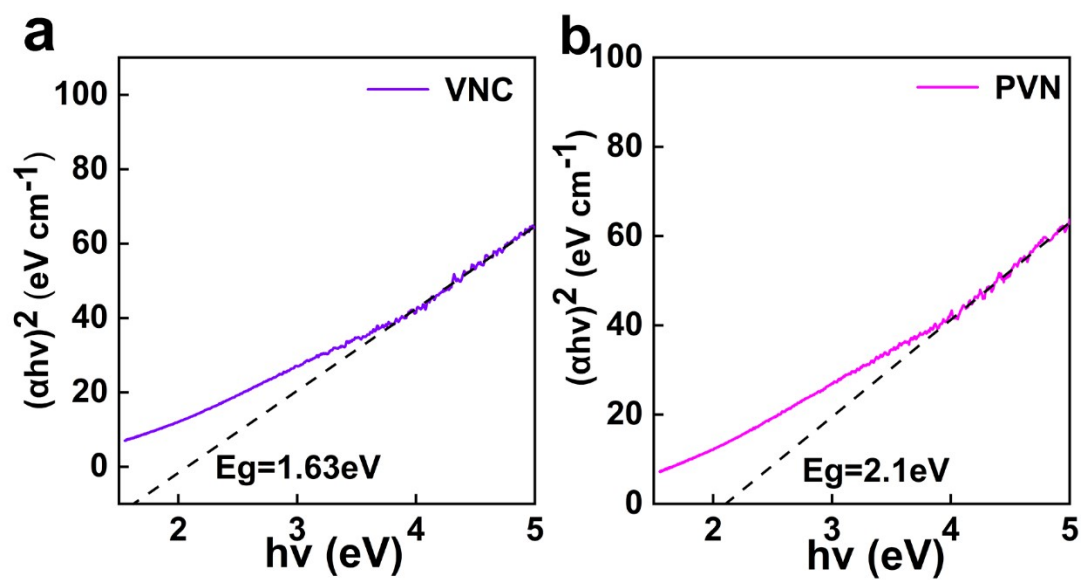


Figure S9. The band gaps of the VNC and PV

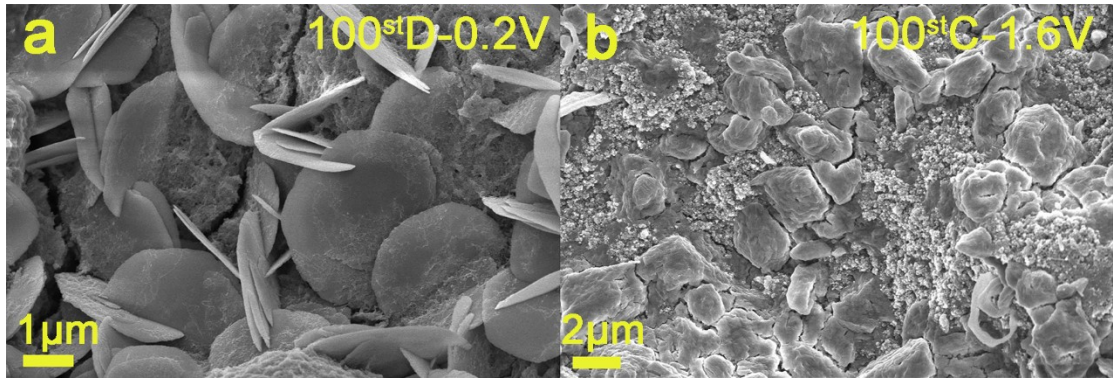


Figure S10. (a, b) Ex-situ SEM images of the VNC electrode at various states after 100 cycles.

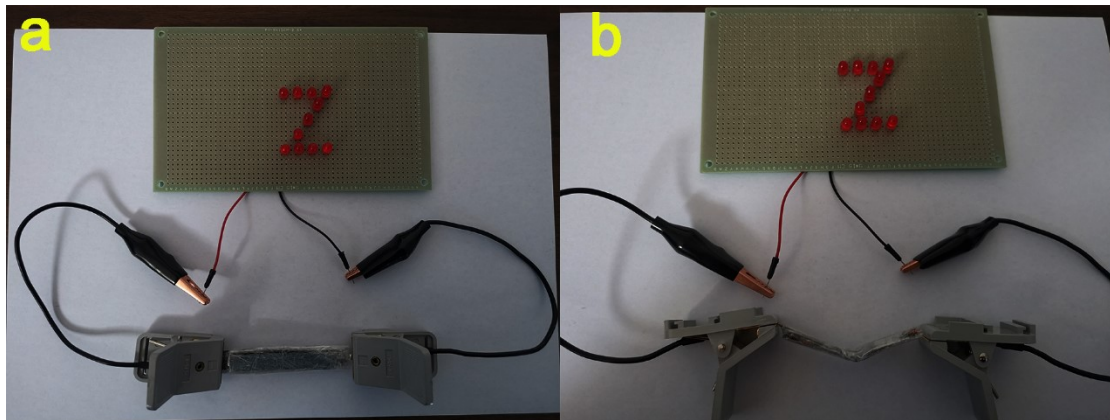


Figure S11. Performance of zinc-VNC flexible batteries under different bending angles

Table S1. Specific surface area and pore size parameters of the VNC and PVN.

Samples	Surface area (m ² g ⁻¹)	Pore volume (cm ³ g ⁻¹)	Average pore size (nm)
VNC	82.6741	0.114491	8.4403
PVN	15.1694	0.096528	31.3999

Table S2. The atomic content of V, N, and C elements in the XPS characterization of the VNC.

Elements Samples	Atomic content (%)		
	V	N	C
VNC	45.64	33.12	21.24

Table S3. Comparison of the electrochemical performance for this work with the reported AZIBs.

Materials	Capacity (mAh g ⁻¹) Current density (A g ⁻¹)	Capacity (mAh g ⁻¹) High current density (A g ⁻¹)	Capacity Retention Cycles Number, Current density (A g ⁻¹)	Maximum energy density (Wh kg ⁻¹) and power density (W kg ⁻¹)	Ref.
VNC	630 (0.1)	360 (5.0)	83% (3000, 10.0)	560.41 32728.8	This work
VN@rGO	306.6 (0.1)	129.4 (20.0)	91.24% (10900,20.0)	246.5, 10938.95	[21]
VO ₂ (B)	357 (0.1)	117 (51.2)	91.2% (300,51.2)	297,46k	[34]
p-V ₂ O ₃ -CNT	398 (0.1)	211 (50.0)	83% (5000,10.0)	319.16, 6330.84	[35]
VN _x O _y /C	407.4 (0.5)	300 (5.0)	90% (2000,5)	384.1, 17307.5	[36]
Ca _{0.24} V ₂ O ₅ ·0.83H ₂ O	340 (0.2C)	72 (80C)	96% (3000,80C)	267,991	[37]
Na ₂ V ₆ O ₁₆ ·1.63H ₂ O	352 (0.05)	162 (2.0)	90% (6000,5.0)	251,851	[38]
VS ₂	190 (0.05)	115 (2.0)	98% (200,2.0)	123,1200	[13]

Table S4. The value of adsorption energies E_a (eV) for Zn ion on the surfaces of the VNC and PVN, respectively.

Model Samples	E_{total} (eV)	E_h (eV)	E_{Zn} (eV)	E_a (eV)
VNC	-594.366404	-593.42442	-0.009219696	-0.9304
PVN	-299.59877	-298.59428	-0.009129719	-0.9953