Supporting Information

Oxygen Defects Hydrated Vanadium Dioxide/Graphene as the Superior Cathode for Aqueous Zn Battery

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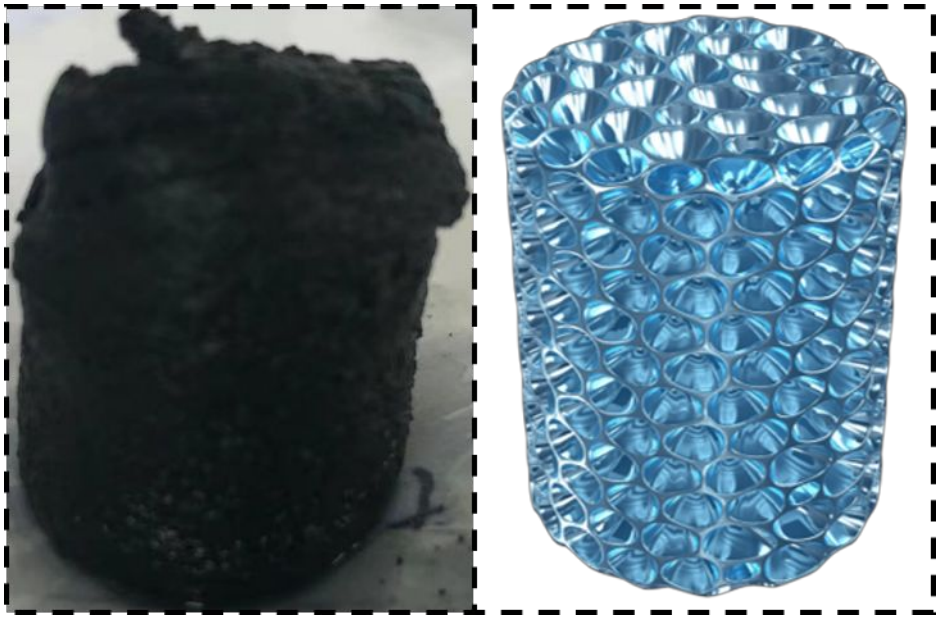

Figure S1. Photograph and structure of O_d-HVO/rG (Diameter = 3 cm).

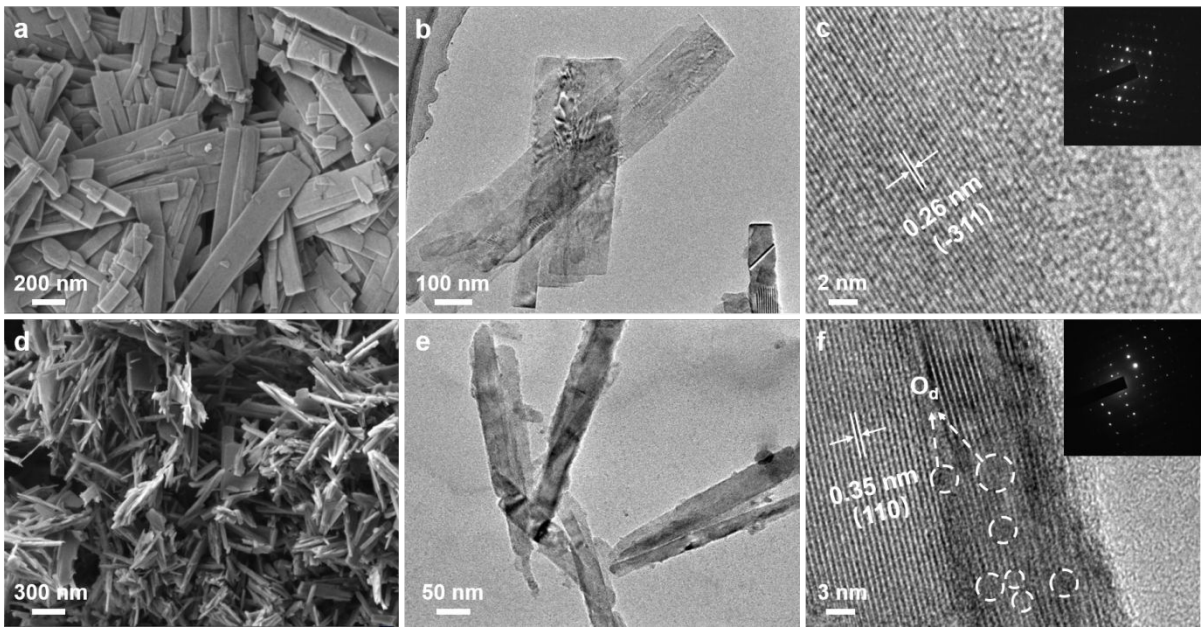

Figure S2. SEM and TEM images of pure HVO (a-c) and O_d-HVO (d-f).

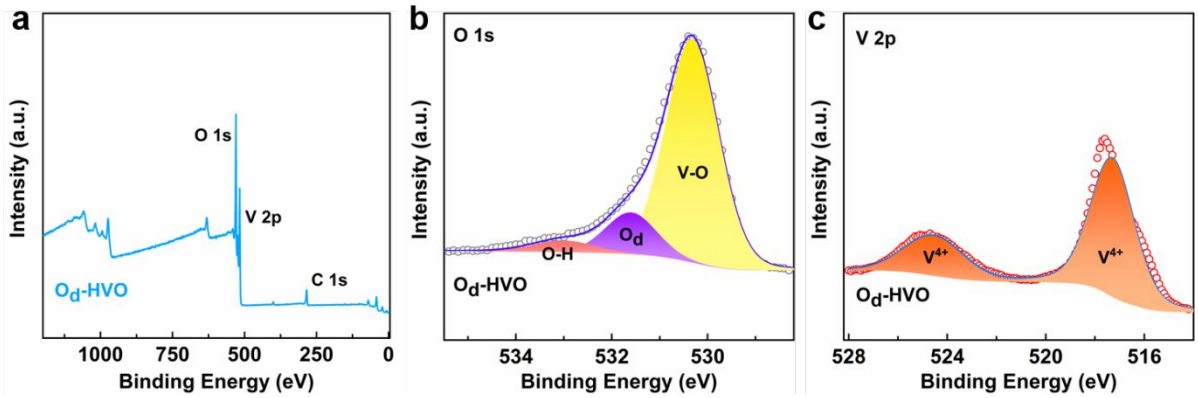

Figure S3. XPS spectrum of O_d-HVO: a) full survey spectra, b) O 1s and c) V 2p.

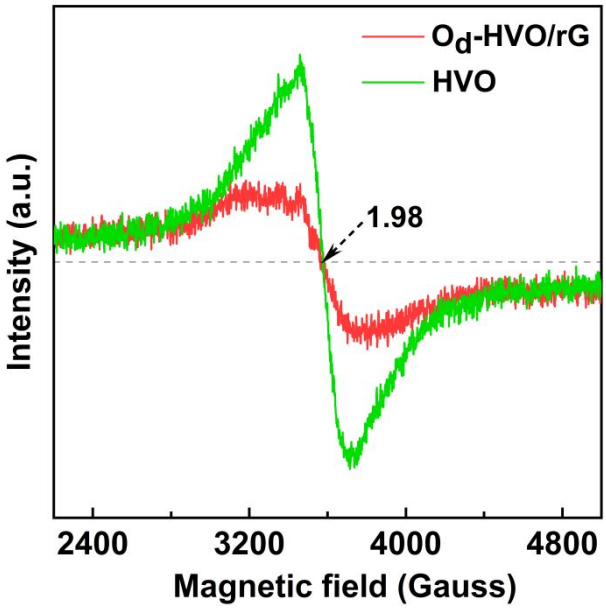

Figure S4. EPR spectra of O_d-HVO/rG and HVO**.**

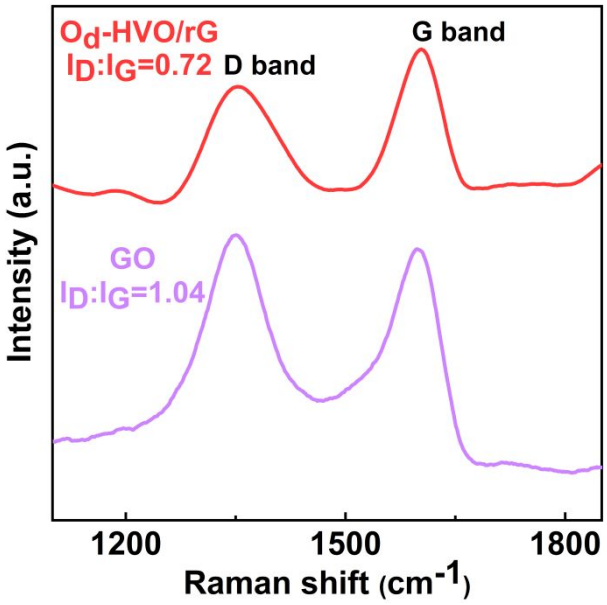

Figure S5. Raman spectra of O_d-HVO/rG and GO.

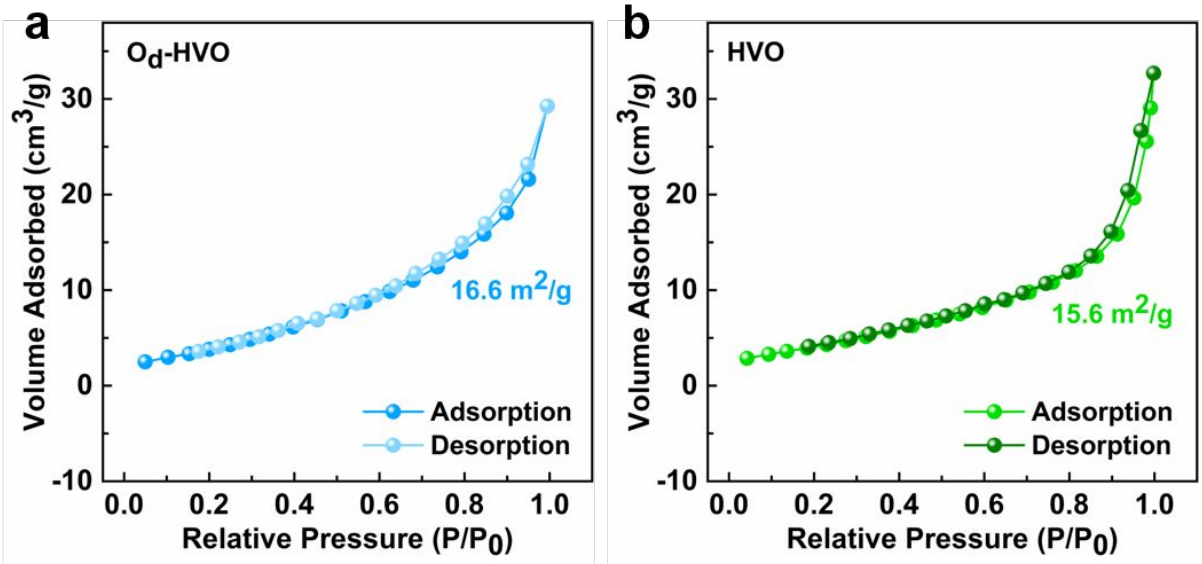

Figure S6. Nitrogen adsorption and desorption isotherm of different samples. a) O_d-HVO, b) HVO nanorods.

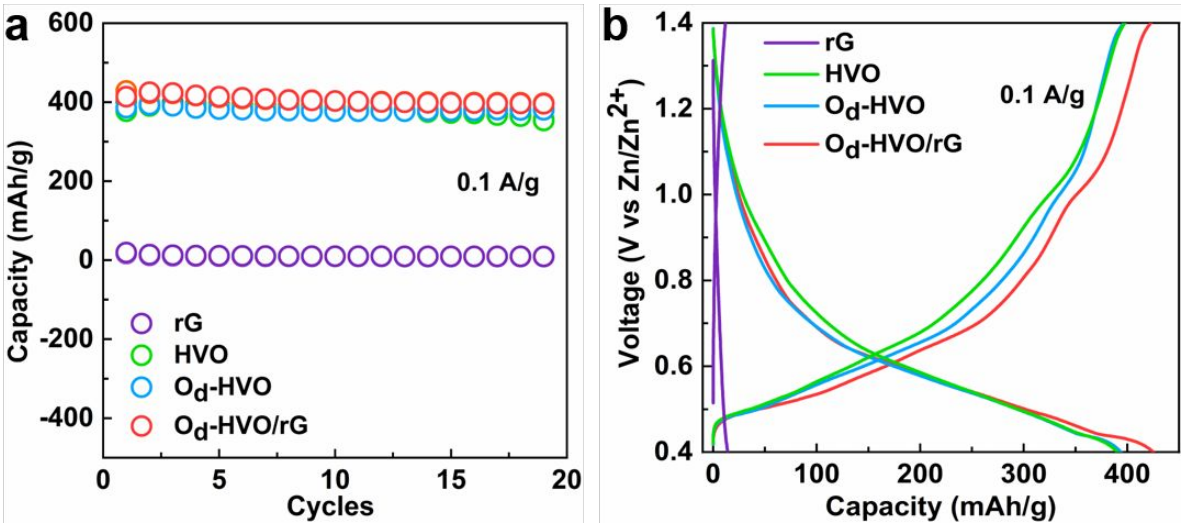

Figure S7. a) cycling test at 0.1 A/g, b) GCD curves for all samples.

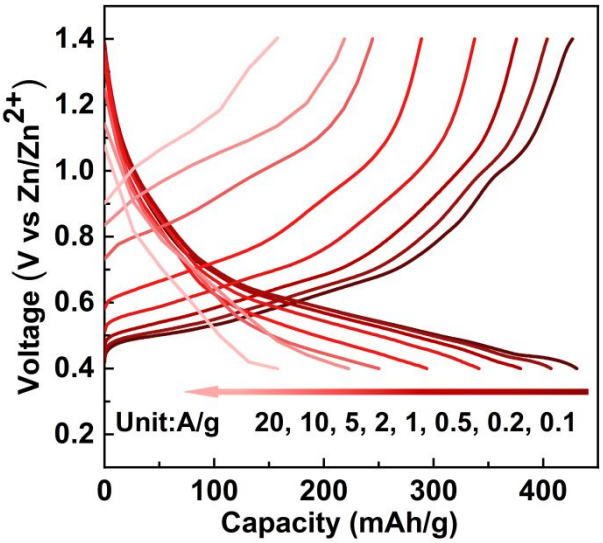

Figure S8. Galvanostatic charge and discharge curves of O_d-HVO/rG cathode at various currents ranging from 0.1 to 20 A/g.

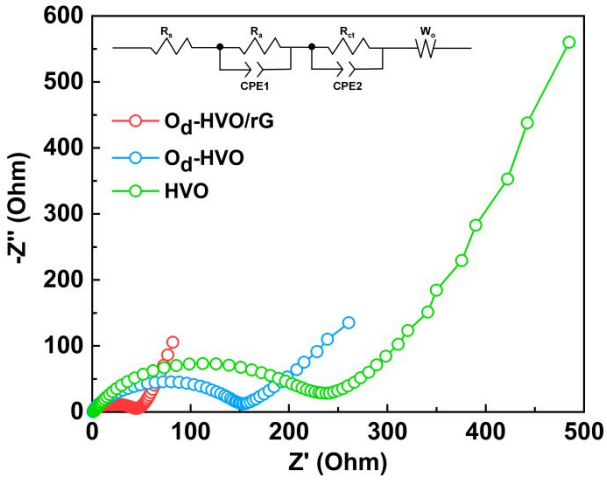

Figure S9. EIS impedance curves of O_d-HVO/rG, O_d-HVO and HVO.

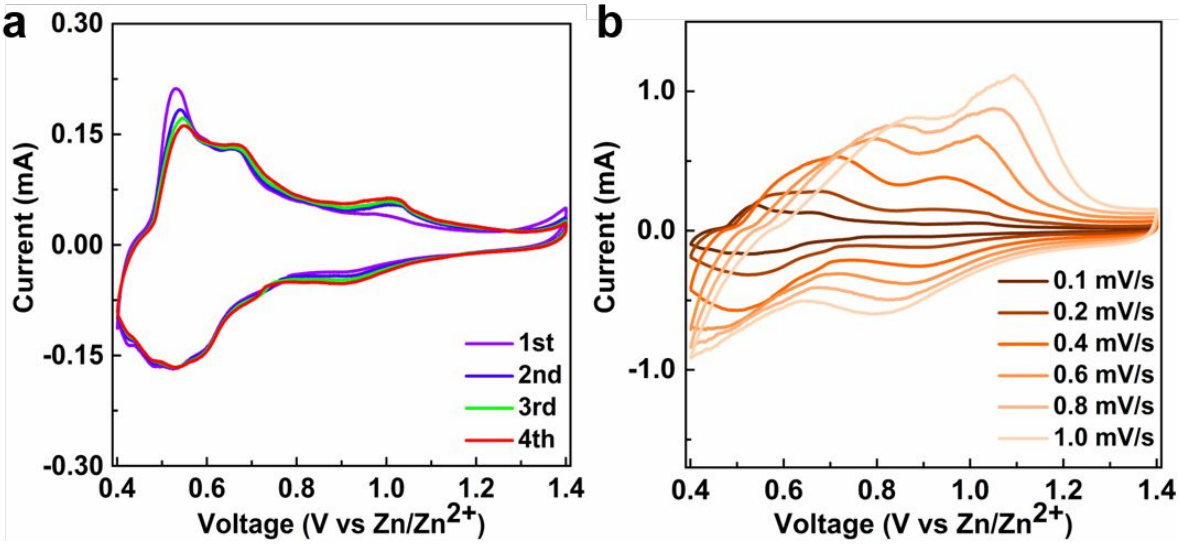

Figure. S10. The CV curves of pure HVO nanobelts at a) 0.1 mV/s, b) different scan rates from 0.1 to 1.0 mV/s.

Tables

Table S1. Comparison of the electrochemical performances of recently reported prominent cathode materials.

Cathode	Electrolyte	Voltage window	Specific capacity	Ref.
O_d-HVO/rG	3 M $ZnSO_4$	0.4-1.4 V	428.6 mAh/g at 0.1 A/g 186 mAh/g at 20 A/g	This work
pyrene-4,5,9,10-tetraone (PTO)	2 M $ZnSO_4$	0.36-1.46 V	336 mAh/g at 0.04 A/g	40
NVO	2 M $ZnSO_4$	0.2-1.6 V	397 mAh/g at 0.2A/g	41
MoS_2	3 M $Zn(CF_3SO_3)_2$	0.2-1.4 V	21 mAh/g at 0.1 A/g	42
RGO/VO_2	3 M $Zn(CF_3SO_3)_2$	0.3-1.3 V	276 mAh/g at 0.1 A/g	43
LiV_3O_8	1 M $ZnSO_4$	0.6-1.2 V	256 mAh/g at 16 mA/g	44
FeHCF	1 M $Zn(OAc)_2$	0.6-1.8 V	54 mAh/g at 0.1 mA/cm^2	45
$Ca_{0.25}V_2O_5 \cdot xH_2O$	1 M $ZnSO_4$	0.6-1.6 V	340 mAh/g at 0.2 C	46