

Electronic Supplementary Information

**Electrochemically Activation Strategies of A Novel High Entropy Amorphous V-based
Cathode Material for High-performance Aqueous Zinc Ion Batteries**

Shangshang Zhang,^a Zhenjiang Liu,^a Lun Li,^a Yudie Tang,^a Shengkai Li,^a Haitao Huang^b and
Haiyan Zhang^{a*}

^a School of Materials and Energy, Guangdong University of Technology, Guangzhou, 510006,
P. R. China.

^b Department of Applied Physics and Materials Research Center, The Hong Kong Polytechnic
University, Hong Kong SAR, P. R. China.

* Corresponding author, E-mail: hyzhang@gdut.edu.cn

Supplementary Figures

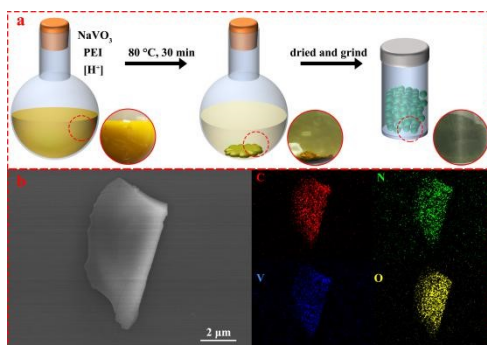


Fig. S1 a) Schematic illustration of the synthesis. b) SEM and Elements-Mapping of $V_xO_y@PEI$

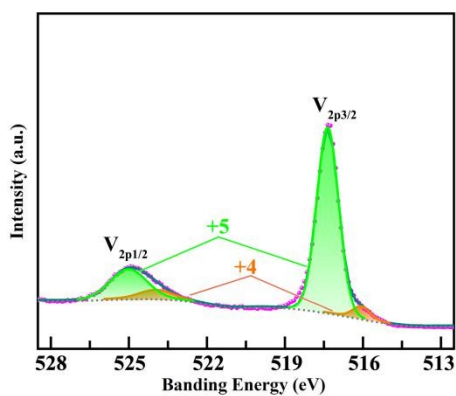


Fig. S2 XPS of $V_xO_y@PEI$ annealed under 600 °C for 180 min at air

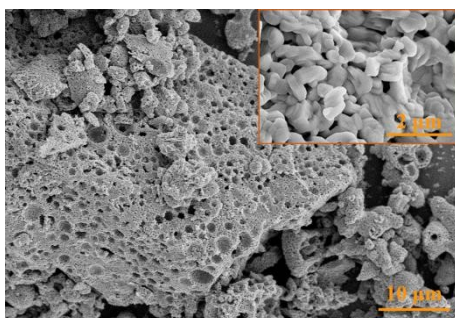


Fig. S3 SEM of $V_xO_y@PEI$ annealed under 600 °C for 180 min at air

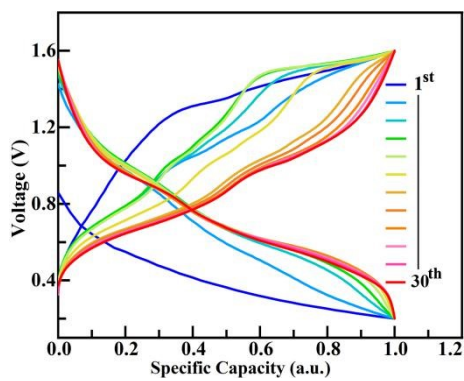


Fig. S4 Normalization galvanostatic dis/charge profiles of $V_xO_y@C$ under pre-activation stage at $0.2 \text{ A}\cdot\text{g}^{-1}$.

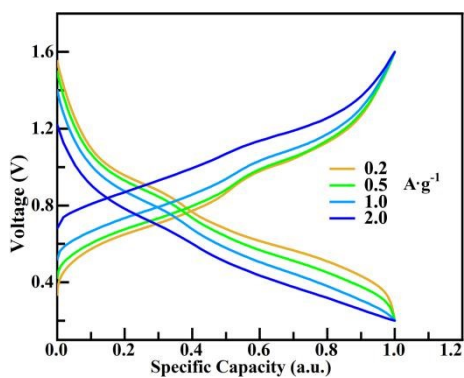


Fig. S5 Normalization galvanostatic dis/charge profiles of $V_xO_y@C$ at varying current density after 20 cycles activation at $0.2 \text{ A}\cdot\text{g}^{-1}$.

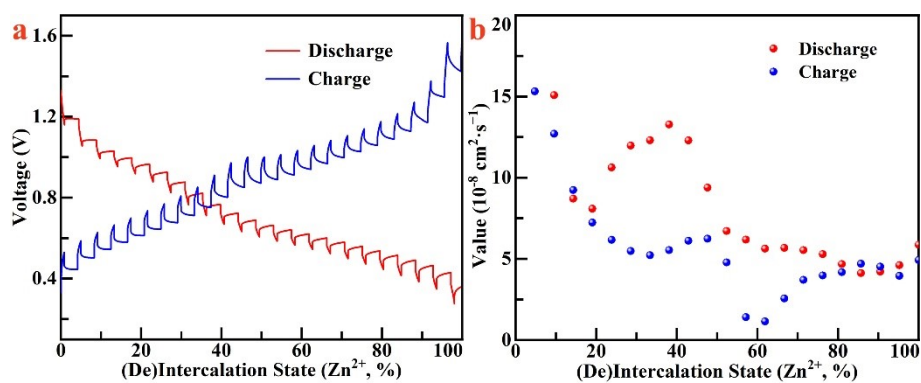


Fig. S6 GITT measurements and (c) corresponding Zn^{2+} diffusion coefficient at $50 \text{ mA}\cdot\text{g}^{-1}$.

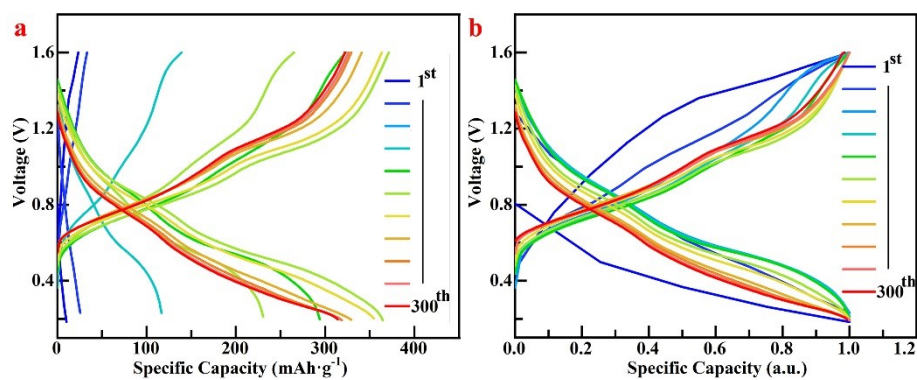


Fig. S7 Galvanostatic dis/charge profiles and normalization galvanostatic dis/charge profiles of $V_xO_y@C$ at $1.0 \text{ A}\cdot\text{g}^{-1}$.

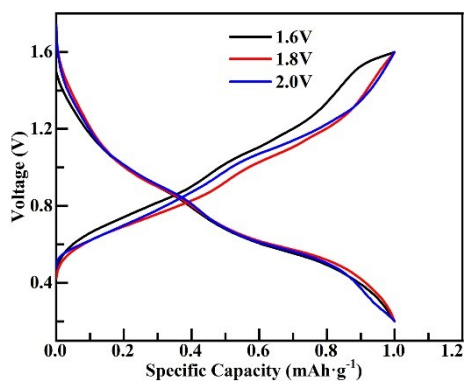


Fig. S8 Normalization first galvanostatic dis/charge profiles of $V_xO_y@C$ at $0.5 \text{ A}\cdot\text{g}^{-1}$ after constant voltage charge.

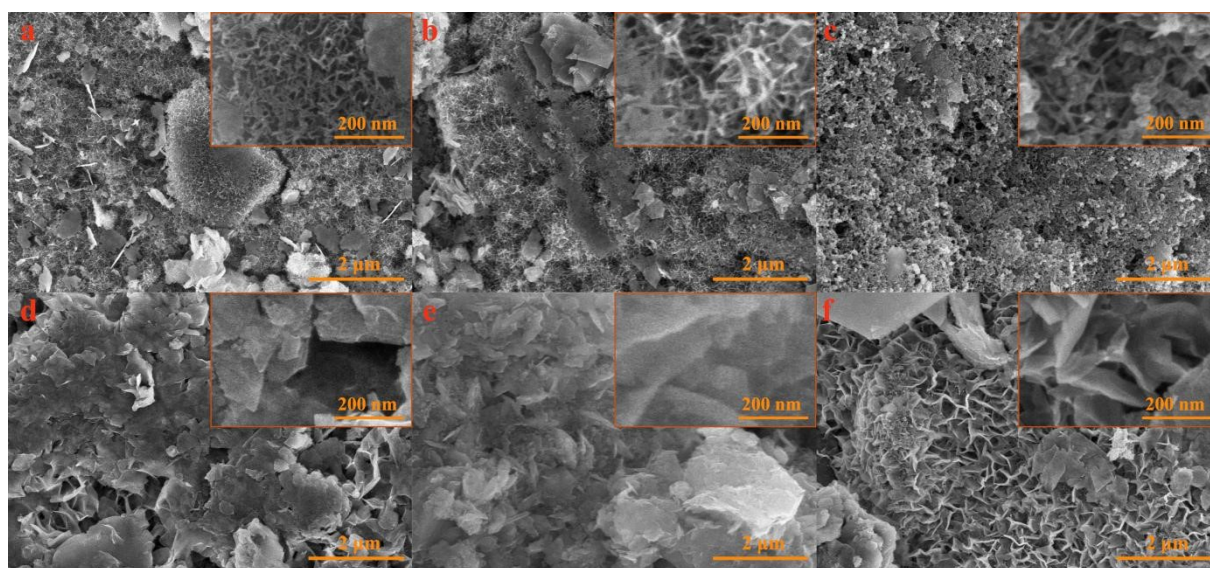


Fig. S9 SEM of electrode for full charge or discharge. **a, d)** 10st cycle. **b, e)** 30th cycle. **c, f)** 50th cycle

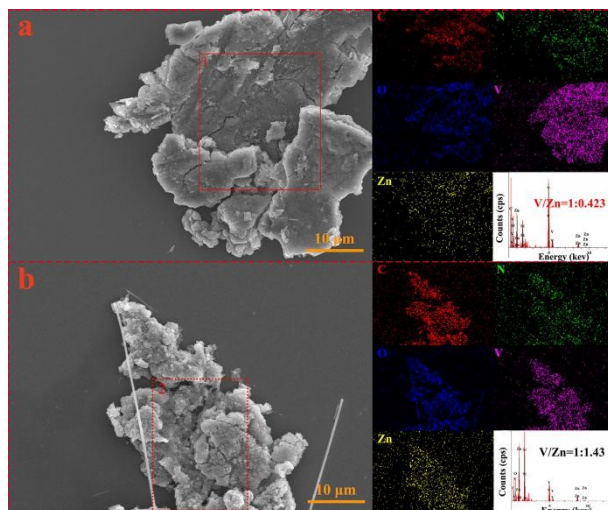


Fig. S10 SEM - EDS of electrode for full charge or discharge after 50 cycles. **a)** full charge. **b)** full discharge.

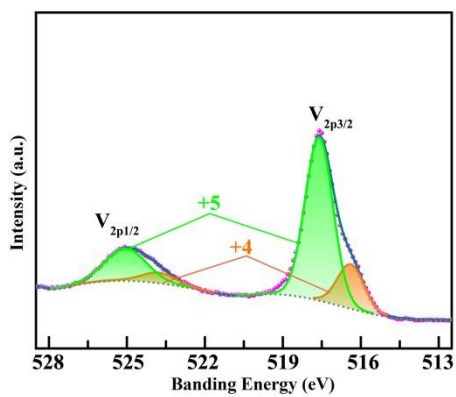


Fig. S11 XPS of electrode after constant voltage charge at 1.8V for 2 hours.

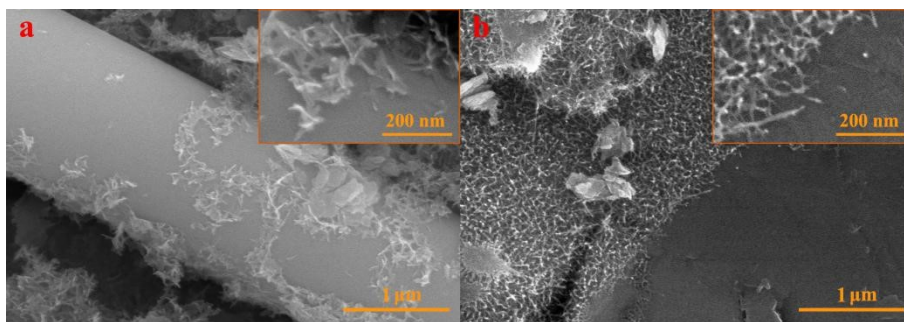


Fig. S12 Distribution of amorphous vanadium oxide fibers on electrode after constant voltage charge at 1.8V for 2 hours. Surface of **a)** glass fiber and **b)** Ti foil.

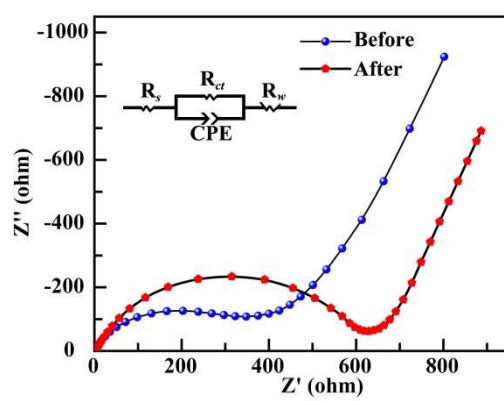


Fig. S13 Nyquist plots of Zn//V_xO_y@C battery before or after activated.