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## **Supporting information**

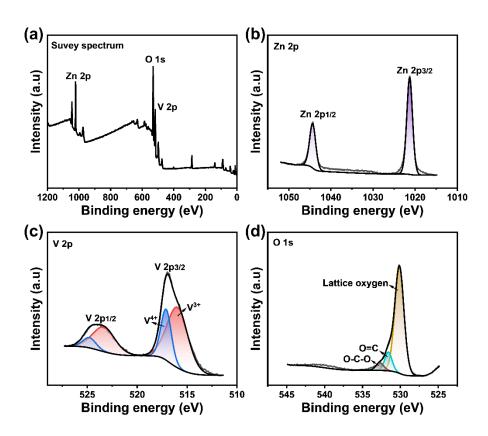


Fig. S1. (a) Survey XPS spectra of ZVO; (b) V 2p XPS spectra of ZVO; (c) Zn 2p XPS spectra of

ZVO; (d) O 1 s XPS spectra of ZVO.

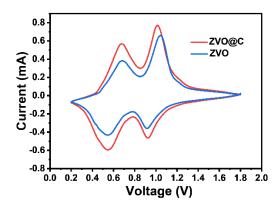


Fig. S2. The third CV curves of ZVO and ZVO@C at the scan rate of  $0.1 \text{ mV s}^{-1}$ .

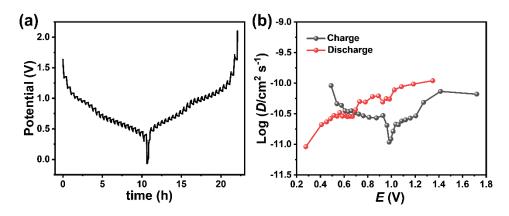


Fig. S3. (a, b) The GITT curves and the related diffusion coefficient of  $Zn^{2+}$  for the ZVO electrode.

Table S1. Electrochemical impedance Rs and Rct values for ZVO and ZVO@C.

Cathode	$R_{s}\left(\Omega\right)$	$R_{ct}\left(\Omega\right)$
ZVO-Before	0.581	486.9
ZVO@C-Before	0.757	268.5
ZVO-10th	0.417	122.0
ZVO@C-10th	0.742	63.0