Supporting Information

Coral-like TeO_2 microwires for rechargeable aluminum batteries

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The number of pages: 13; The number of figures: 9; The number of tables: 3

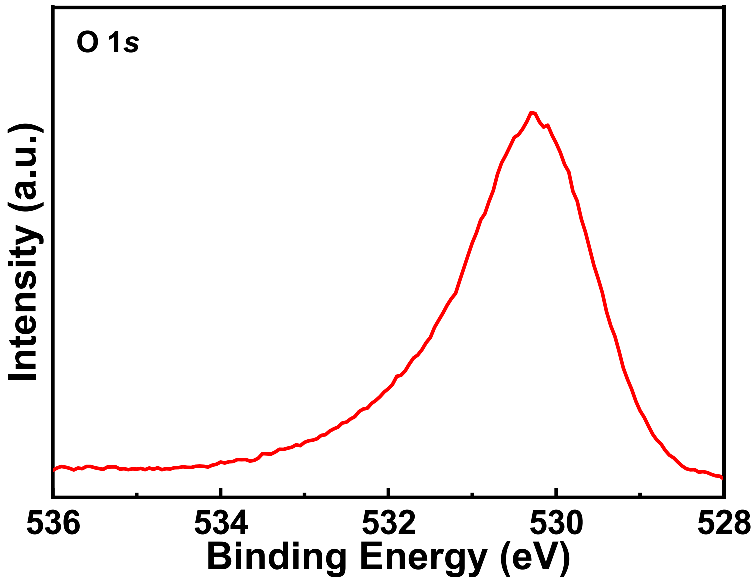

Figure S1. High-resolution XPS spectrum of the O 1s of the as-prepared sample.

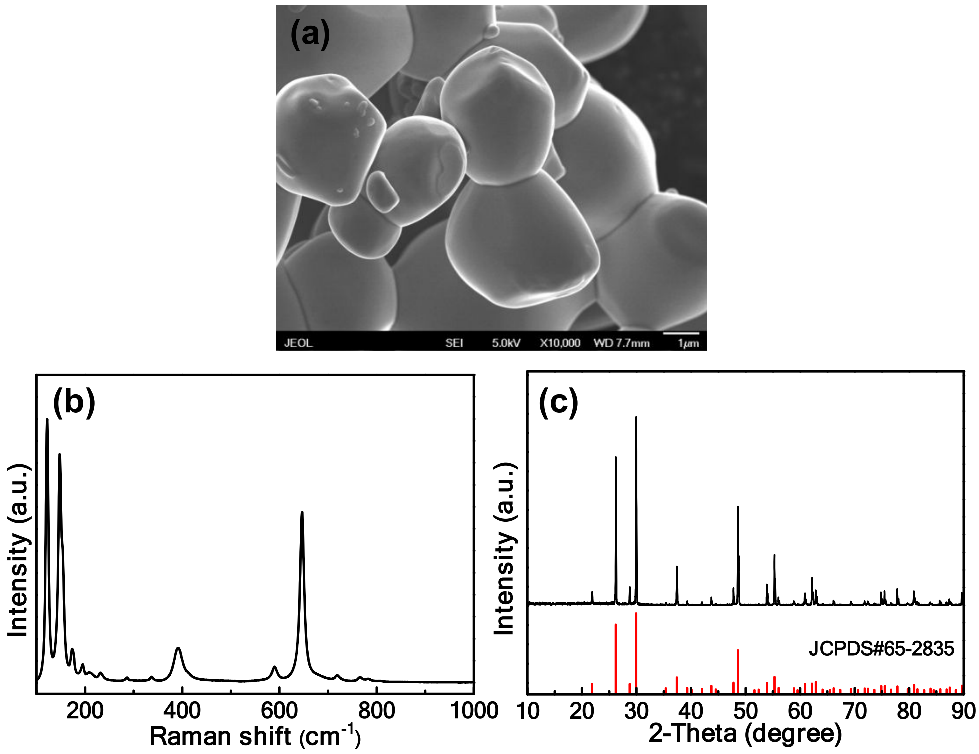

Figure S2. (a) SEM image, (b) Raman spectrum and (c) XRD pattern of commercial TeO_2 powder.

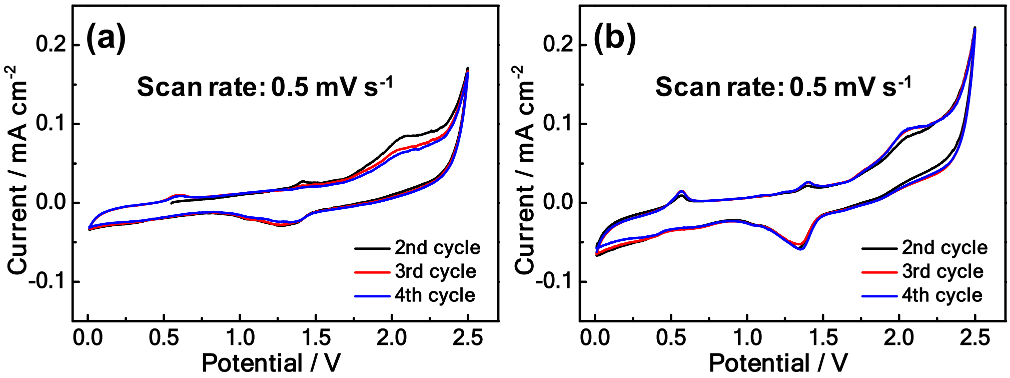

Figure S3. CV curves from 2nd to 4th cycle of (a) C-TeO_2 and (b) H-TeO_2 electrodes at a scan rate of 0.5 mV s^{-1} between 0.01 and 2.5 V vs. Al^{3+}/Al.

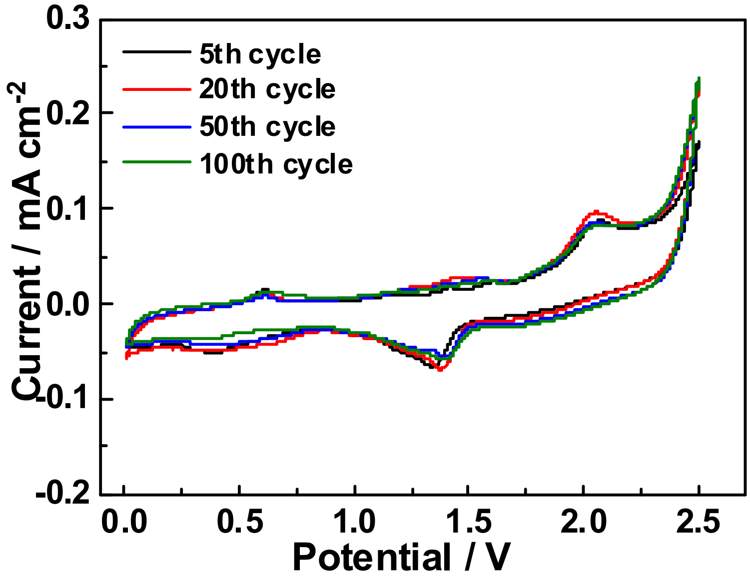

Figure S4. CV curves at different cycles of H-TeO_2 electrode at a scan rate of 0.5 mV s^{-1} between 0.01 and 2.5 V vs. Al^{3+}/Al.

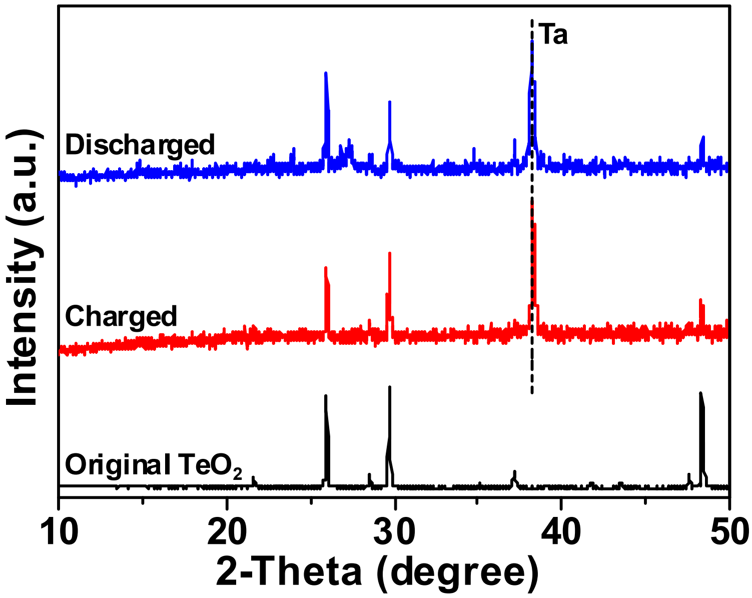

Figure S5. XRD patterns of TeO_2 after fully charged and discharged state.

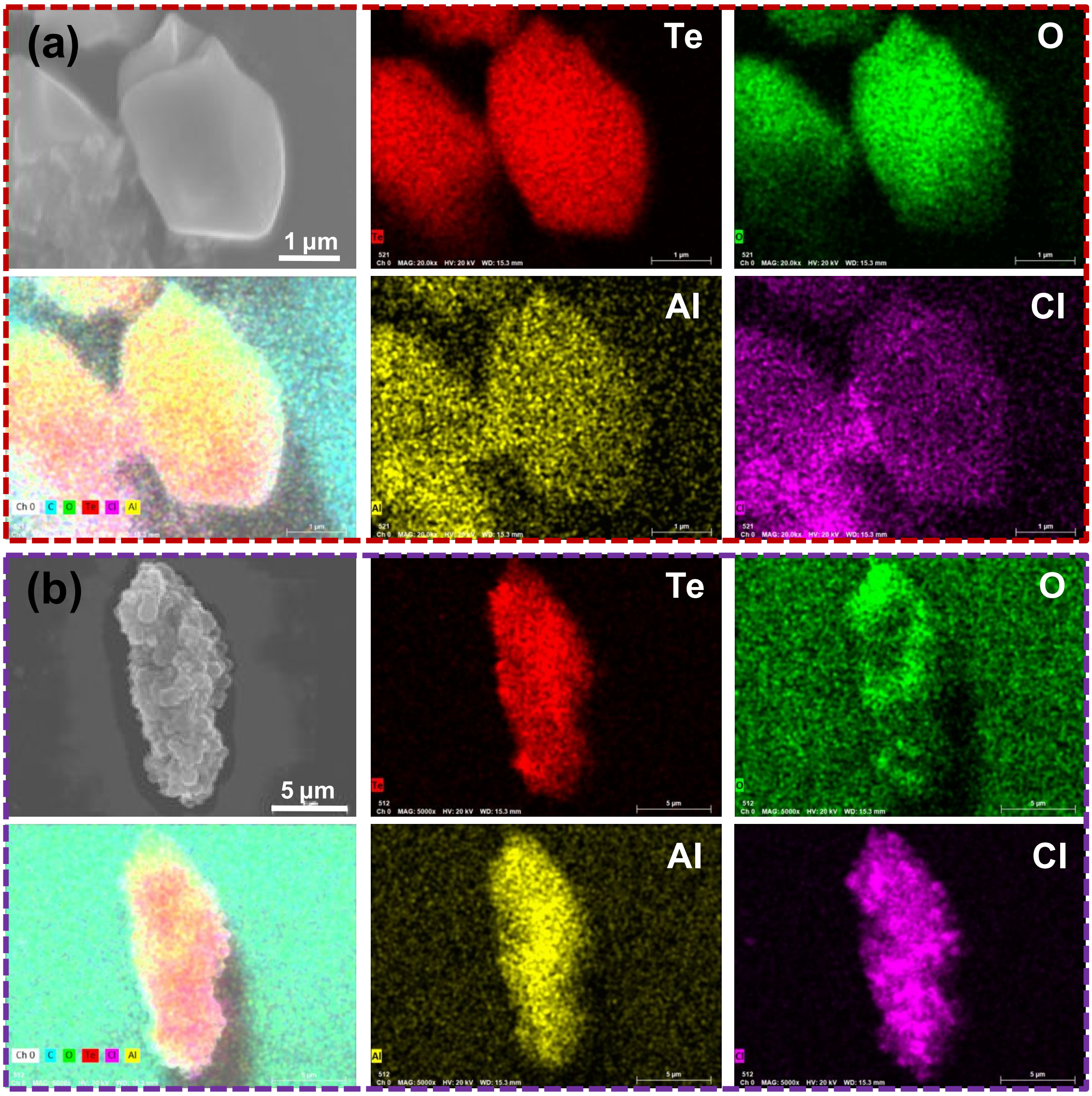

Figure S6. SEM images and element mapping images of Te, O, Al and Cl of the charged (a) and discharged (b) TeO_2 electrodes.

Table S1. EDX element analysis results of the fully charged TeO_2.

Element	*Weight/%*	*Atom/%*
C	69.84	82.50
Te	8.21	0.91
O	15.48	13.73
Al	2.13	1.12
Cl	4.33	1.73
Total	100.00	100.00

Table S2. EDX element analysis results of the fully discharged TeO_2.

Element	*Weight/%*	*Atom/%*
C	41.07	61.85
Te	18.82	2.67
O	22.80	25.78
Al	5.40	3.62
Cl	11.92	6.08
Total	100.00	100.00

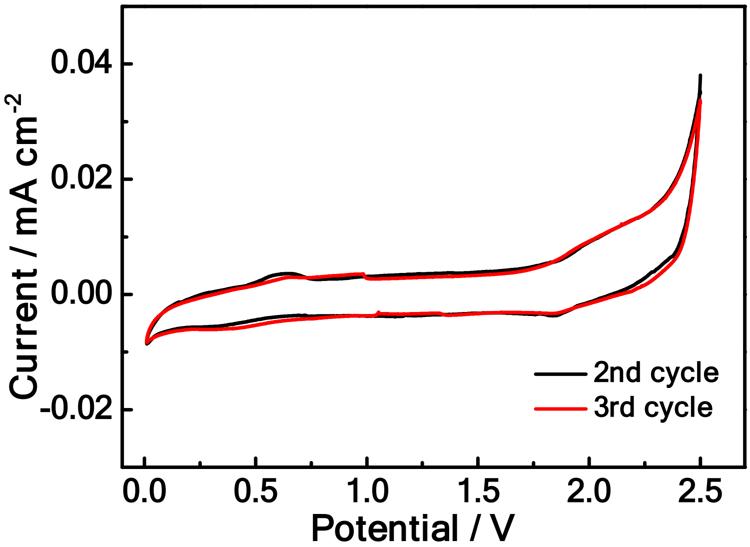

Figure S7. CV curves from 2nd to 3rd cycle of AB-PVDF-GF/A at a scan rate of 0.5 mV s^{-1} between 0.01 and 2.5 V vs. Al^{3+}/Al.

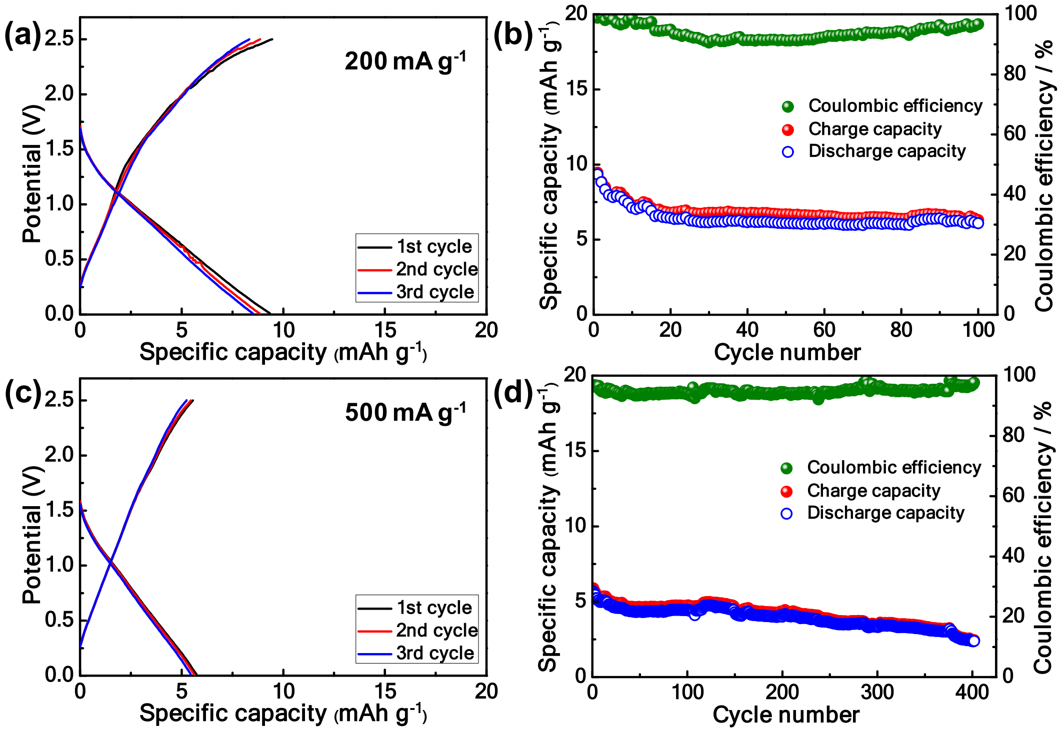

Figure S8. The first three charge-discharge curves for (a,c) the first three cycles and (b,d) cycling performance of AB-PVDF-GF/A at a current density of (a,b) 200 mA g^{-1} and (c,d) 500 mA g^{-1}.

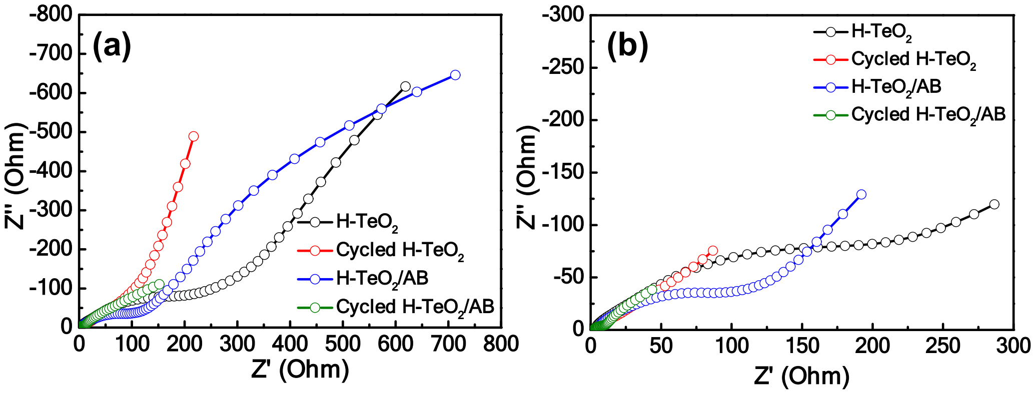

Figure S9. (a) The Nyquist plots of the H-TeO_2 and H-TeO_2/AB electrodes before and after cycling. (b) The partial enlargement of (a) in the high-medium frequency.

Table S3. Comparative electrochemical performance of TeO_2 with other cathode materials recently reported.

Cathode materials	Electrolyte	Discharge capacity (mAh g^{-1})		Cycle number	Current density (mA g^{-1})	Ref.
		1^{st} cycle	Last cycle			
H-TeO_2/AB	$AlCl_3$:[EMIm]Cl (1.3:1)	285.9	152.0	150	200	This work
Carbon paper	$AlCl_3$:[EMIm]Cl (1.3:1)	50	62.7	50	150	1
Pyrolytic graphite	$AlCl_3$:[EMIm]Cl (1.3:1)	60	66	200	66	2
Pyrolytic graphite	$AlCl_3$:[EMIm]Cl (1.5:1)	62	72	2000	75	3
Graphite	$AlCl_3$:Urea (1.3:1)	68	73	200	100	4
Polypyrrole	$AlCl_3$:[EMIm]Cl (1.5:1)	71	48	100	20	5
Ni_3S_2	$AlCl_3$:[EMIm]Cl (1.3:1)	350	60	100	100	6
V_2O_5	$AlCl_3$:[BMIm]Cl (1.1:1)	239	~180	5	44.2	7
SnO_2/C	$AlCl_3$:[EMIm]Cl (1.3:1)	~140	~140	1100	1000	8

Reference:

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