Supporting Information

for

High Crystallinity Urchin-like VS_4 Anode for High-performance Lithium Ion Storage

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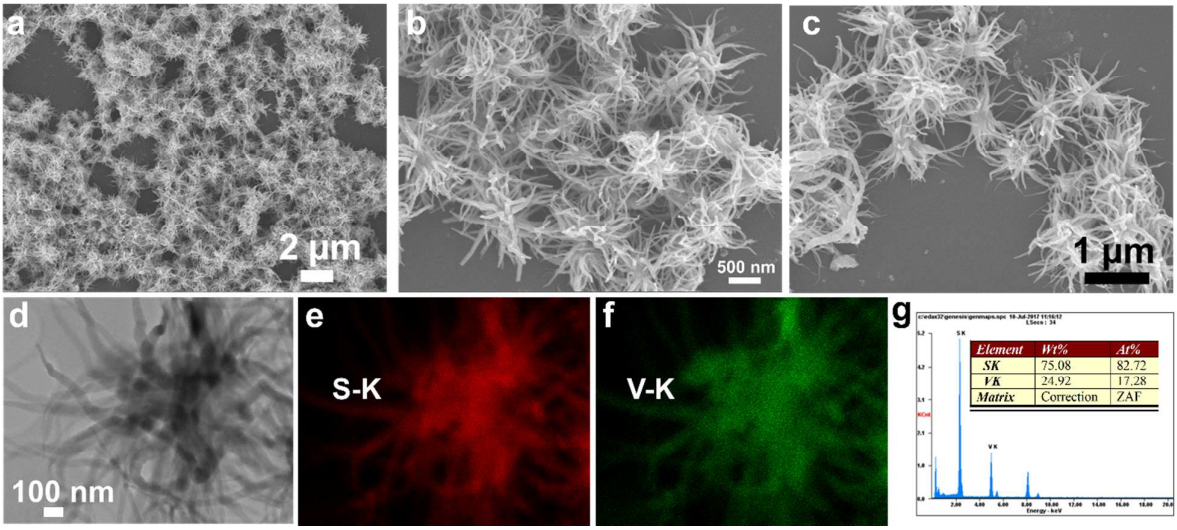

Figure. S1 SEM images and elemental mapping of urchin-like VS_4.

Table S1 FTIR peaks and their assignments.

Peaks	Band assignment	Reference
1631	δ(OH)	1
1400	Amorphous carbon	1
1200	C-O-R	2
980	S^{2-}(V-S-V)	2-4
550	Terminal S stretching	2-4

ν: stretching; δ: bending.

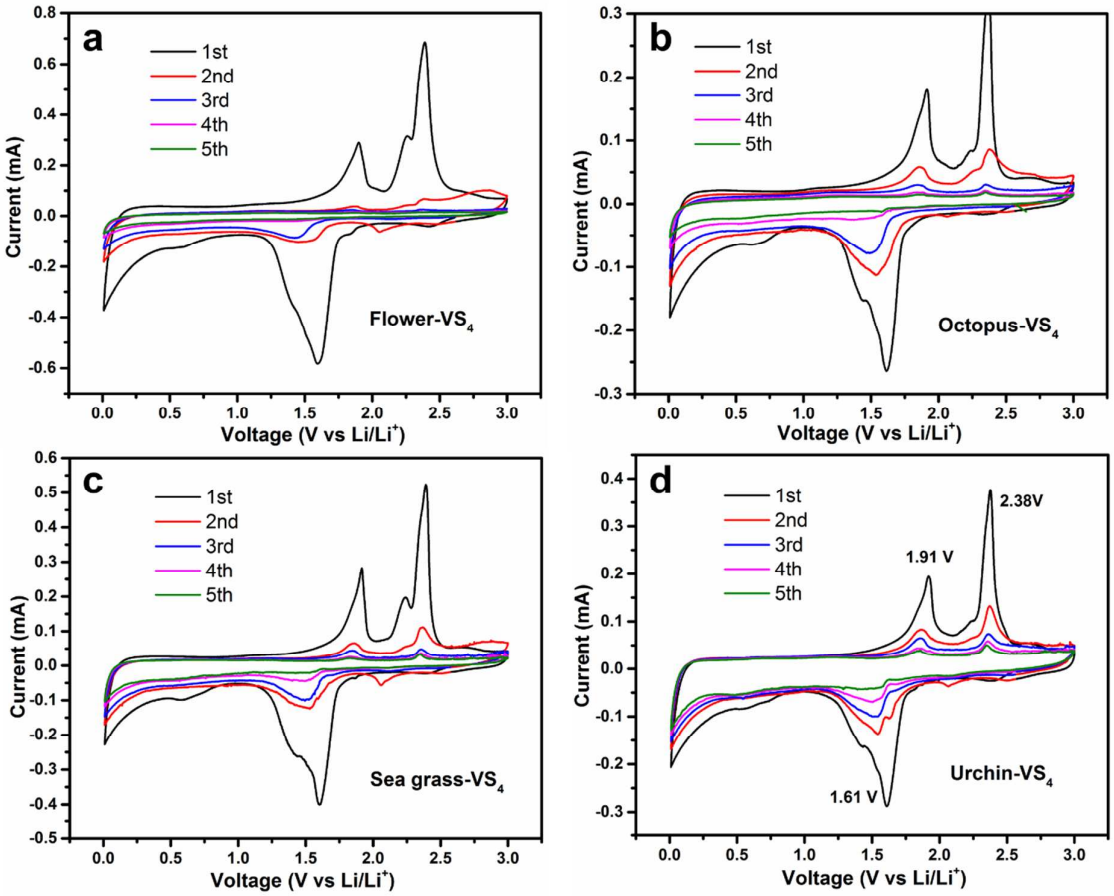

Figure. S2 First five CVs of: (a) flower-VS_4; (b) octopus-VS_4; (c) sea grass-VS_4; (d) urchin-like VS_4 with a scan rate of 0.2 mV s^{-1} in the voltage range of 0.01-3.00 V vs Li/Li^+.

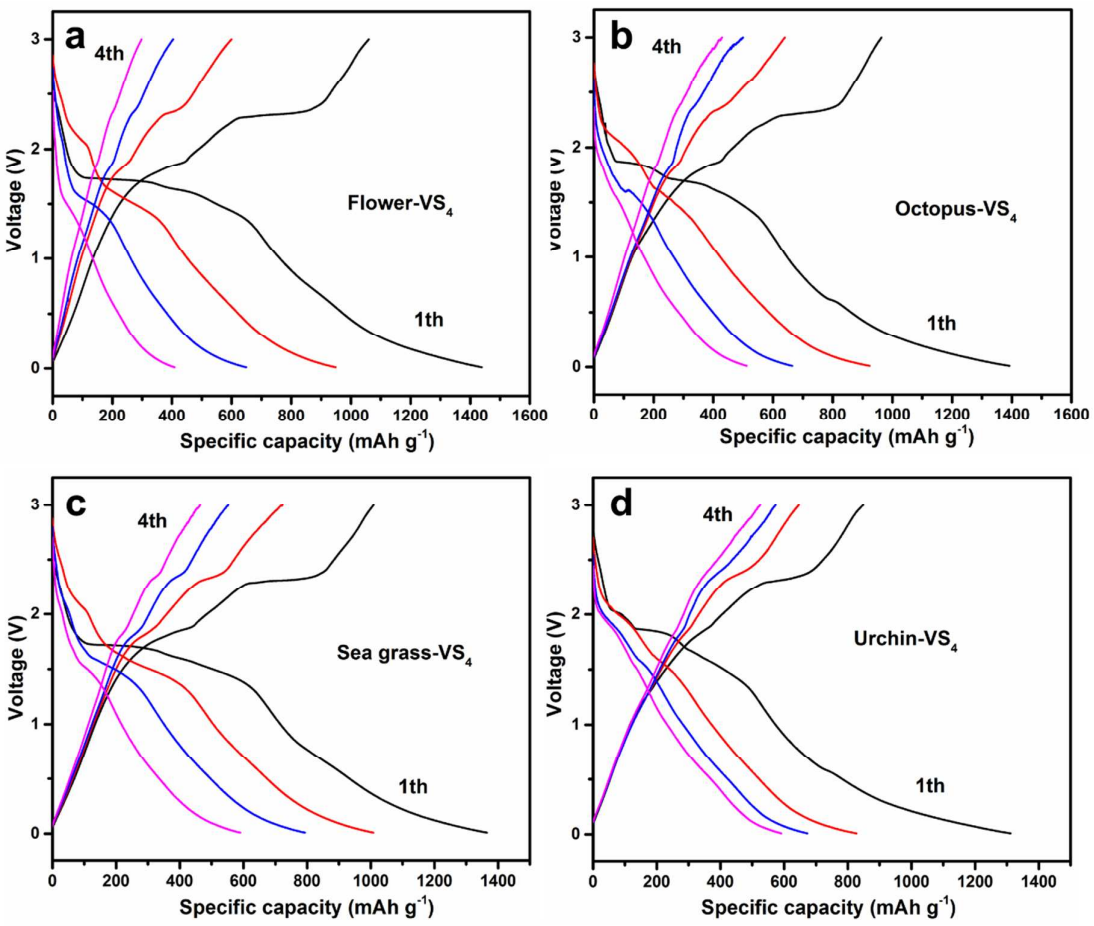

Figure. S3 First three galvanostatic discharge-charge profiles at a current rate of 0.1 A g^{-1} in the voltage range of 0.1-3 V vs Li/Li^+ for: (a) flower-VS_4; (b) octopus-VS_4; (c) sea grass-VS_4; (d) urchin-like VS_4.

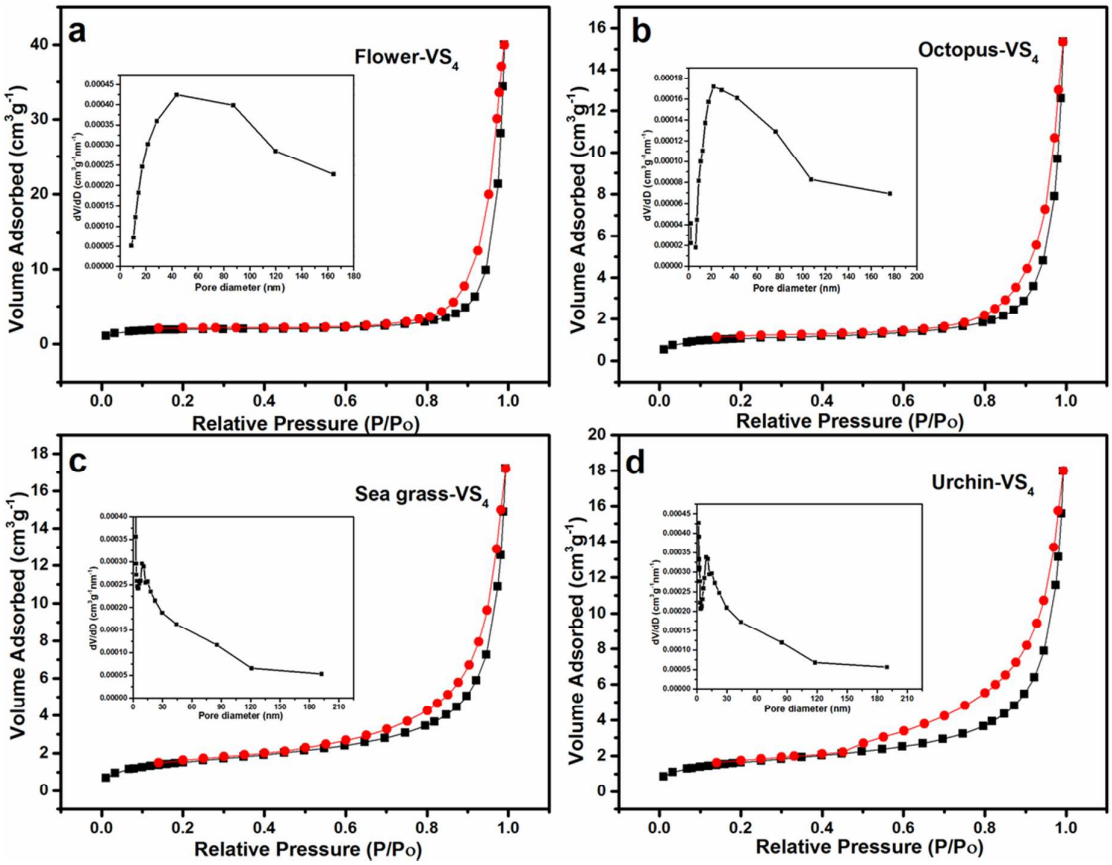

Figure. S4 The Nitrogen-adsorption-desorption isotherms of the (a) flower-VS_4, (b) octopus-VS_4, (c) sea grass-VS_4, and (d) urchin-like VS_4. The insets are their corresponding pore size distribution.

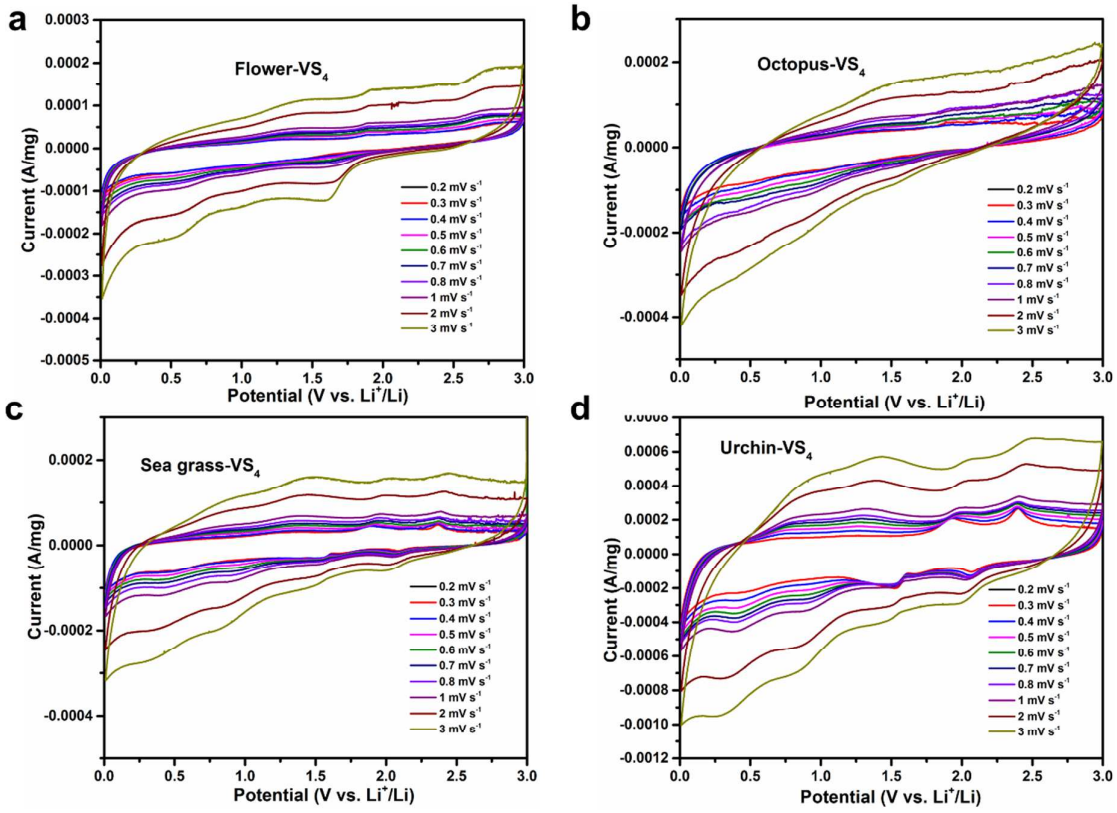

Figure. S5 CV curves of (a) flower-VS_4; (b) octopus-VS_4; (c) sea grass-VS_4; (d) urchin-VS_4 at different scan rates between 0.01 to 3.00 V.

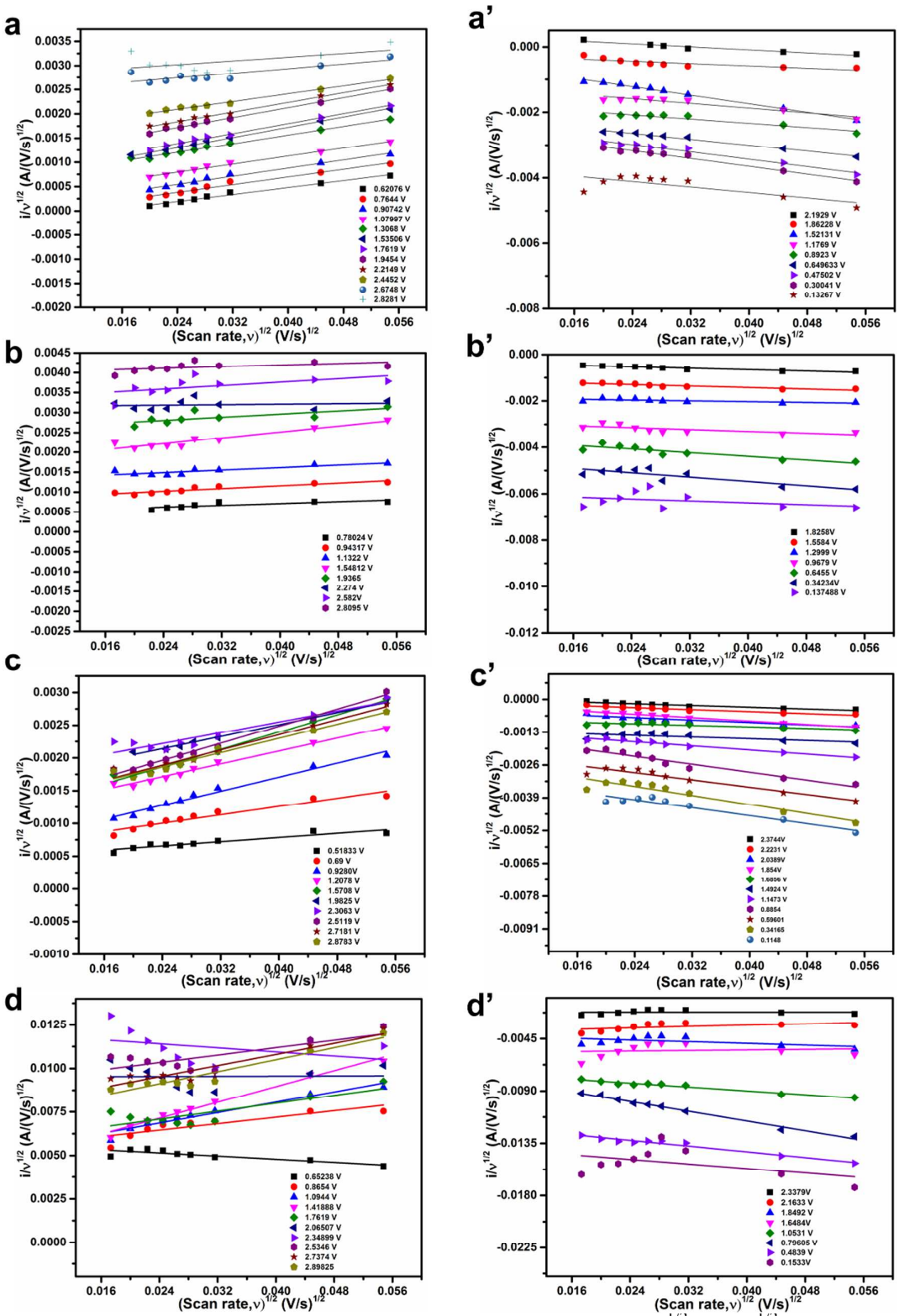

Figure. S6 (a, a'), (b, b'), (c, c') and (d, d') are the plots of $v^{1/2}$ vs $i/v^{1/2}$ for flower-VS_4, octopus-VS_4, sea grass-VS_4 and urchin-like VS_4 at both anodic and cathodic scan. The plots

are used for calculating constants k_1 and k_2 at different potentials of the cathodic scan and anodic scan.

The total current at a fixed potential can be described using the following equation: $I(V) = k_1\nu + k_2\nu^{1/2}$, where $k_1\nu$ and $k_2\nu^{1/2}$ represent the capacitive contribution and intercalation contribution, respectively. k_1 and k_2 can be obtained from the slope and y-axis intercept of the straight line: $i(V)/\nu^{1/2} = k_1\nu^{1/2} + k_2$, as shown in Figure. S6. Thus, the contribution from capacitive and intercalation can be calculated and each component contribution at scan rate of 0.3 mV/s is shown in Figure. 4b.

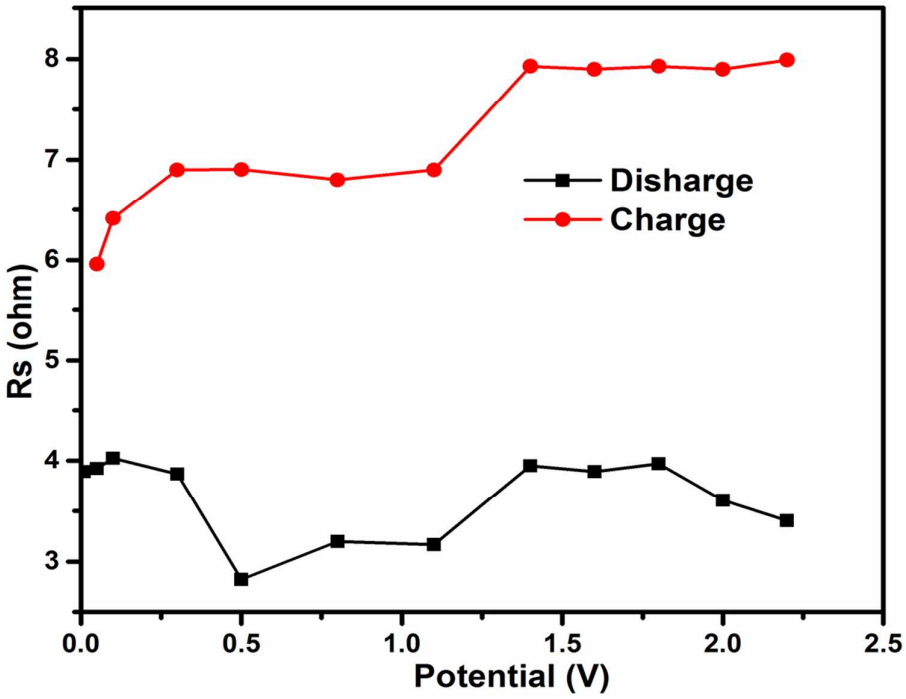

Figure. S7 Variation trend of R_s of urchin-VS_4.

References

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