Supporting information

Construction of Reduced Graphene Oxide Wrapped Yolk-Shell Vanadium Dioxide Sphere Hybrid Host for High-Performance Lithium-Sulfur Batteries

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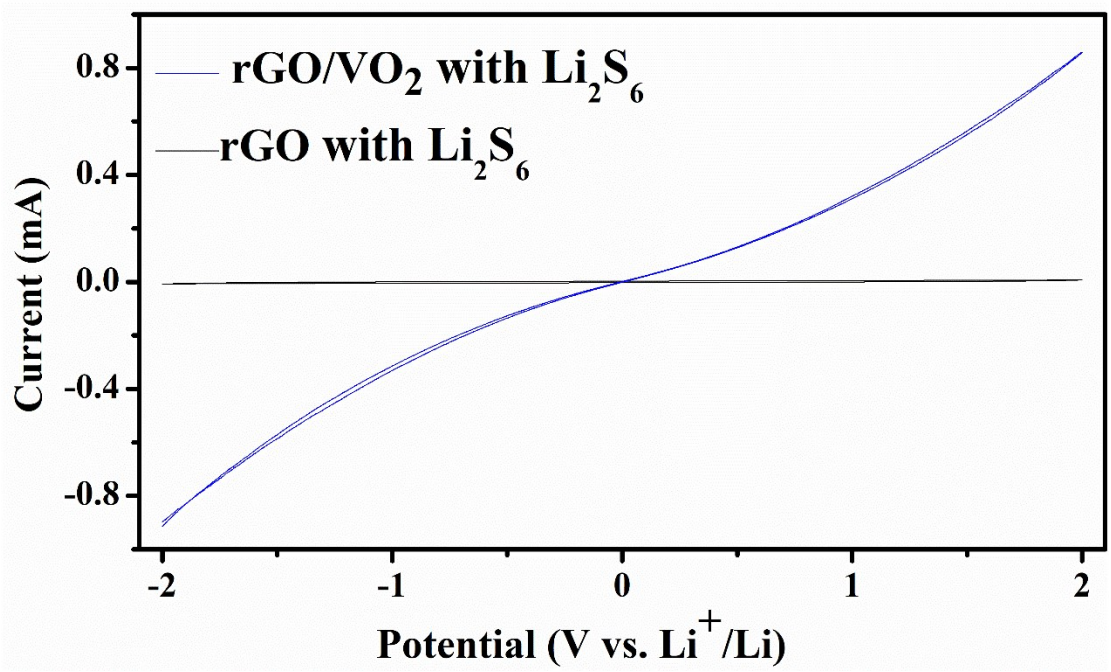

Figure S1 CV measurements of different symmetrical battery with Li_2S_6 electrolyte.

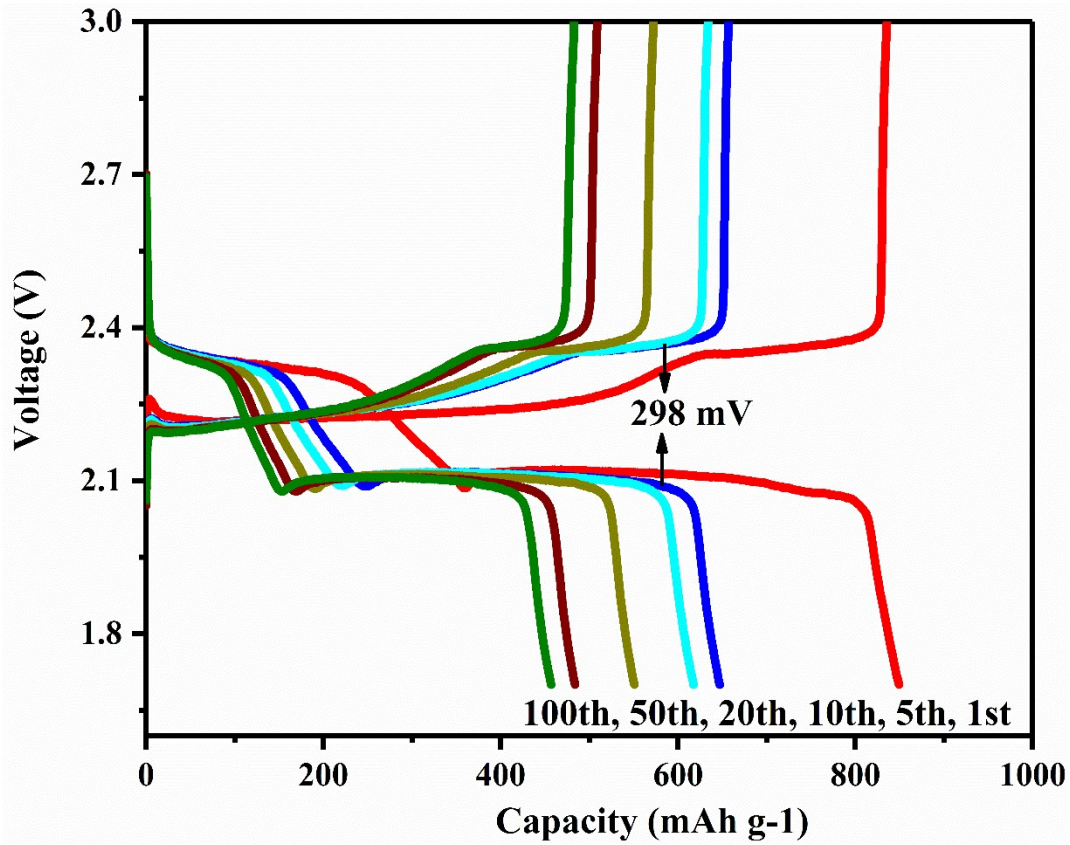

Figure S2. Galvanostatic charge/discharge profiles of rGO/S cathode at 0.1 C.

Table S1. Impedance parameters simulated from the equivalent circuits.

Electrodes	R_e (Ω)	R_{ct} (Ω)
rGO/VO_2/S	3.20	21.03
VO_2/S	10.35	54.25
rGO/S	5.37	58.57

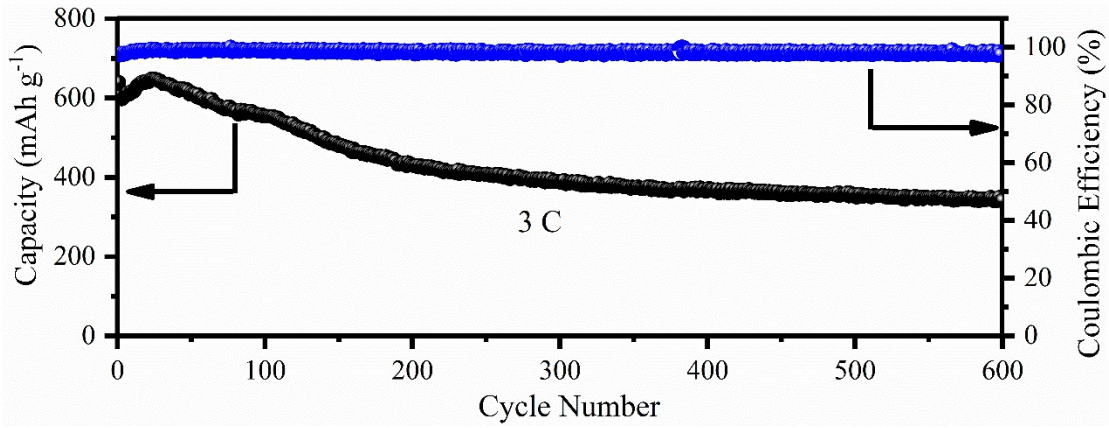

Figure S3. Cycling performance of rGO/VO_2/S at 3 C.

Table S2. The electrochemical performances comparison between rGO/VO_2/S cathode and some reported other kinds of sulfur electrodes with similar sulfur content and mass loading.

cathodes	Sulfur content (wt%)	Mass loading (mg cm^{-2})	Discharge Capacity (mAh g^{-1})	Decay rate (% per cycle)	Ref.
S/SnS_2-porous carbon	78%	1.5	750 (300^{th} cycle at 0.5 C)	0.073%	S1
G/CNT@MnO_2@S	81.8%	1.5-2.0	590 (200^{th} cycle at 1 C)	0.11%	S2
RCE-Co_3O_4@G-S	71%	1.6	423.8 (500^{th} cycle at 1 C)	0.069%	S3
$FePO_4$@rGO/S	76.5%	2.1	554 (200^{th} cycle at 1 C)	0.154%	S4
$Co(OH)_2$@S/CCB	59.29%	--	576 (200^{th} cycle at 1 C)	0.144%	S5
C@AZO/S	70%	2.2	623.5 (300^{th} cycle at 0.5 C)	0.12%	S6
Cobalt-graphene @CNT/S	76%	1.3-1.6	363 (500^{th} cycle at 1 C)	0.09%	S7
h-CeO_2/sulfur-0.8-CNT/h-CeO_2 interlayer electrode	80%	1.8	425.5 (500^{th} cycle at 1 C)	0.073%	S8
PS/Mo_2C-CNFs	--	2.0	406 (500^{th} cycle at 1 C)	0.136%	S9

p-CNT@Void @MnO_2/S	**~65%**	**0.65–1.06**	**526 (100^{th} cycle at 1 C)**	**0.12%**	**S10**
VO_2 nanosheet@S	**67.2%**	**—**	**516 (200^{th} cycle at 1 C)**	**0.257%**	**S11**
VO_2 nanotube/G/S	**68.89%**	**1.2**	**541 (500^{th} cycle at 2 C)**	**0.09%**	**S12**
rGO/VO_2/S	**~70%**	**1.8** **2.8**	**516.1 (400^{th} cycle at 1 C)** **342.2 (600^{th} cycle at 3 C)**	**0.07%** **0.078%**	**This work**

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