WO_3 nanowire/carbon nanotube interlayer as a chemical adsorption mediator for high-performance lithium-sulfur batteries

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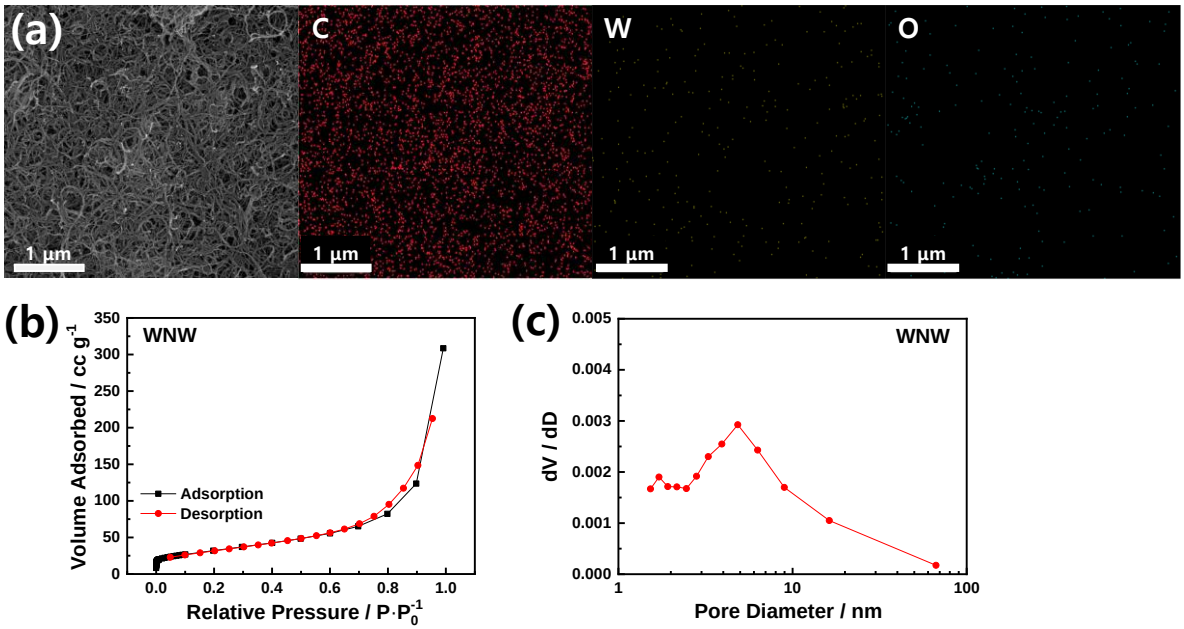

Figure S1. (a) SEM images of CNT interlayer with EDS mapping images of carbon, tungsten, oxygen. (b) Isotherm profiles and (c) pore size distributions of WNW.

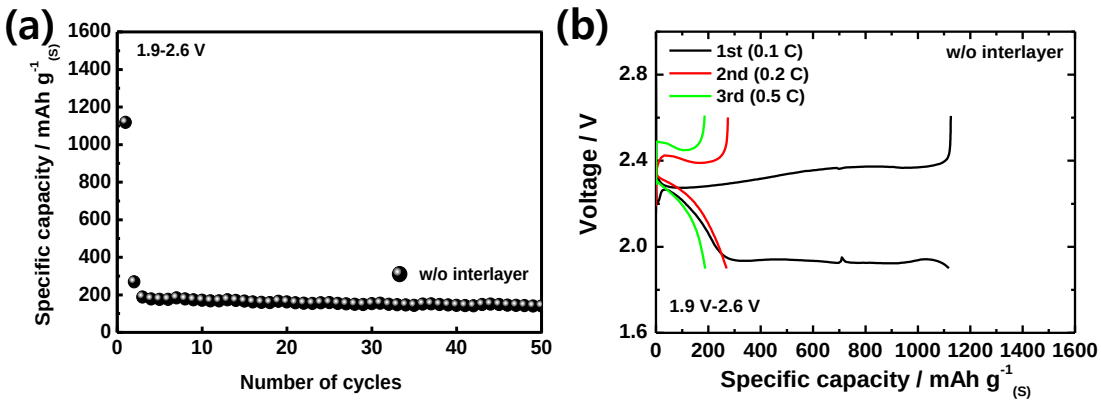

Figure S2. (a) Cycling performance and (b) voltage profiles of a lithium-sulfur cell without an interlayer.

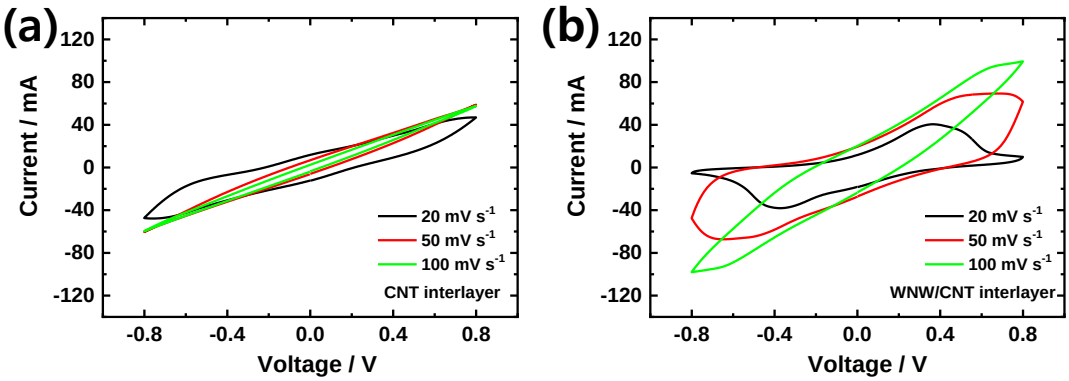

Figure S3. Cyclic voltammetry curves of the lithium-sulfur cells with a (a) WNW/CNT interlayer and (b) CNT interlayer, respectively, at different scan rates.

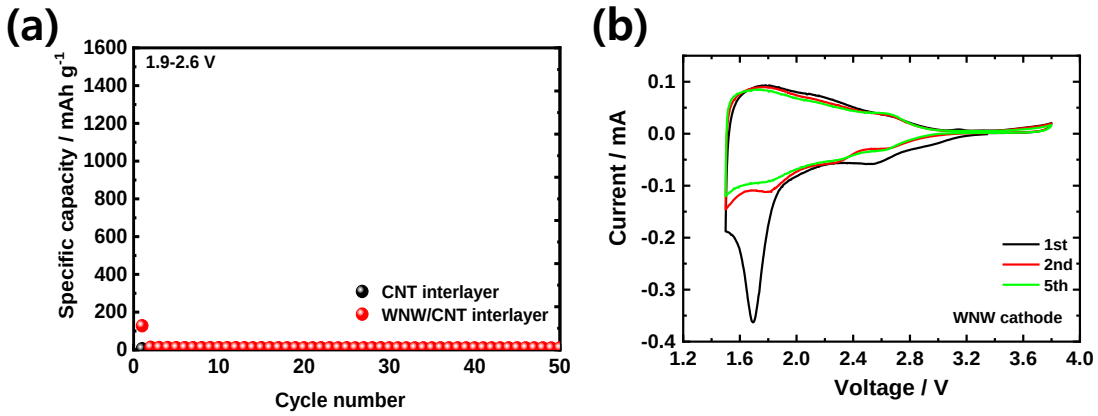

Figure S4. (a) Cycling performances of the interlayers without sulfur electrodes. (b) CV profiles of WNW (1.5–3.8 V).

Table S1 Comparison of overall electrochemical performances previously reported lithium-sulfur batteries incorporating different types of interlayer or functional separators.

Samples	Sulfur content in cathode (%)	Overall S content (%)	Sulfur loading (mg cm^{-2})	Specific capacity (mAh g^{-1})(s)	Cycle number	Capacity fading rate (%/cycle)	Rate capability	Reference
CNF-T interlayer	60	42.5	0.8	1328 (0.2 C)	500	0.121	1091 (0.1 C) 940 (0.3 C) 820 (0.5 C) 740 (1 C) 620 (2 C)	[S1]
PANiNF/CNT separator	60	59.7	1.4	1020 (0.2 C)	100	0.3	1020 (0.2 C) 867 (0.5 C) 791 (1 C)	[S2]
Glass fiber/CNT interlayer	70	56.6	1.6	1111.7 (0.2 C)	230	0.12	1260 (0.1 C) 1150 (0.2 C) 1070 (0.5 C) 1000 (1 C)	[S3]

							853 (2 C)	
Self-assembled CNT interlayer	80	52.6	3.0	851 (0.5 C)	100	0.042	1280 (0.06 C) 950 (0.12 C) 800 (0.3 C) 670 (0.6 C) 600 (0.9 C) 530 (1.2 C) 450 (1.8 C)	[S4]
Graphene/PP/Al_2O_3 separator	60	45.1	2.4	1068 (0.2 C)	100	0.25	1060 (0.2 C) 950 (0.5 C) 870 (1 C) 780 (2 C)	[S5]
Ti_3C_2 nanosheet/glass fiber separator	70	59.0	1.9	820 (0.3 C)	100	0.12	886 (0.3 C) 716 (0.45 C) 589 (0.6 C) 530 (0.9 C) 476 (1.2 C)	[S6]

SRGO/glass fiber interlayer	53.3	50.6-51.2	1.2-1.5	1320 (0.5 C)	250	0.18	1240 (0.2 C) 1019 (0.5 C) 866 (1 C) 673 (2 C) 550 (3 C) 471 (4 C)	[S7]
PAA-SWNT interlayer	65	54.3	2.7	770 (1 C)	200	0.13	1117 (0.1 C) 860 (0.2 C) 740 (0.5 C) 640 (1 C) 592 (2 C)	[S8]
MoS_2/graphene interlayer	60	43.6-48.0	0.8-1.2	840 (0.6 C)	200	0.13	850 (0.3 C) 770 (0.6 C) 701 (1.2 C) 600 (1.8 C)	[S9]
N-doped conductive interlayer	75	50.0	3.0	990 (0.2 C)	200	0.24	1295 (0.1 C) 990 (0.2 C) 750 (0.5 C)	[S10]

Graphene/CNT aerogels interlayer	50	48.0	2.46	1128 (0.5 C)	100	0.25	1286 (0.2 C) 990 (0.5 C) 736 (1 C) 493 (2 C)	[S11]
P-doped C microtube textile interlayer	60	36.3-37.2	2.9-3.1	788 (1 C)	100	0.07	1220 (0.1 C) 1040 (0.2 C) 880 (0.5 C) 760 (1 C) 674 (2 C)	[S12]
WNW/CNT interlayer	70	48.0	3.0	1225 (0.5 C)	300	0.11	1558 (0.1 C) 1281 (0.2 C) 1172 (0.5 C) 1052 (1 C) 874 (2 C) 656 (3 C)	This work

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