Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supplemental information

Dual additive of lithium titanate and sulfurized pyrolyzed polyacrylonitrile in sulfur cathode for high rate performance in lithium-sulfur battery

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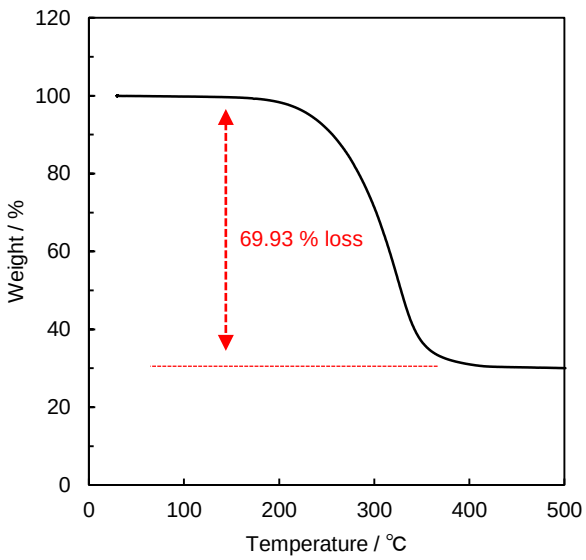

Figure S1. TGA plot of S/CNovel complex powder. S and CNovel in the weight ratio of 70:30 were mixed and then heated at 155 ℃ for 12 h to incorporate S into CNovel.

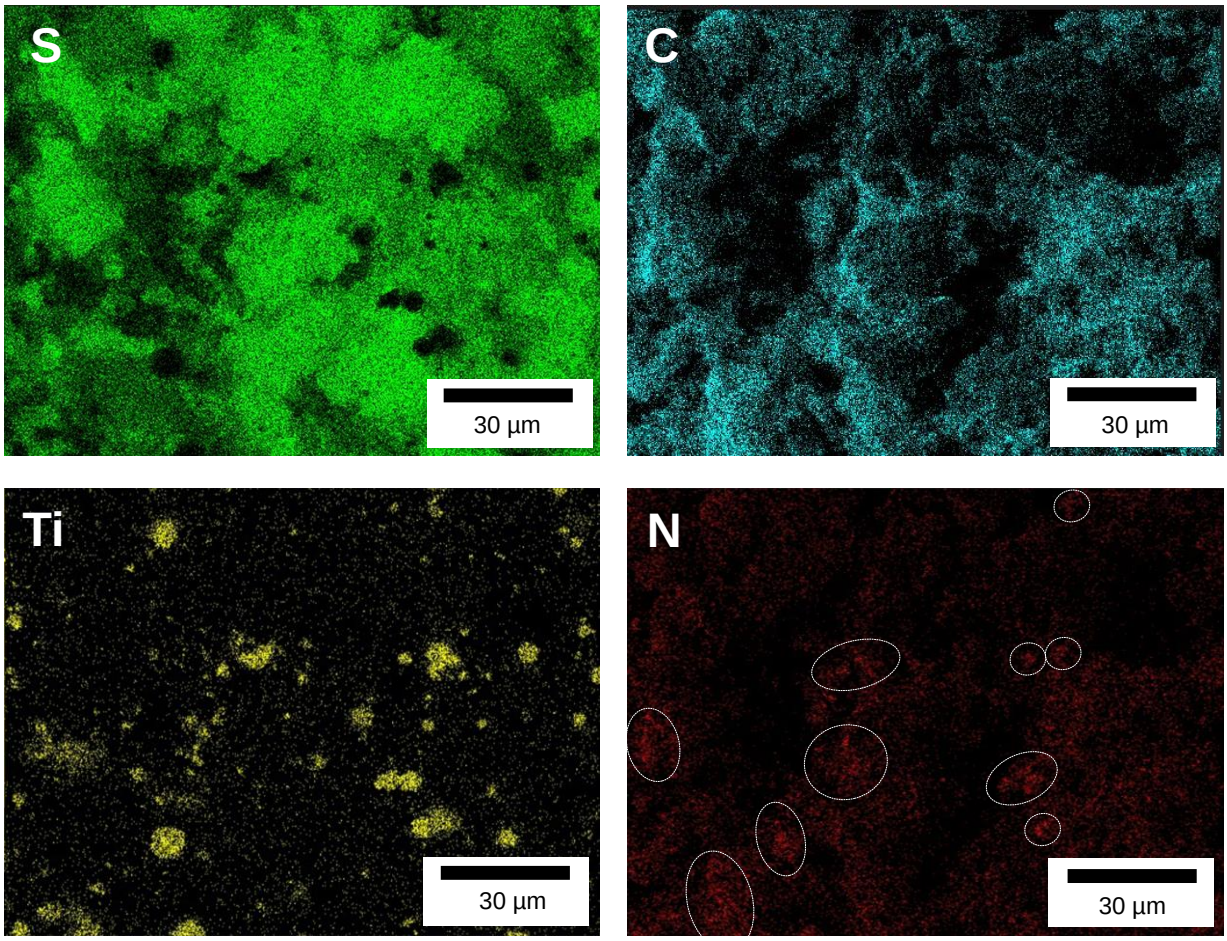

Figure S2. EDS mapping images of sulfur, carbon, titanium, and nitrogen in the 4:3 wt.% LTO:SPAN electrode surface. The images of N atom, white circles indicate

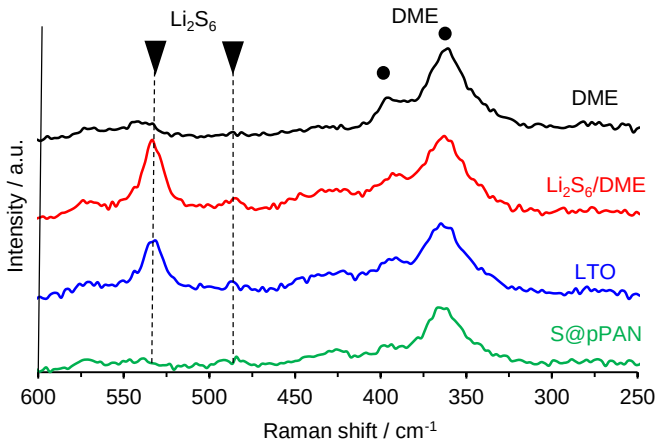

Figure S3. Raman spectra with the solutions after the adsorption test. LTOand SPAN with an equal surface area were added into 5mM Li_2S_6/DME solution with storage for 7 days..

Table S1. Atomic ratios of the SPAN surface obtained by XPS before/after the polysulfide adsorption test. SPAN was immersed in the solution for 7 days.

	Before the polysulfide adsorption/%	After the polysulfide adsorption/%
Oxygen	12.36	11.27
Nitrogen	9.91	9.69
Carbon	67.29	67.36
Sulfur	10.44	11.68

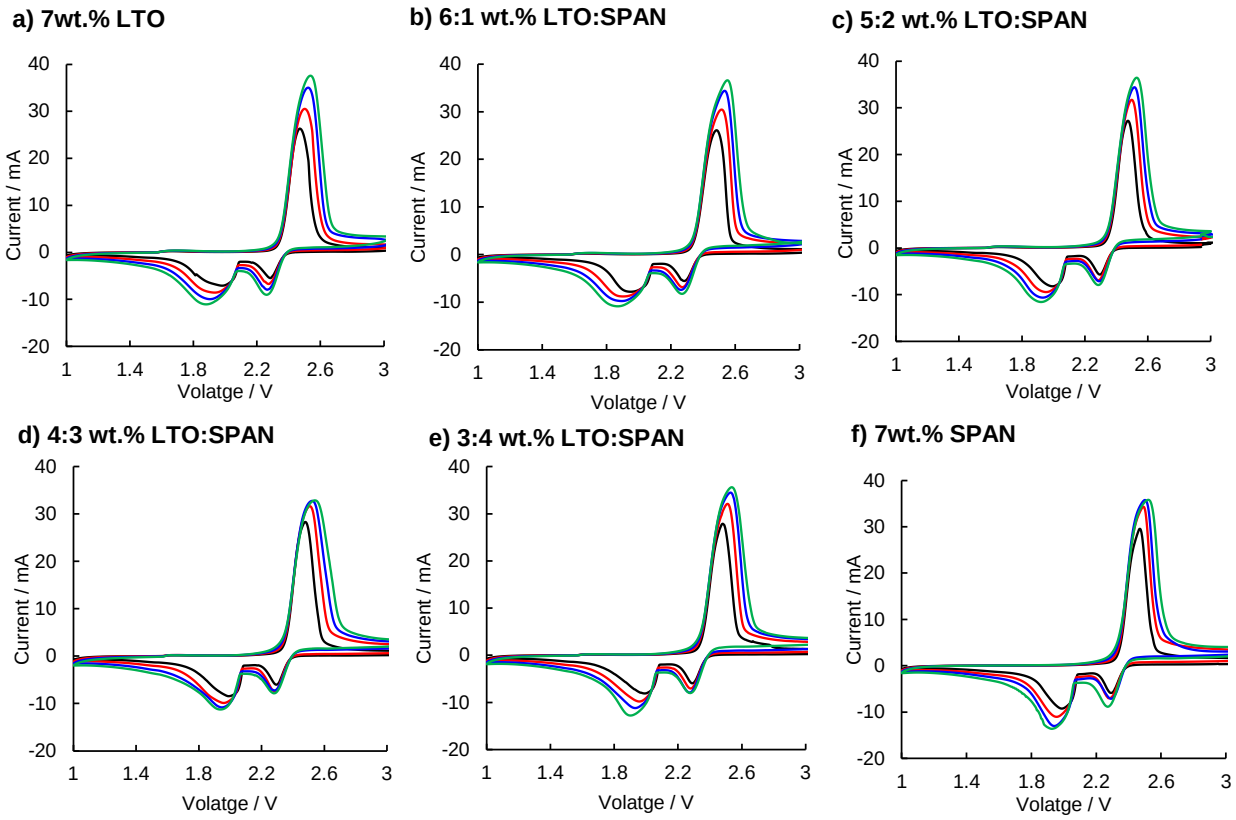

Figure S4. Cyclic voltammogram at different sweep rates from 0.2 to 0.5 mV s^{-1} for Li-S cells in the different cathodes. (a) 7 wt% LTO, (b) 6:1 wt% LTO:SPAN, (c) 5:2 wt% LTO:SPAN, (d) 4:3 wt% LTO:SPAN, e) 3:4 wt% LTO:SPAN, and (f) 7 wt% SPAN. The C_1 peak and the C_2 peak correspond to the reduction from S_8 to higher-order lithium polysulfide (Li_2S_x, $x \geqq 4$) and the reduction from Li_2S_4 to Li_2S_2 and/or Li_2S, respectively. The A_1 peak is assigned to oxidation from Li_2S to higher-order lithium polysulfide and/or S_8.

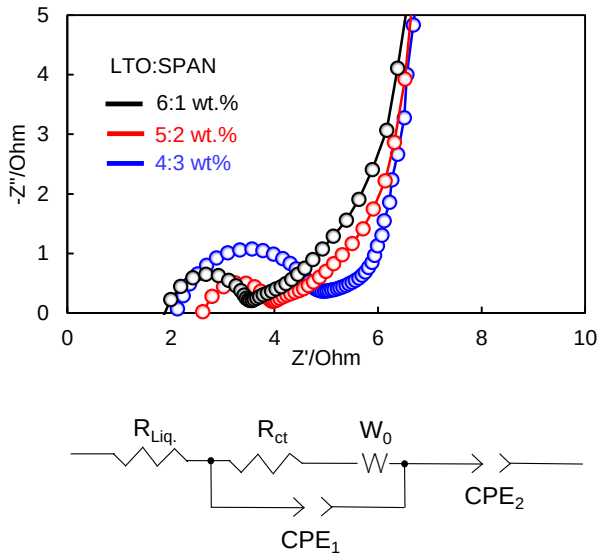

Figure S5. (a) Nyquist plots of Li-S cells using different weight ratios of LTO and SPAN and an equivalent circuit model. EIS was conducted in the frequency range of 3 MHz to 0.1 Hz with an amplitude of 10 mV at 60 ℃.