



Title	L-Cysteine-Modified Acacia Gum as a Multifunctional Binder for Lithium-Sulfur Batteries
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Supporting Information

L-cysteine modified acacia gum as a multifunctional binder for lithium-sulfur batteries

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Supporting Figures

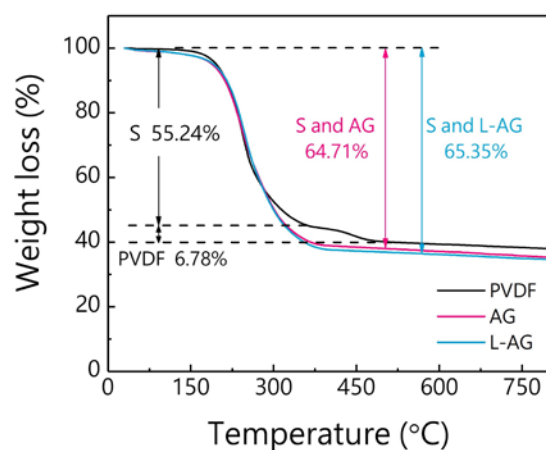


Figure S1. The TG profiles of the electrodes with PVDF, AG and L-AG binders. After removing the weight loss resulted from the binder decomposition (6.78, 8.08 and 8.62 wt% for PVDF, AG and L-AG in Figure S4), the mass loadings of sulfur in the electrodes were 55.24, 56.63 and 56.73 wt%.

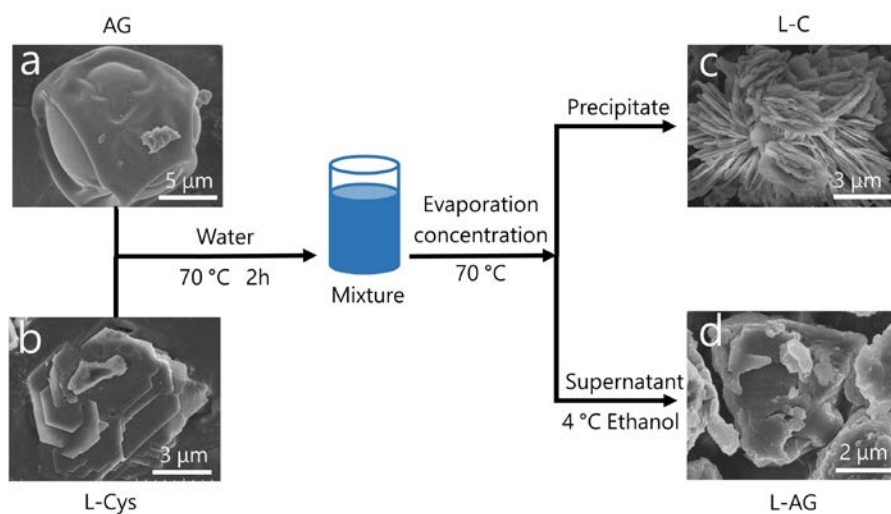


Figure S2. The synthesis process of L-AG and SEM images of (a) AG, (b) L-Cys, (c) L-C and (d) L-AG.

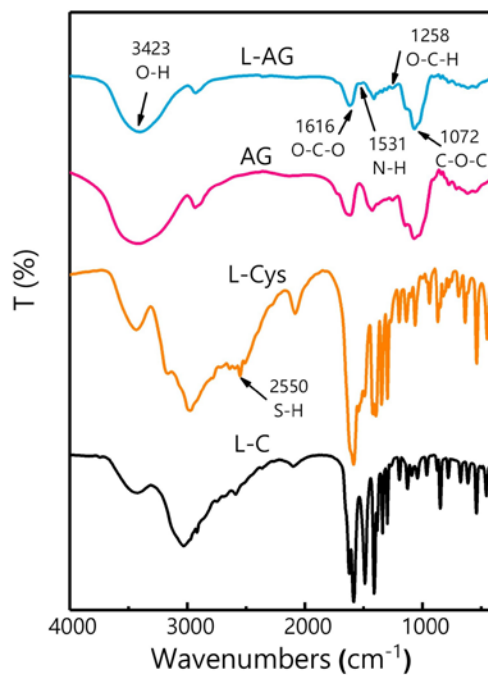


Figure S3. FTIR spectra of L-AG, AG, L-Cys and L-C.

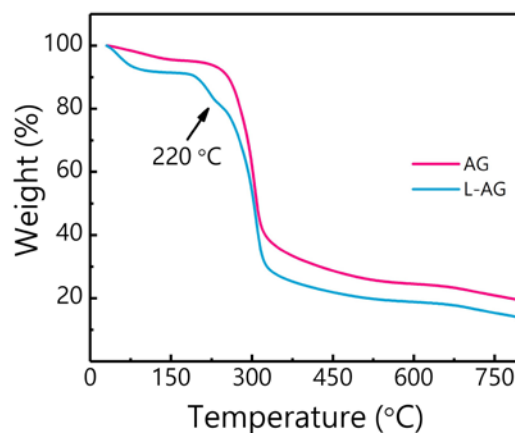


Figure S4. TG profiles of AG and L-AG with the temperature up to 800 °C.

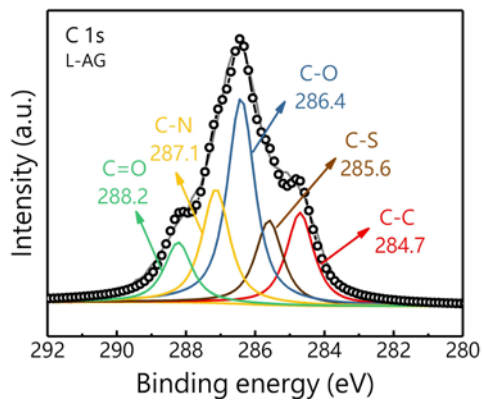


Figure S5. C 1s XPS profile of L-AG.

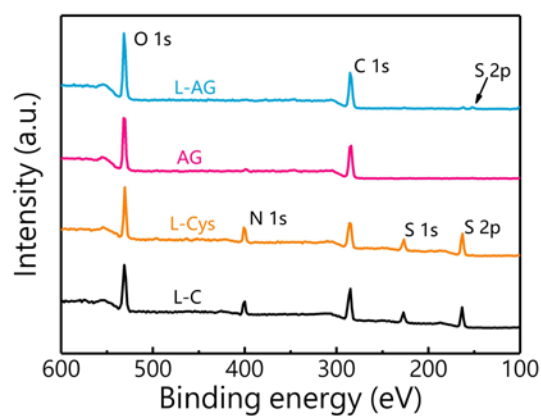


Figure S6. XPS profiles of L-AG, AG, L-Cys and L-C.

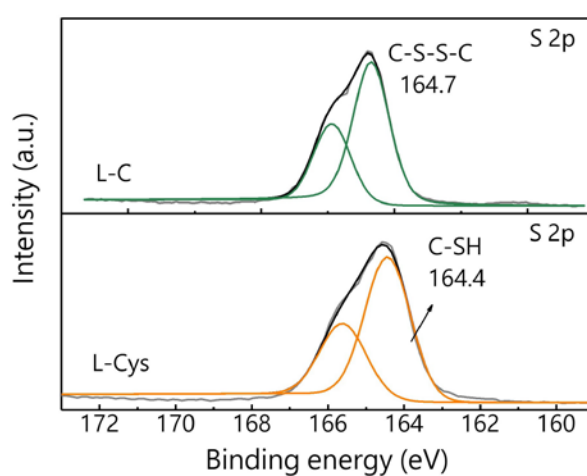


Figure S7. S 2p XPS profiles of L-Cys and L-C.

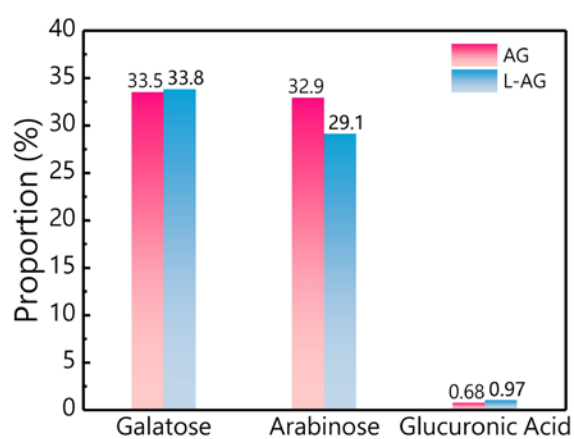


Figure S8. The monosaccharides (galactose, arabinose and glucuronic acid) compositions in AG and L-AG.

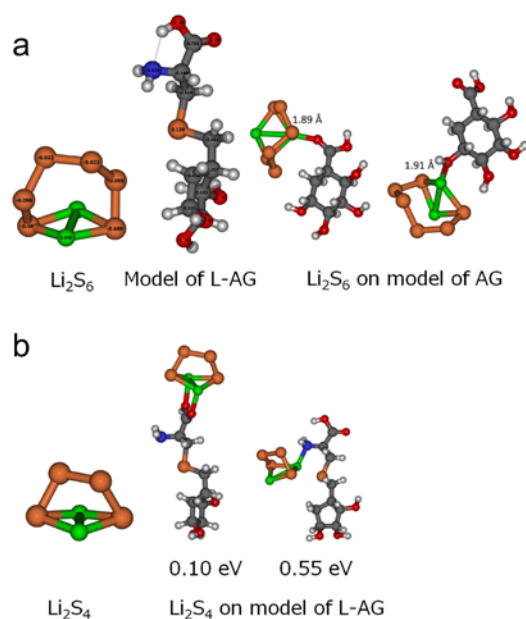


Figure S9. (a) Adsorption Geometries of L-AG/AG on Li₂S₆, the numbers indicate the natural charge for each atom. (b) Adsorption Geometries of L-AG/AG on Li₂S₄.

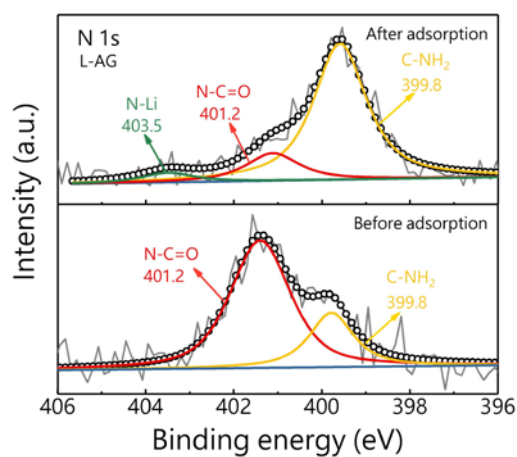


Figure S10. N 1s XPS profiles of L-AG before and after adsorption of Li₂S₆.

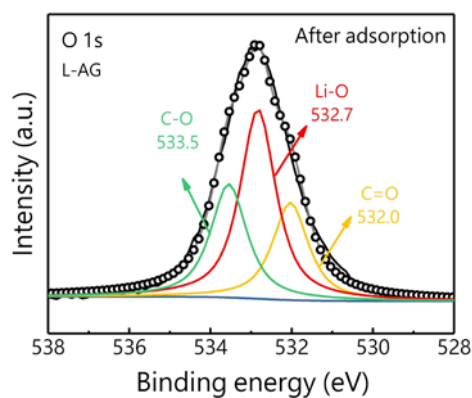


Figure S11. O 1s XPS profile of L-AG after adsorption of Li₂S₆.

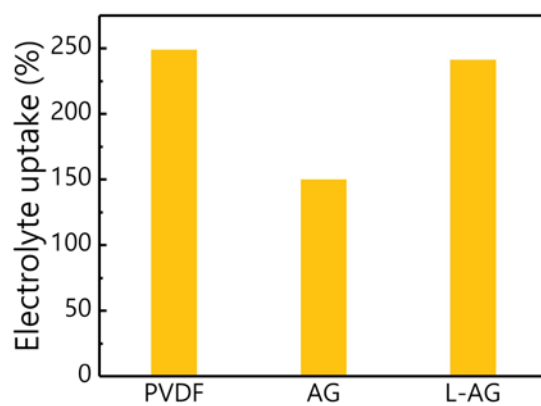


Figure S12. The electrolyte uptake ability of electrodes with PVDF, AG and L-AG binders.

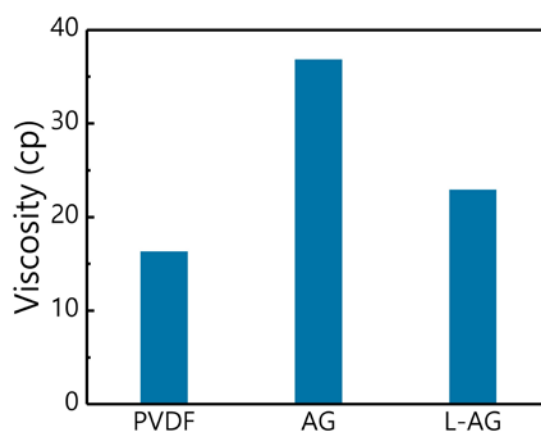


Figure S13. The viscosity of 10 wt% binder solutions.

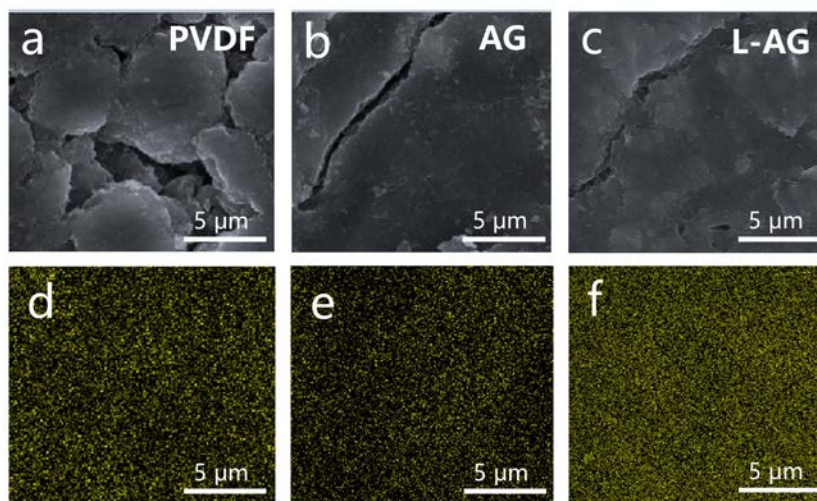


Figure S14. SEM images of electrodes after 100 cycles using (a) PVDF, (b) AG and (c) L-AG binders, and the corresponding sulfur elemental distribution mappings (d-f).

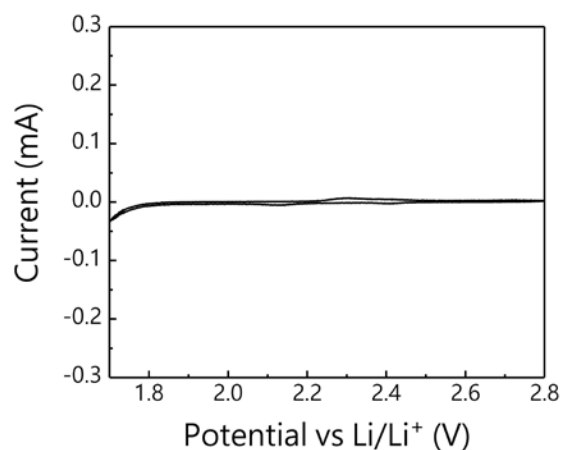


Figure S15. Cyclic voltammetry profile of L-AG in the voltage range of 1.7-2.8 V at the scan rate of 0.1 mV s^{-1} .

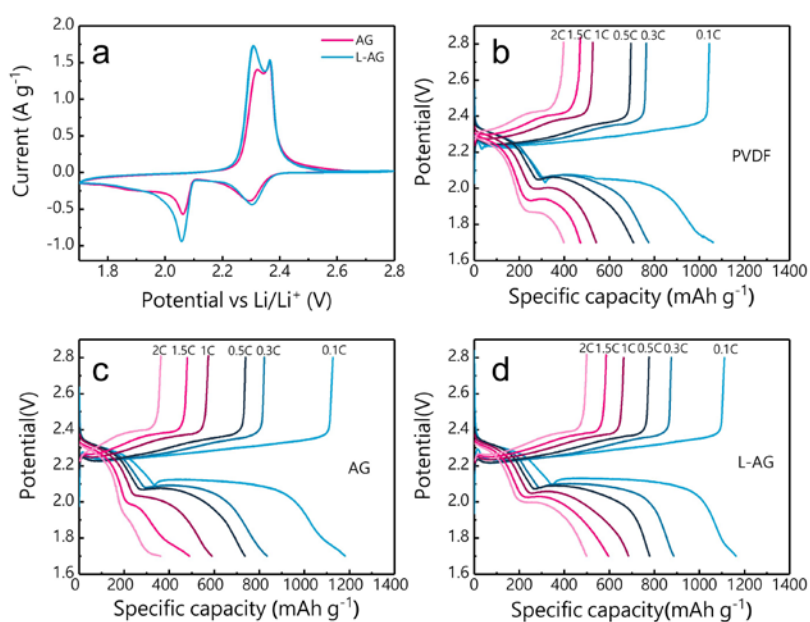


Figure S16. (a) CV profiles of electrodes with AG and L-AG binders. Charge and discharge voltage profiles of the electrodes with (b) PVDF, (c) AG and (d) L-AG binders at various rates.

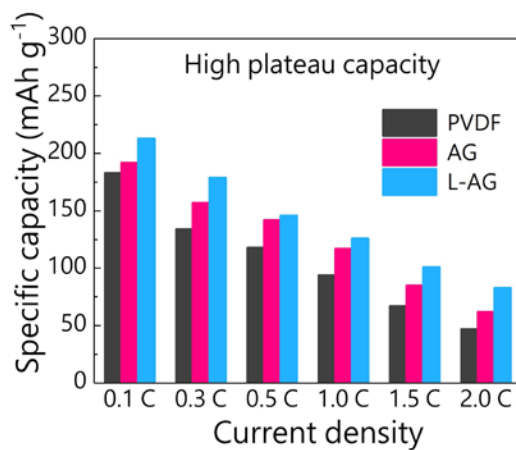


Figure S17. High plateau capacity of the electrodes with PVDF, AG and L-AG binders obtained from Figure 4a.

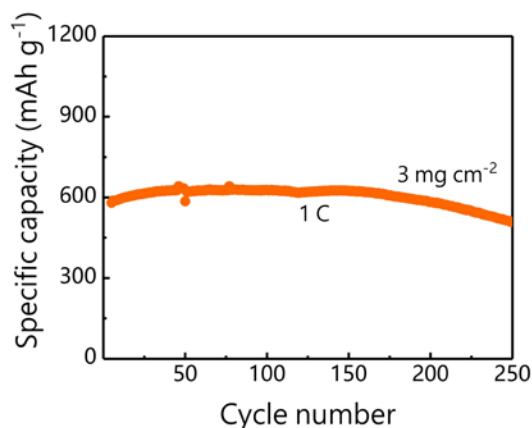


Figure S18. Cycling stability of the electrode with L-AG binder with a high sulfur loading of 3 mg cm^{-2} at 1 C.

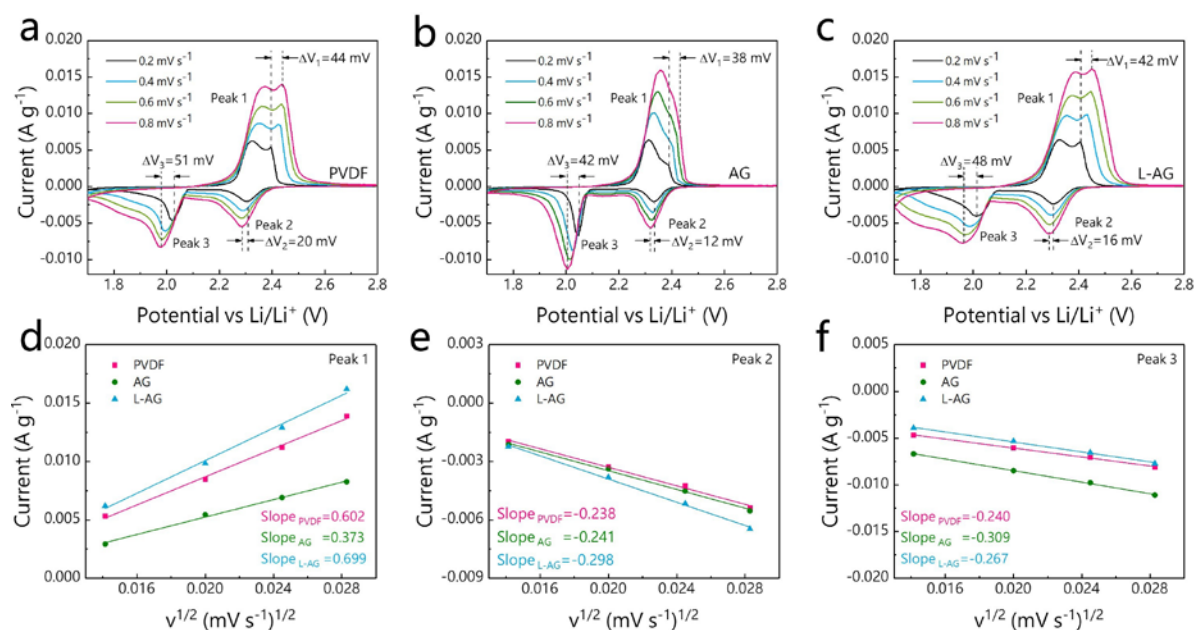


Figure S19. Cyclic voltammograms of electrodes with (a) PVDF, (b) AG and (c) L-AG binders. The relationships of the currents of (d) Peak 1, (e) Peak 2 and (f) Peak 3 versus the square root of scan rate of electrode with different binders.

Table S1. The values of each part in the fitted equivalent circuit.

Resistance (Ω)	PVDF	AG	L-AG
R₁	2.11	1.97	2.51
R₂	38.38	28.86	18.06
W₁	0.12	7.17	0.19