Synergistic effect between PPy:PSS copolymers and biomass-derived activated carbons: A simple strategy for designing sustainable high–performance Li–S batteries

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Supplementary Information

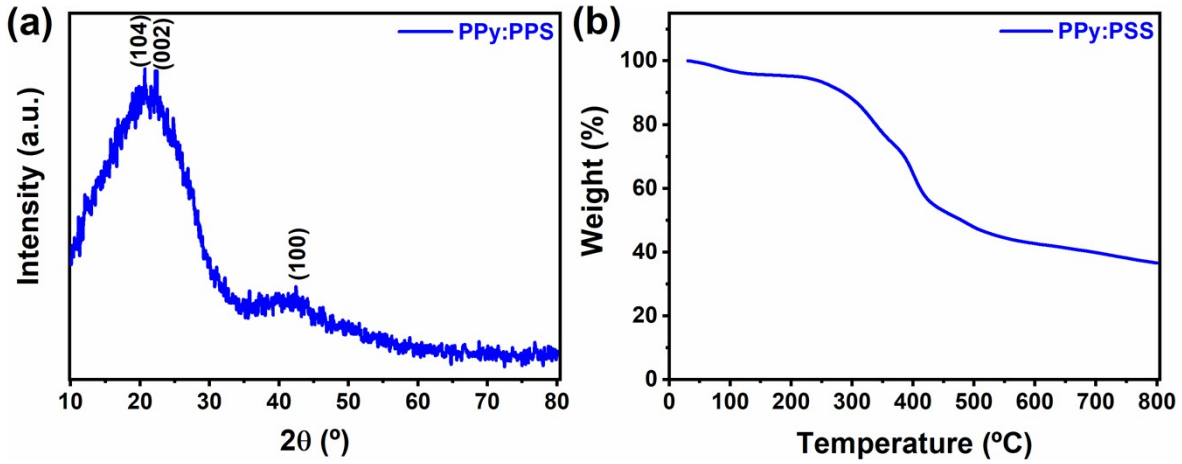

Figure S1. (a) XRD pattern. (b) TGA curve recorded in N_2 of PPy:PSS copolymer.

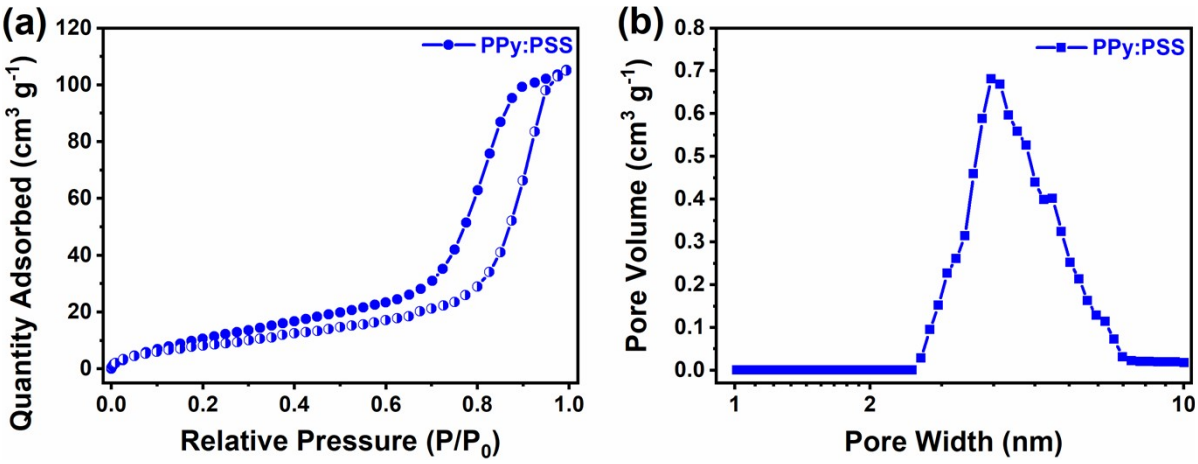

Figure S2. (a) N_2 adsorption/desorption isotherm. (b) Pore size distribution of PPy:PSS copolymer.

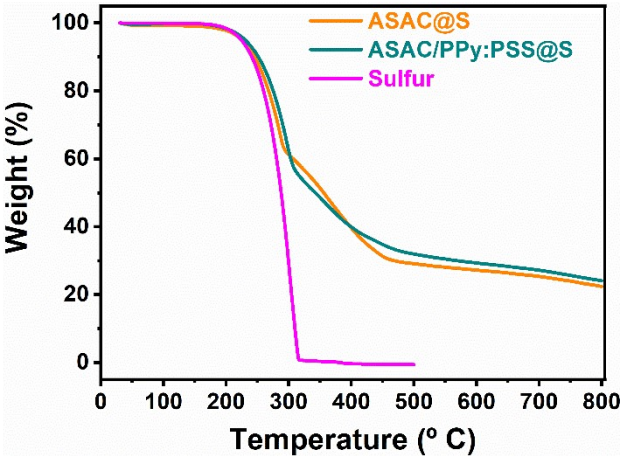

Figure S3. TGA curves recorded under N_2 of pure S and ASAC@S and ASAC/PPy:PSS@S composites.

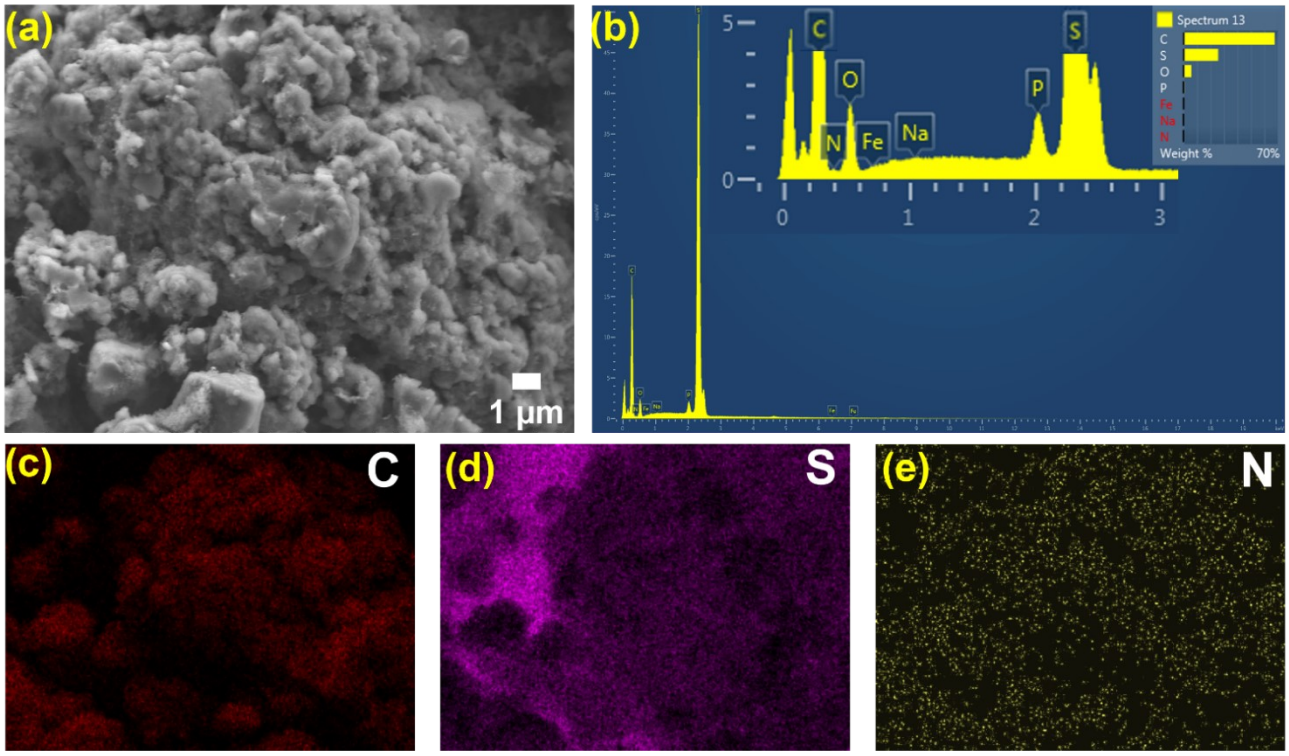

Figure S4. (a) SEM image. (b) EDX spectrum. In the insert, the plot scale is enlarged.

. (c) C, (d) S, and (e) N elemental mappings of ASAC/PPy:PSS@S composite.

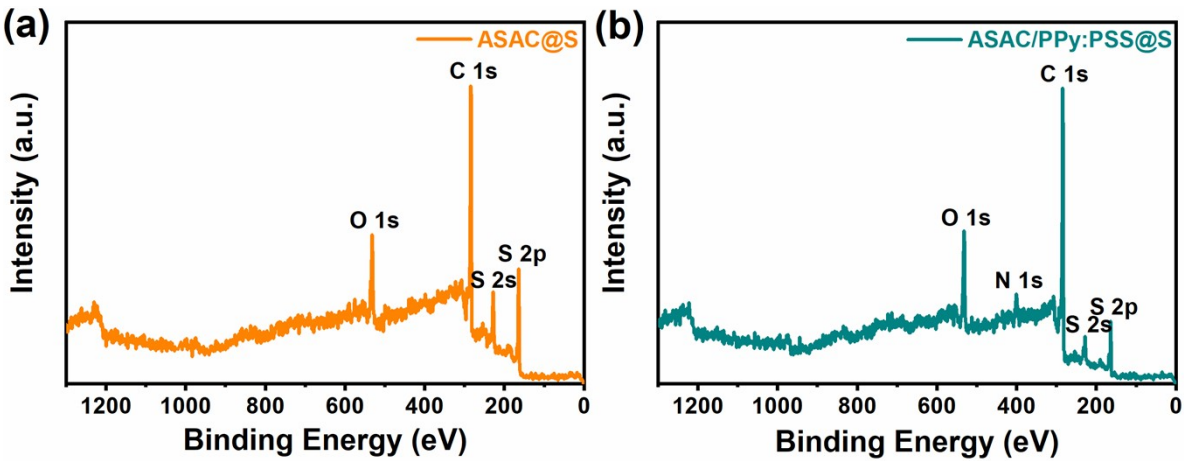

Figure S5. XPS survey spectra of (a) ASAC@S and (b) ASAC/PPy:PSS@S composites.

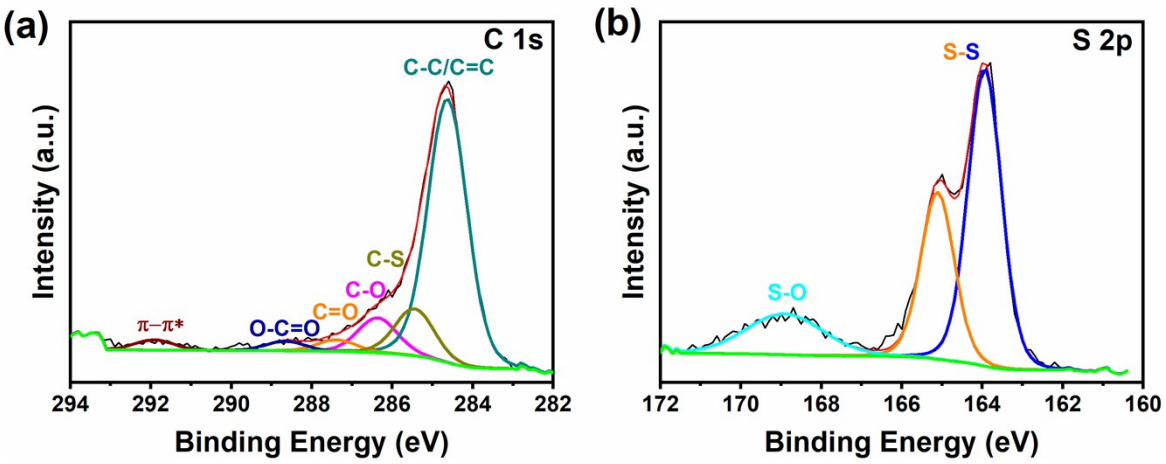

Figure S6. XPS spectra of (a) C 1s, (b) S 2p for the ASAC@S composite.

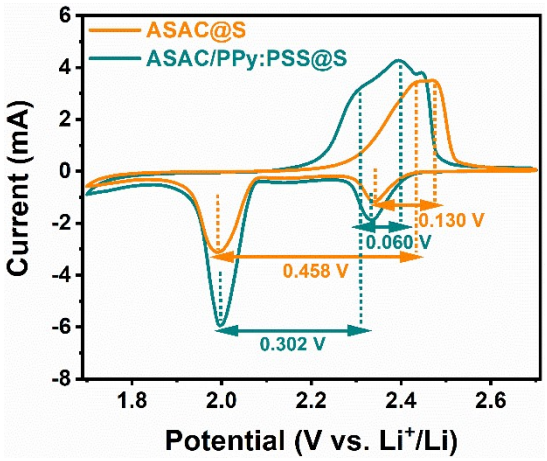

Figure S7. Polarization values (ΔE) between the cathode and anode peaks of the composite electrodes.

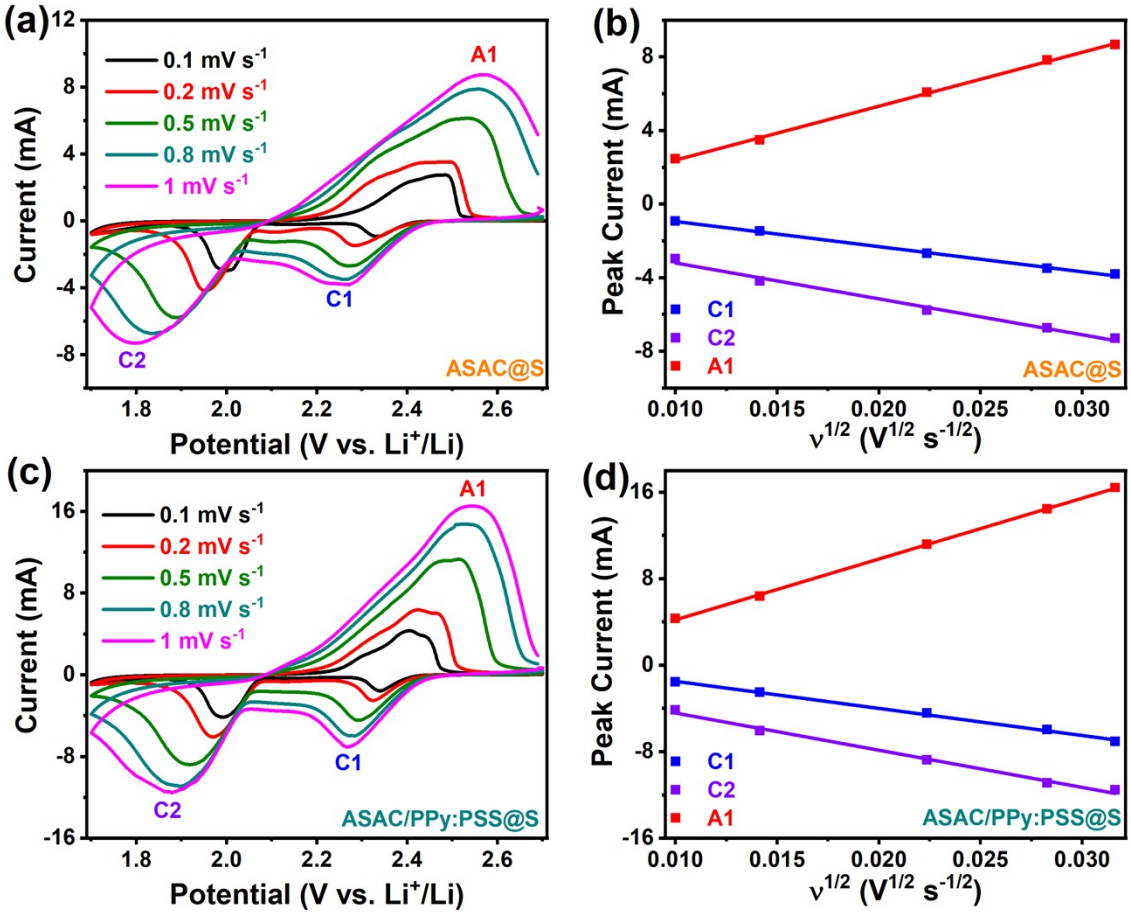

Figure S8. (a), (c) CV curves of the composite electrodes at various scan rates from 0.1 to 1 mV s^{-1}. (b), (d) The corresponding fitted plots of the Randles–Sevcik equation applied to the cathode and anode peaks.

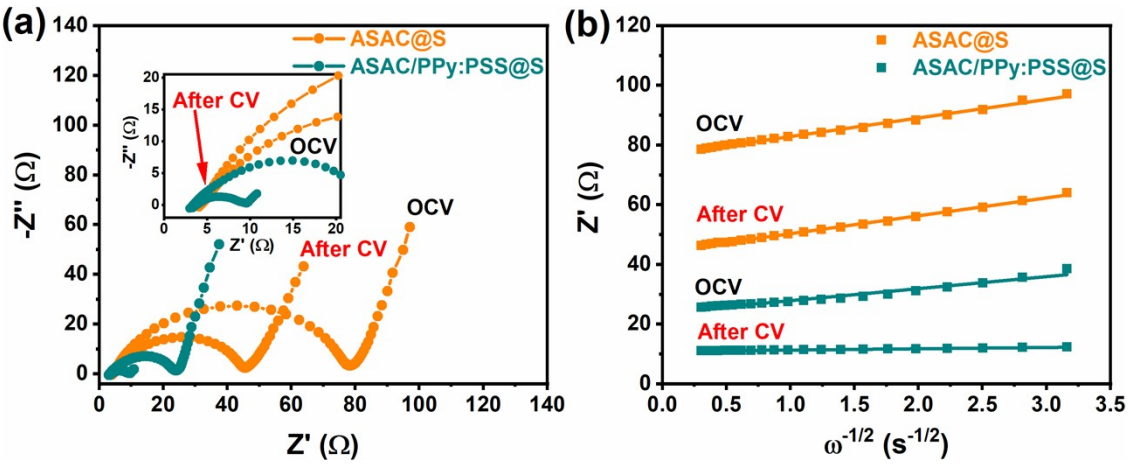

Figure S9. (a) EIS spectra of the composite electrodes recorded in a frequency range from 0.1 Hz to 500 kHz at OCV and after CV recorded at a potential scanning rate of 0.1 mV s^{-1}. In the insert, the plot scale is enlarged. (b) The corresponding fitted plot of the real part Z′ of the impedance as a function of the inverse square root of angular frequency range from 0.316 to 3.16 $s^{-1/2}$ (frequency range from 10 to 0.1 Hz) for the electrode composites.

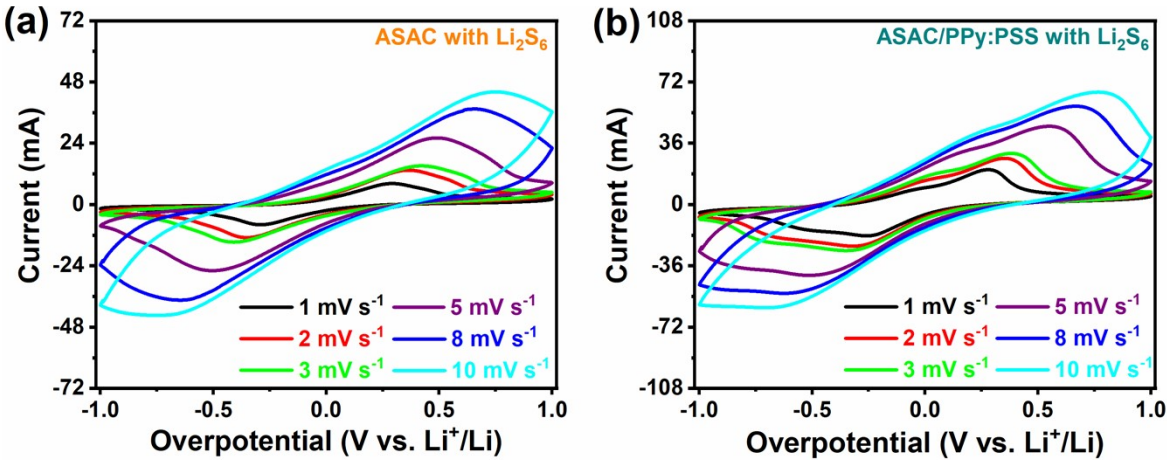

Figure S10. Polarization curves of symmetric cells with Li_2S_6 of: (a) ASAC. (b) ASAC/PPy:PSS free−sulfur matrix electrodes. The curves were recorded at scan rate from 1 to 10 mV s^{-1}.

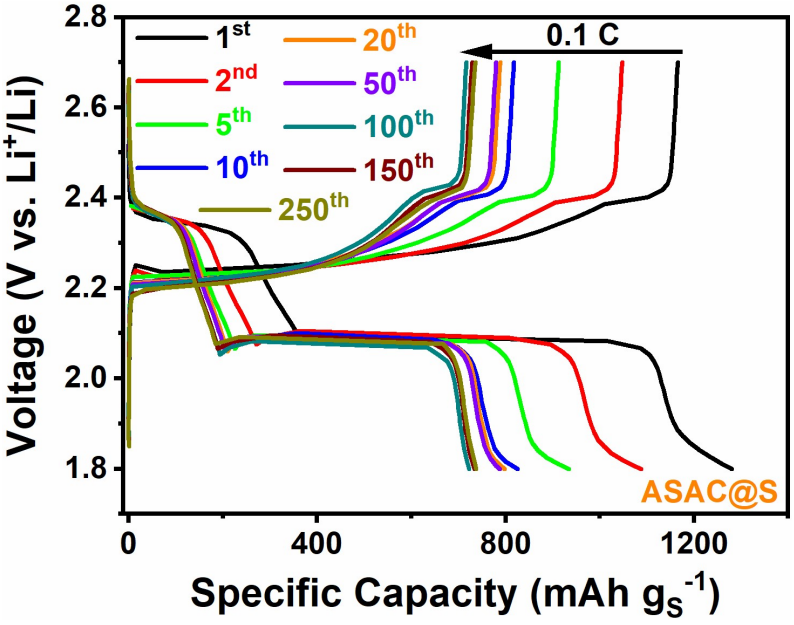

Figure S11. Discharge–charge profiles of the ASAC@S electrode at 0.1C. Electrode sulfur loading: 2.0 mg cm^{-2}.

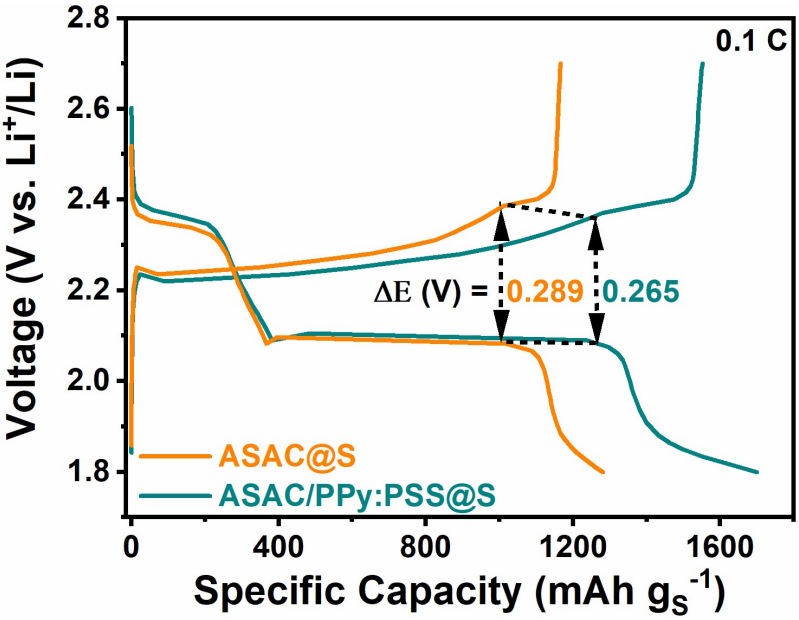

Figure S12. Polarization values (ΔE) between the discharge and charge curves of the electrodes recorded at 0.1C. Electrode sulfur loading: 2.0 mg cm^{-2}.

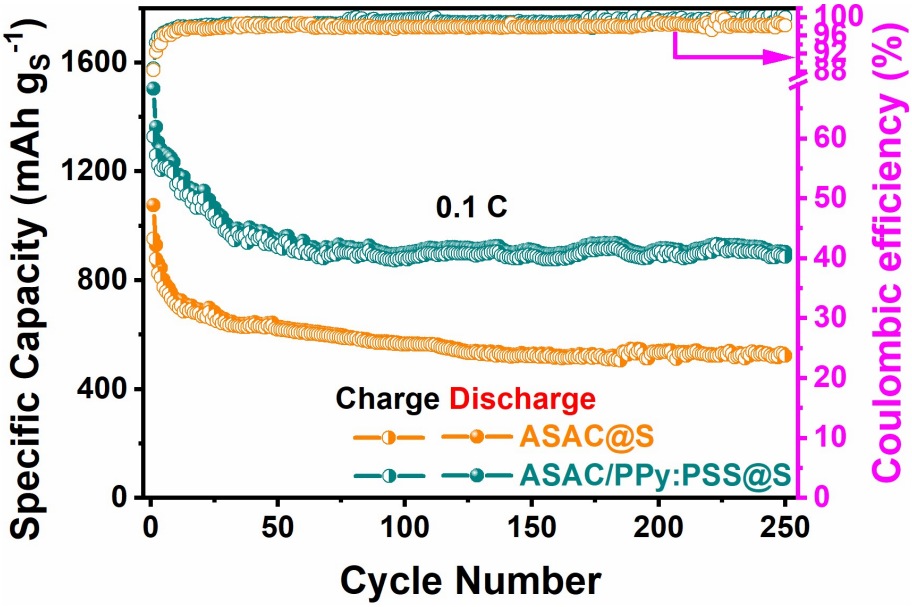

Figure S13. Variation of the discharge capacity as a function of the cycle number at 0.1 C with a sulfur loading of 6 mg cm^{-2} for the composite electrodes. Electrode sulfur loading: 6.0 mg cm^{-2}.

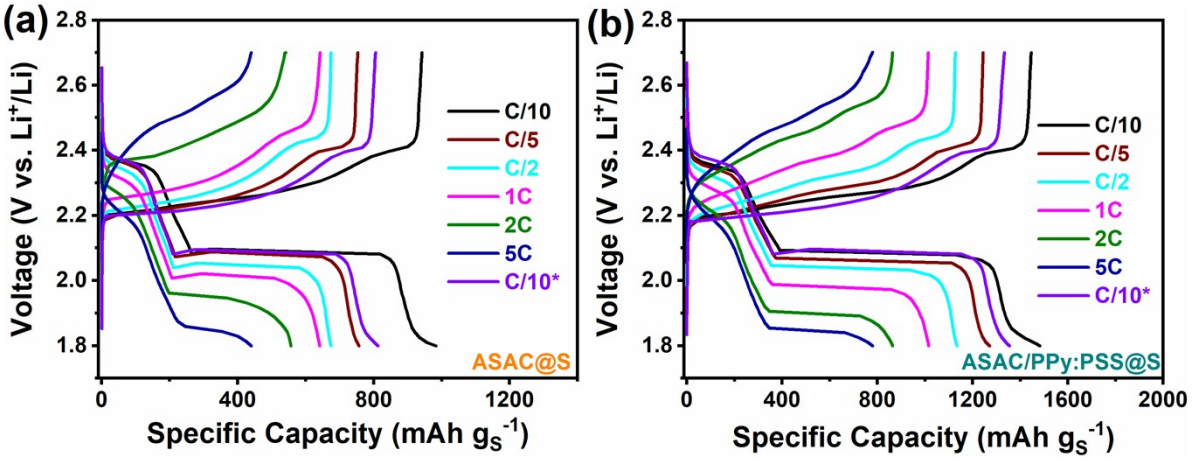

Figure S14. Discharge-charge profiles recorded at different current rates. (a) ASAC@S and (b) ASAC/PPy:PPS@S electrodes. Electrode sulfur loading: 2.0 mg cm^{-2}.

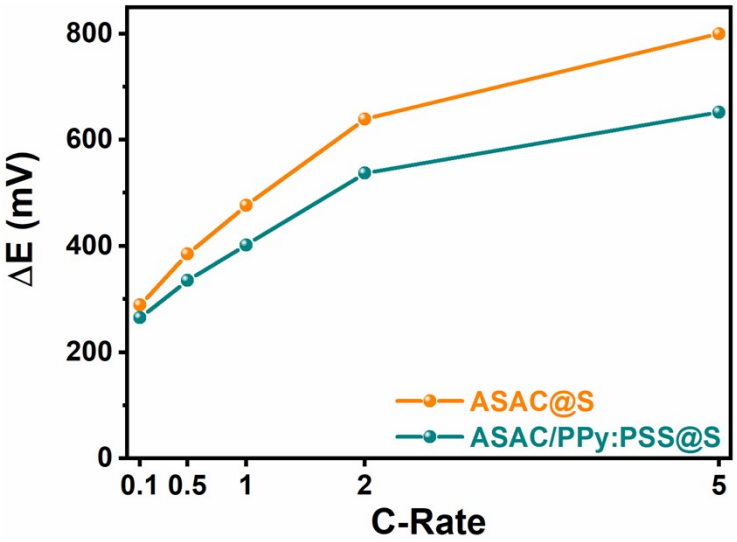

Figure S15. Variation of the polarization (ΔE) between the discharge and charge curves as a function of the current rates (values obtained from rate capability curves). Electrode sulfur loading: 2.0 mg cm^{-2}.

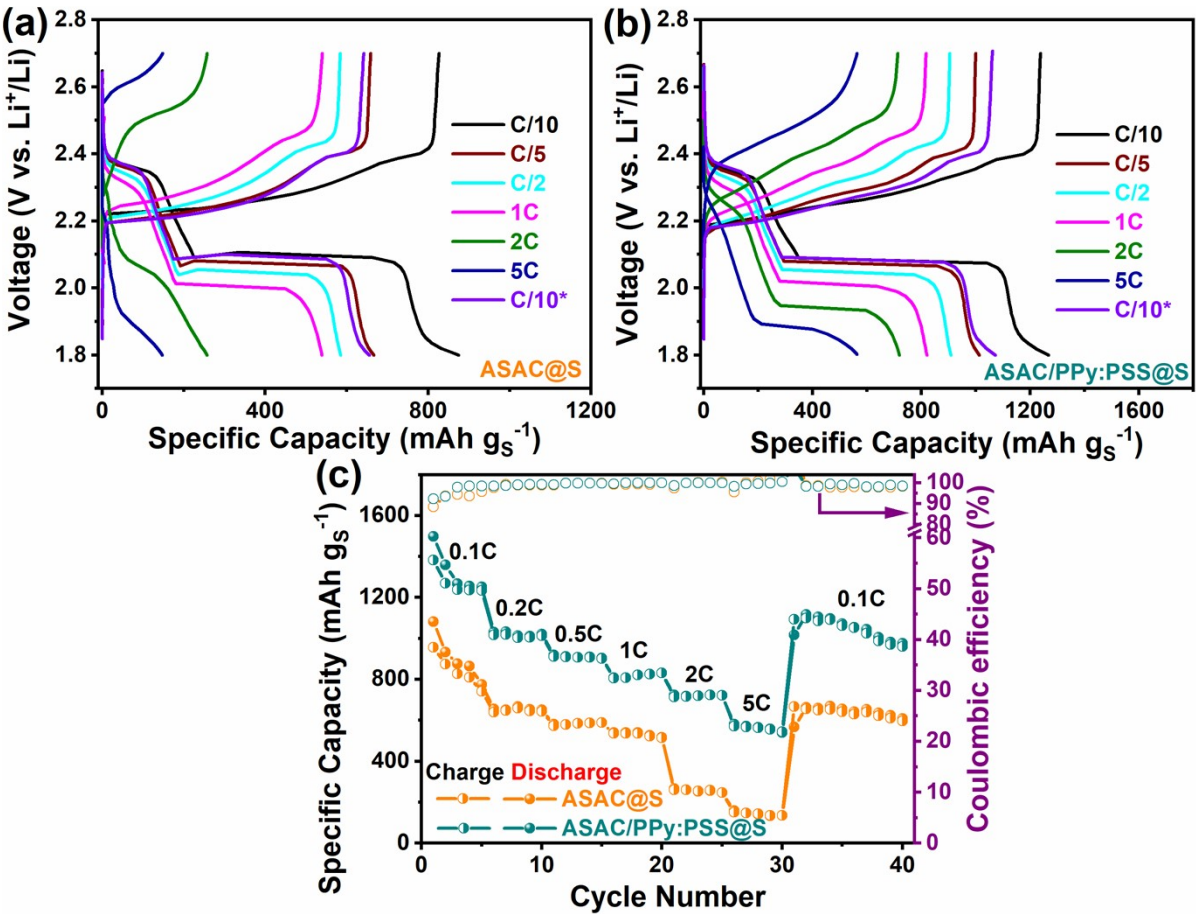

Figure S16. Rate capability data at different current rates for ASAC@S and ASAC/PPy:PSS@S composite electrodes with a sulfur loading of 6 mg cm^{-2}. Electrode sulfur loading: 6.0 mg cm^{-2}.

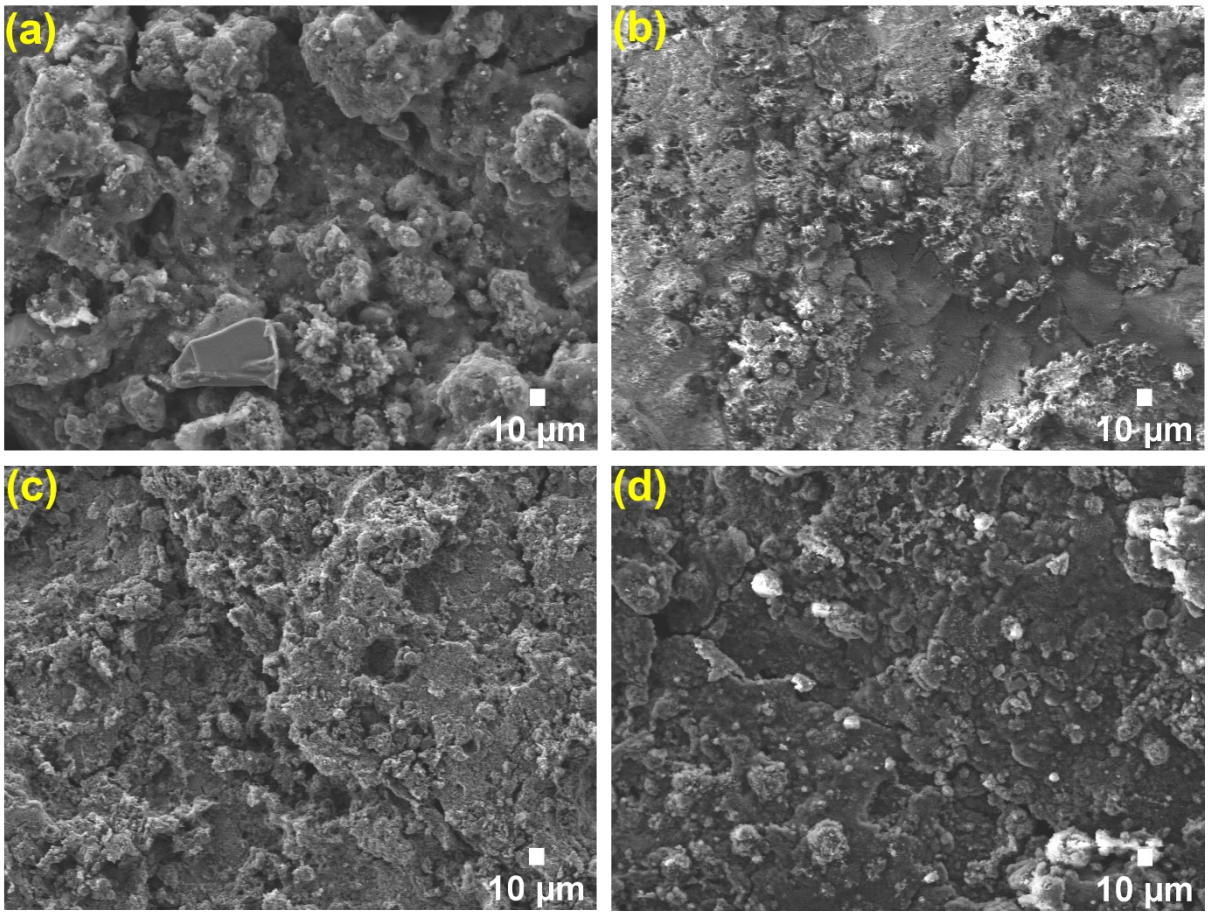

Figure S17. SEM images of electrodes: (a) ASAC@S uncycled, (b) ASAC@S cycled, (c) ASAC/PPy:PSS@S uncycled, and (d) ASAC/PPy:PSS@S cycled.