Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Supplementary Information

Sulfurized Polyacrylonitrile Cathodes with electrochemical and structural tuning for high capacity all-solid-state lithium-sulfur batteries

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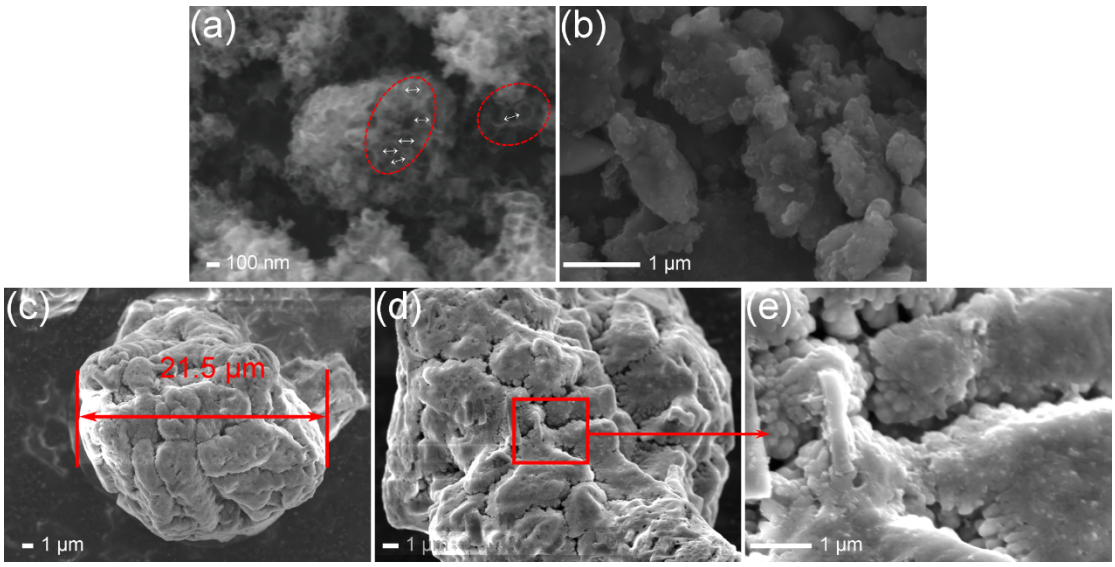

Figure S1 SEM images of (a) MaPC and (b) PAN@MaPC; (c)(d)(e) SEM images of LPSC at different magnifications

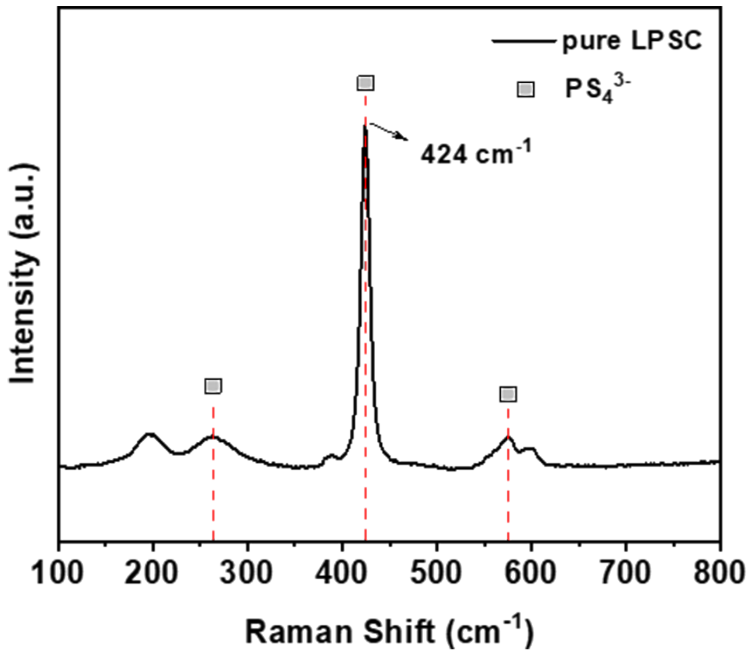

Figure S2 Raman spectra of the pure LPSC powders in range of 100 - 800 cm^{-1}

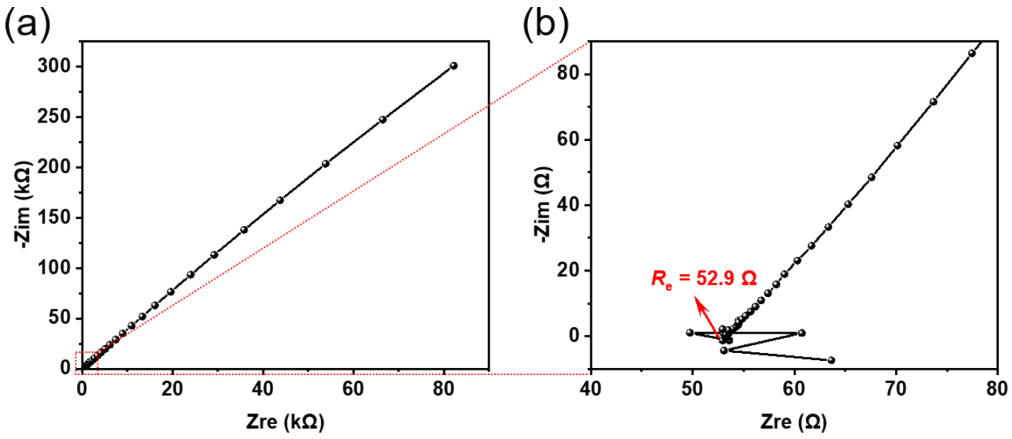

Figure S3 EIS of the symmetric cell steel|LPSC-SE|steel at room temperature

The lithium ion conductivity at room temperature is calculated as 3.85×10^{-3} S cm^{-1} according to the equation $\sigma = \frac{d}{R_e S}$, where the σ (S cm^{-1}) denotes the lithium ion conductivity; d (cm) is the thickness of the electrolyte; S (cm^2) is the effective area of the electrode; R_e (Ω) equals the bulk resistance of the electrolyte. In this work, the values of the d, R_e and S are 0.16 cm, 52.9 Ω, and 0.785 cm^{-2}, respectively.

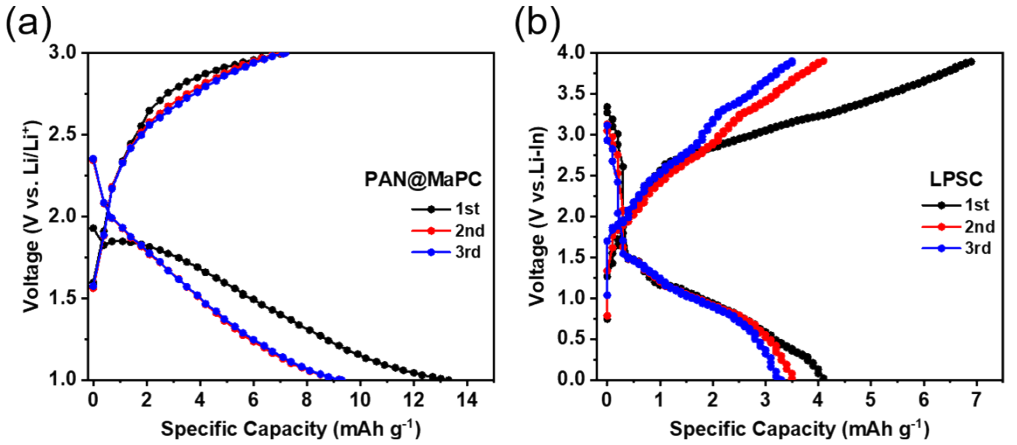

Figure S4 Charge/discharge curves of the (a) PAN@MaPC-ca|LPSC-SE|Li and (b) LPSC|LPSC-SE|Li

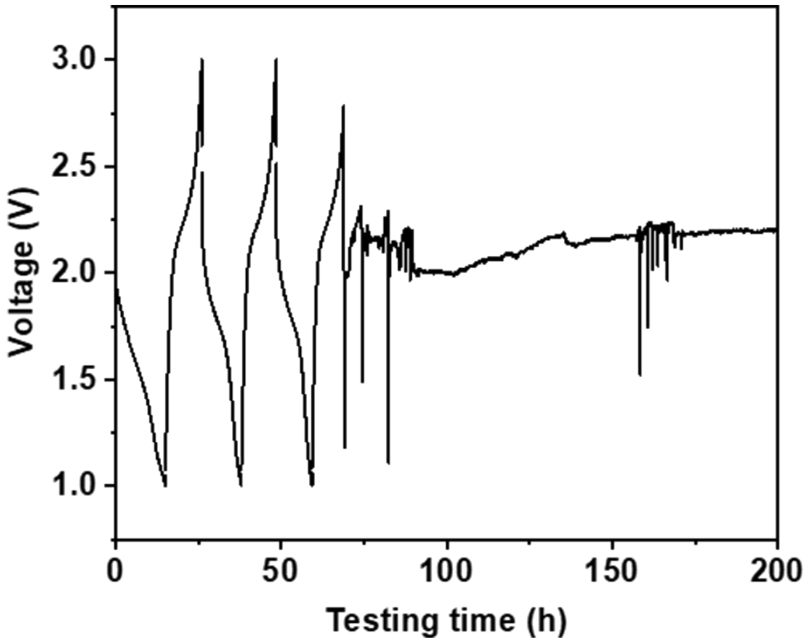

Figure S5 Charge/discharge curves of the ASSLSB using Li metal as the anode at 0.1C at room temperature

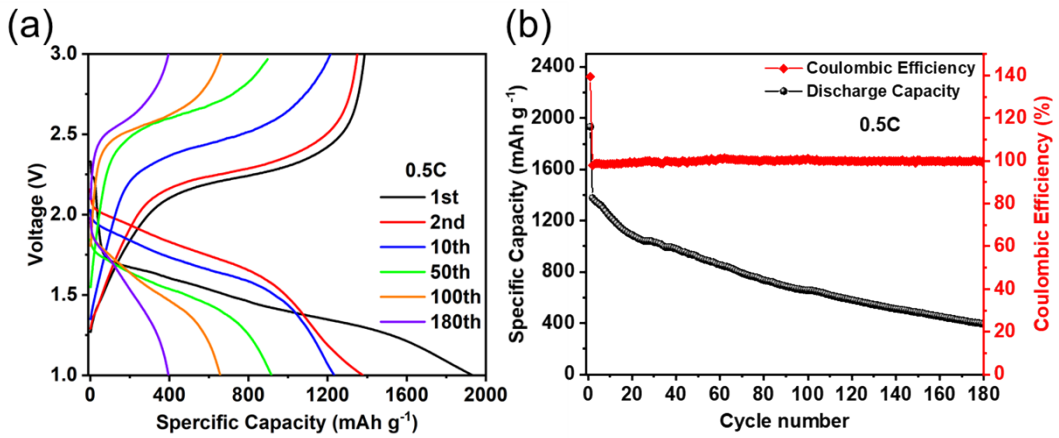

Figure S6 (a) Charge/discharge curves and (b) cycling performance of SPAN@MaPC in the liquid cell (SPAN@MaPC|Liquid Electrolyte|Li) at 0.5C at room temperature

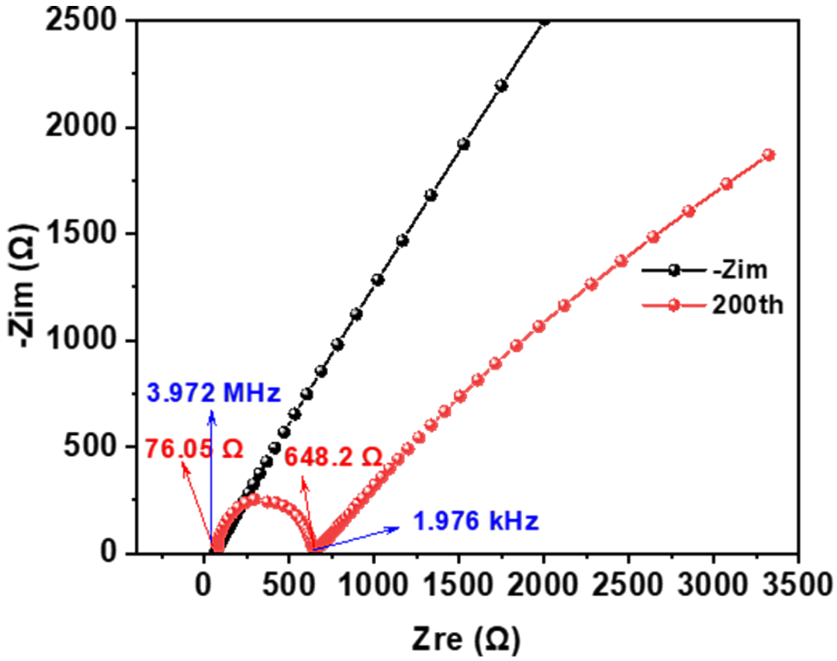

Figure S7 EIS of the SPAN@MaPC based ASSLSBs (SPAN@MaPC-ca|LPSC-SE|In-Li) before and after cycling with pure sulfur loading of 1 mg cm^{-2}

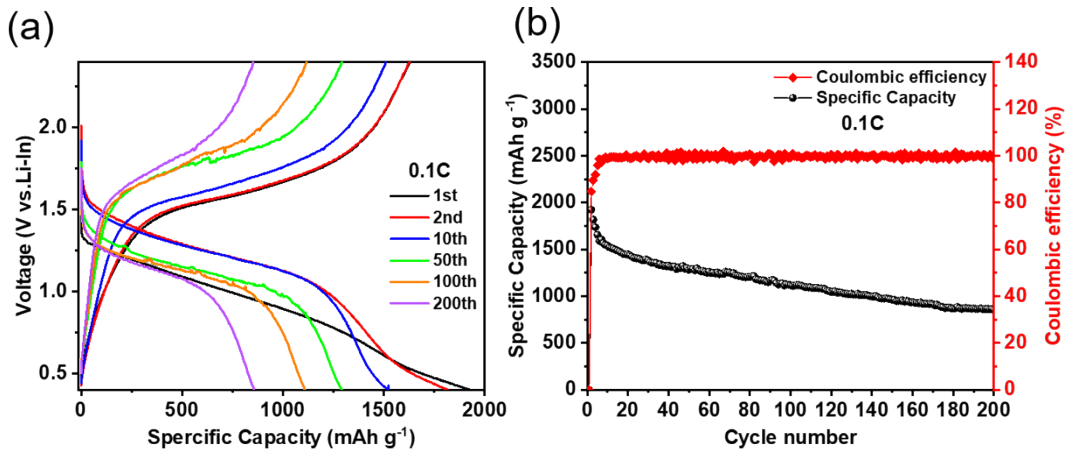

Figure S8 (a) charge/discharge and (b) cycling performance of the SPAN@MaPC based ASSLSBs (SPAN@MaPC-ca|LPSC-SE|Li-In) with sulfur loading of 0.6 mg cm^{-2} at 0.1C at room temperature

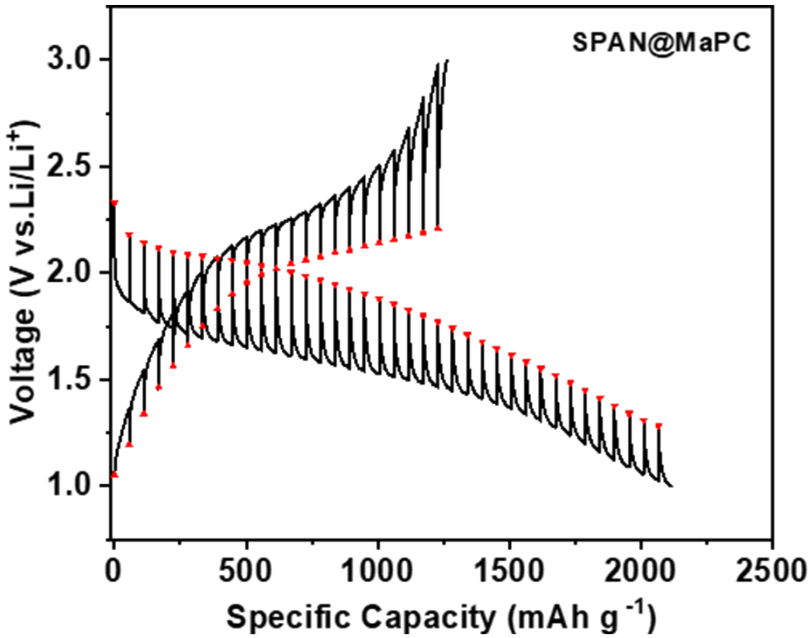

Figure S9 GITT charge/discharge curve of SPAN@MaPC based ASSLSBs (SPAN@MaPC-ca|LPSC-SE|Li)

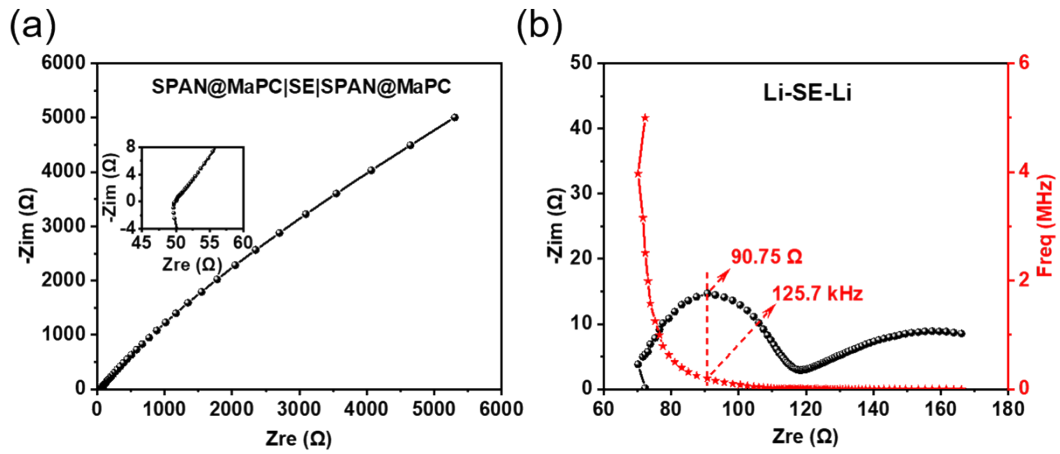

Figure S10 EIS of the (a) SPAN@MaPC-ca|LPSC-SE|SPAN@MaPC-ca and (b) Li|LPSC-SE|Li symmetrical cells

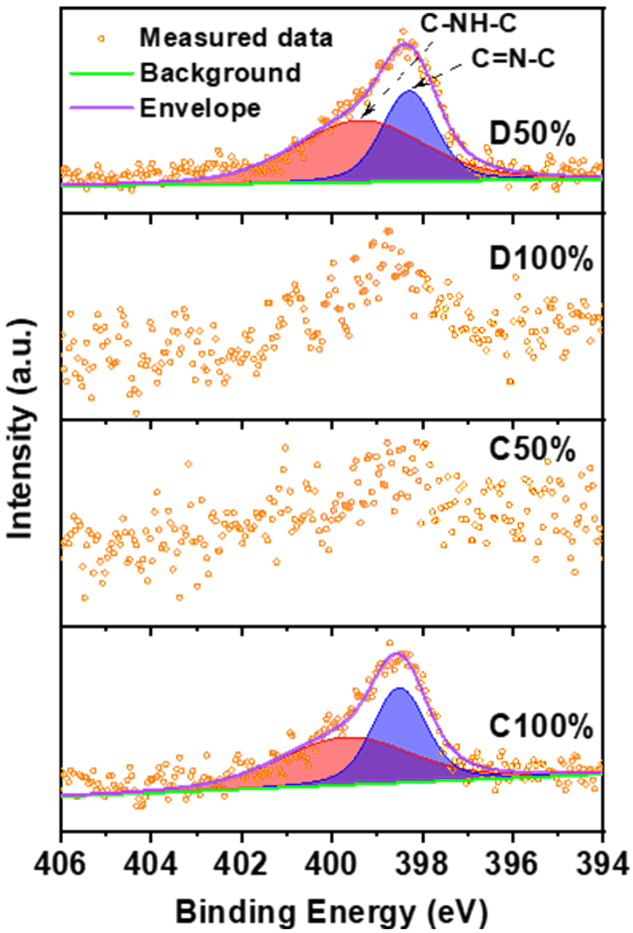

Figure S11 N 1s spectra for the SPAN@MaPC cathode in the ASSLSBs (PAN@MaPC-ca|LPSC-SE|Li) at various states of charge in the first cycle