

Self-healing High-performance Phosphorus Composite Anode Enabled by in-situ Preformed Intermediate Lithium Sulfides

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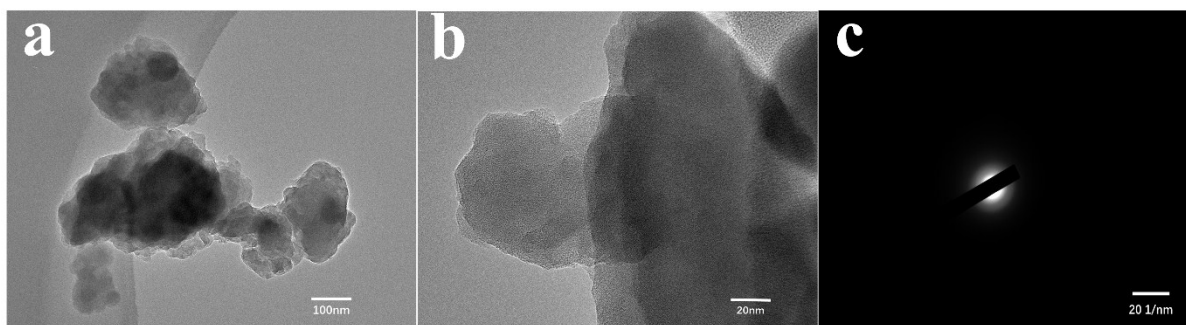


Fig. S1 (a) and (b) TEM images of PS/C composite; (c) SAED pattern of PS/C composite.

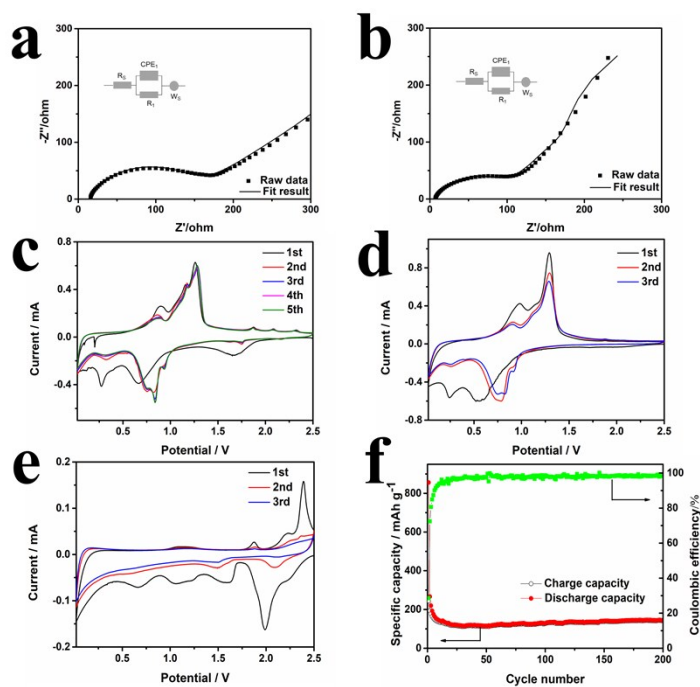


Fig. S2 (a) Nyquist plot of P electrode measured before cycling with selected equivalent circuit (inset), and (b) Nyquist plot of the PS electrode with selected equivalent circuit (inset); (c) Cyclic voltammetry

curves of PS/C composite from the 1st to the 5th cycle at a scan rate of 0.1 mV s^{-1} ; (d) Cyclic voltammetry curves of P electrode from the 1st to the 2nd cycle at a scan rate of 0.1 mV s^{-1} ; (e) Cyclic voltammetry curves of S composite from the 1st to the 3rd cycle at a scan rate of 0.1 mV s^{-1} ; (f) Cycling performance and the corresponding Coulombic efficiency of S with the potential window of between 0.02 V and 2.5 V (vs. Li^+/Li) at the current density of 200 mA g^{-1} for 200 cycles.

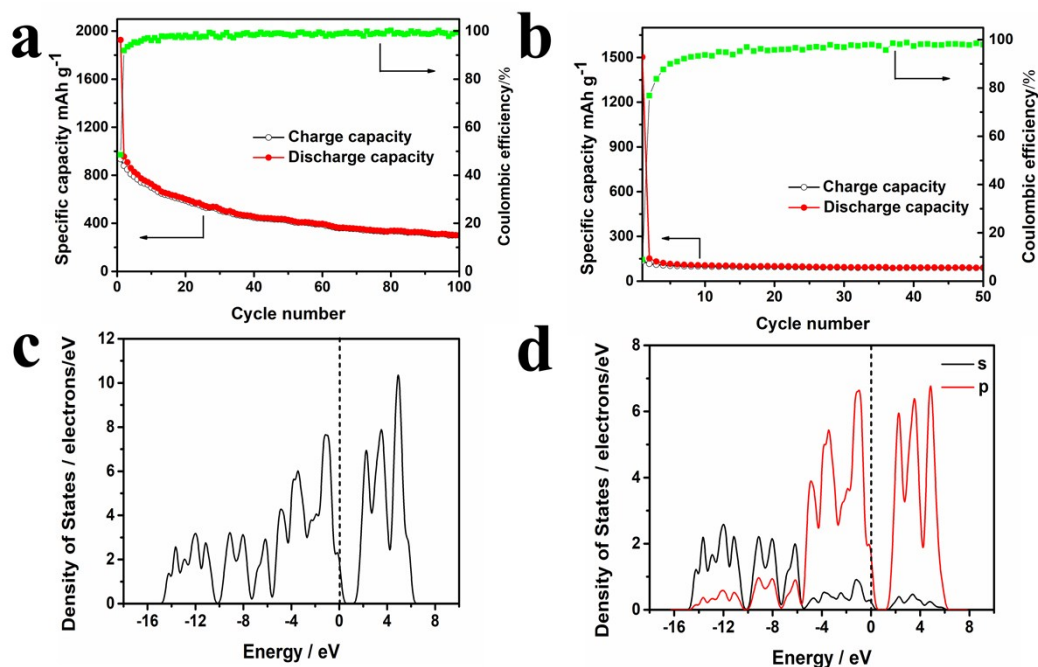


Fig. S3 (a) Cycling performance and the corresponding Coulombic efficiency of PS/C with the potential window of between 0.02 V and 1.6 V (vs. Li^+/Li) at the current density of 200 mA g^{-1} for 100 cycles; (b) Cycling performance and the corresponding Coulombic efficiency of S with the potential window of between 0.02 V and 1.6 V (vs. Li^+/Li) at the current density of 200 mA g^{-1} for 50 cycles; (c) The total DOS of P; (d) The PDOS of P.

Table S1 Results of EIS, σ and D in P, PS, PS/C

Active Material	R_s [Ω]	R_1 [Ω]	W [Ω]	σ [$S\ cm^{-1}$]	D [$cm^2\ s^{-1}$]
PS/C	2.00	84.72	537.5	2.41×10^{-6}	4.2×10^{-12}
PS	6.54	85.73	535.5	2.39×10^{-6}	6.2×10^{-12}
P	13.52	124.90	842.0	1.53×10^{-6}	