Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.

Supporting Information

Amorphous niobium polysulfide based nanocomposite enables ultrastable all-solid-state lithium batteries

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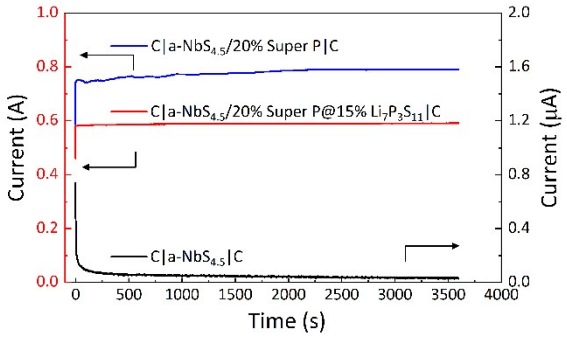

Figure S1. Direct current polarization curves of the C|a-$NbS_{4.5}$|C, C|a-$NbS_{4.5}$/20% Super P|C and C|a-$NbS_{4.5}$/20% Super P@$Li_7P_3S_{11}$|C.

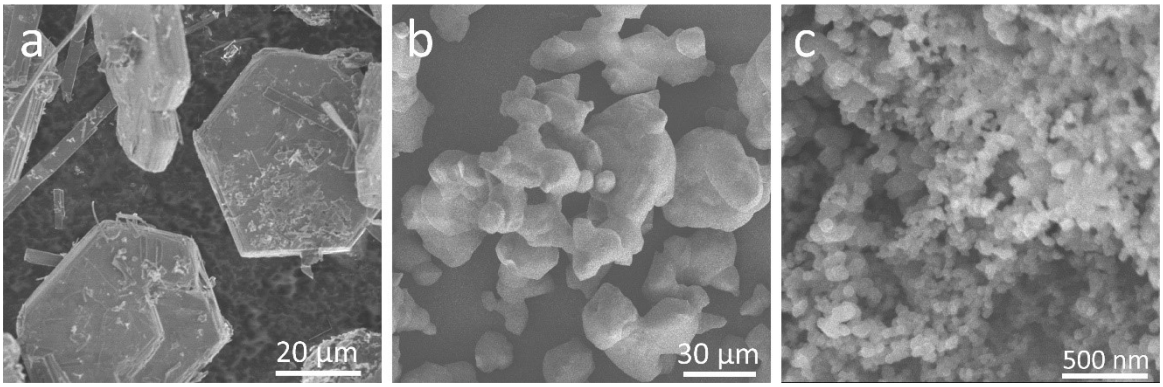

Figure S2. SEM images of (a) NbS_2, (b) S_8 and (c) Super P.

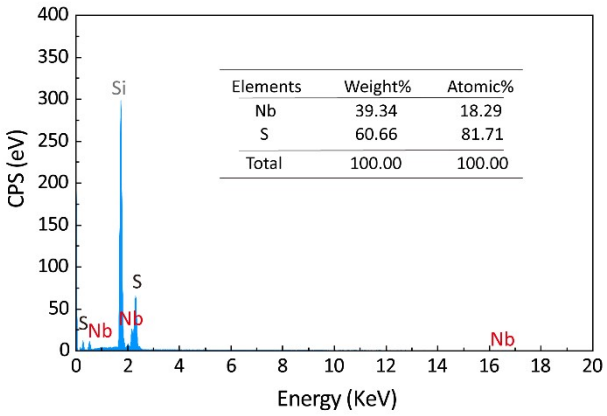

Figure S3. SEM-EDS analysis of a-$NbS_{4.5}$. The inset is the element composition results.

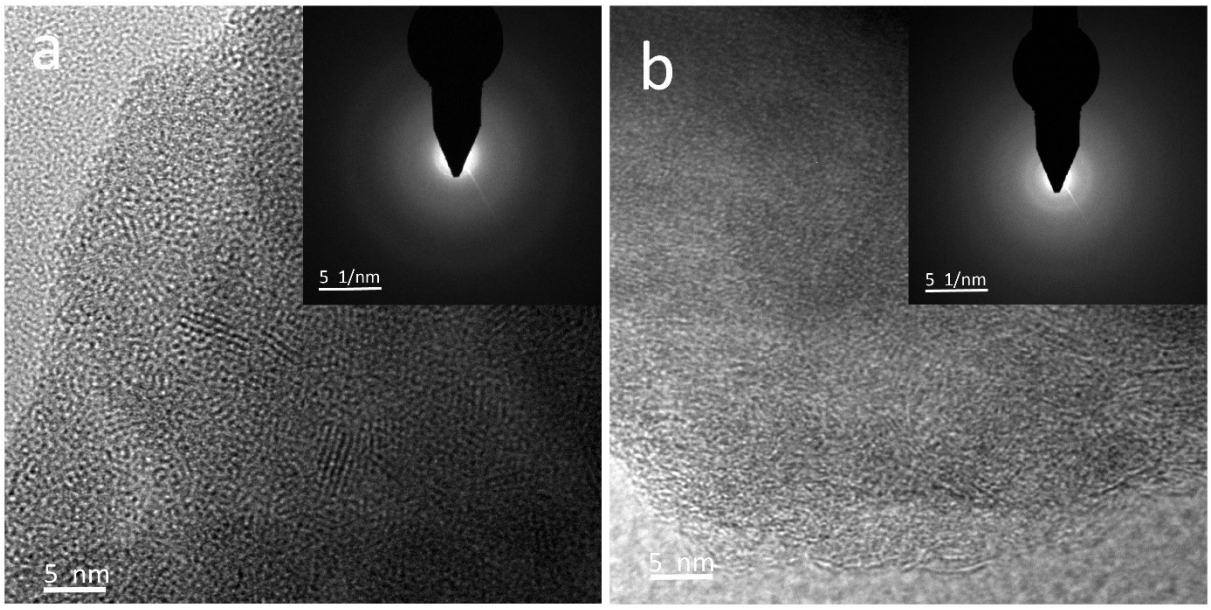

Figure S4. HRTEM image and SAED pattern of (a) a-$NbS_{4.5}$, (b) a- $NbS_{4.5}$/20% Super P sample.

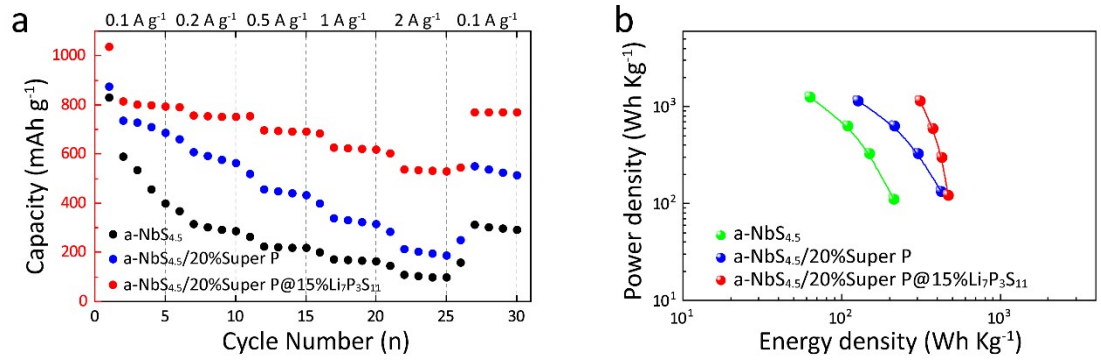

Figure S5. (a) Rate performances of a-$NbS_{4.5}$, a-$NbS_{4.5}$/20%Super P and a-$NbS_{4.5}$/20%Super P@15%$Li_7P_3S_{11}$ cathodes at the current densities from 0.1 to 2 A g^{-1}. (b) Ragone plots. The plots were derived from the discharge curves in Figure 4a-c.

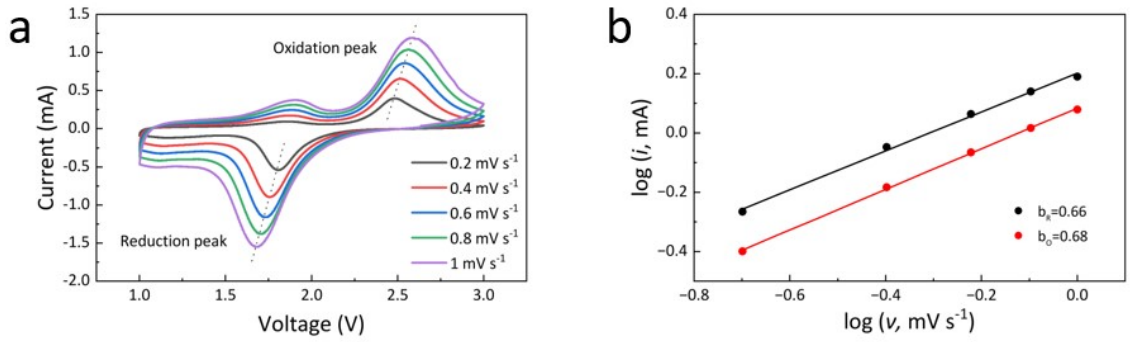

Figure S6. (a) CV curves of the cells using a-$NbS_{4.5}$/20%Super P@15%$Li_7P_3S_{11}$ cathode at different scan rates for the second cycle. (b) The fitted lines and log (peak current) vs. log (scan rate) plots at main oxidation and reduction peaks.

Table S1. The fitted results of batteries after the 1st and 40th cycle.

sample	after 1st cycle		after 40th cycle	
	R_e (Ω)	R_{ct} (Ω)	R_e (Ω)	R_{ct} (Ω)
a-$NbS_{4.5}$	72.0	60.1	578.5	236.4
a-$NbS_{4.5}$/20%Super P	69.5	/	410.8	101.6
a-$NbS_{4.5}$/20%Super P@15%$Li_7P_3S_{11}$	62.5	/	155.9	11.5