

## Supporting information for

Triggering High Conductive  $\text{FePSe}_3$  with Cu-based  
Coordination towards All-climate Ultrafast Sodium Ions Storage

## Figures and Captions

**Fig.S1** TG curves of the as-resulted samples about FP (a), FPS-1 (b) and FPS-2 (c)

**Fig.S2** The analysis of elements valence: Full XPS spectra of FP (a) and FPS-1 (d), Fe2p HR-XPS of FP (b) and FPS-1 (e), P2p HR-XPS of FP (c)

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**Fig.S10** Nyquist Plots at various cycles and the relative linear of  $\omega^{-1/2}$  with  $Z''$  for, CA-FPS-2 (A1, A2) at RT, CA-FPS-2 (B1, B2) at LT

**Fig.S11** The models of coordination with different contents before optimization and after optimization about Cu/DEGDME 1/1 (A1, A2), 1/2 (B1, B2), 1/3 (C1, C2) and 1/4 (D1, D2)

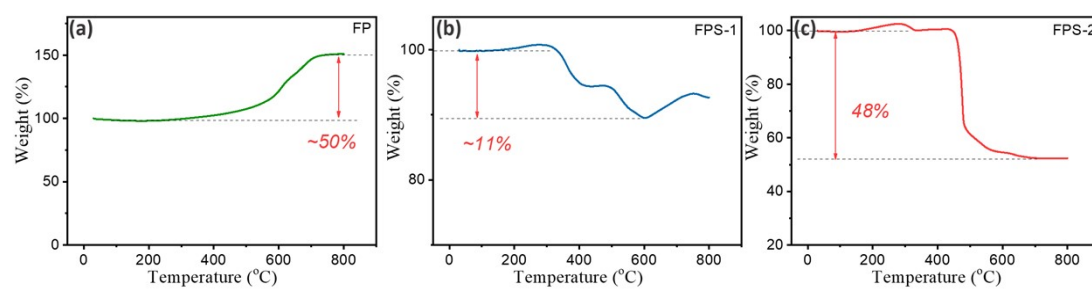
**Fig.S12** SEM images of active materials, and relative Cu foils after 2000 cycles for FP (A1-A2), FPS-1 (B1-B2)

**Fig.S13** Mapping images of FPS-2 after 2000 cycles

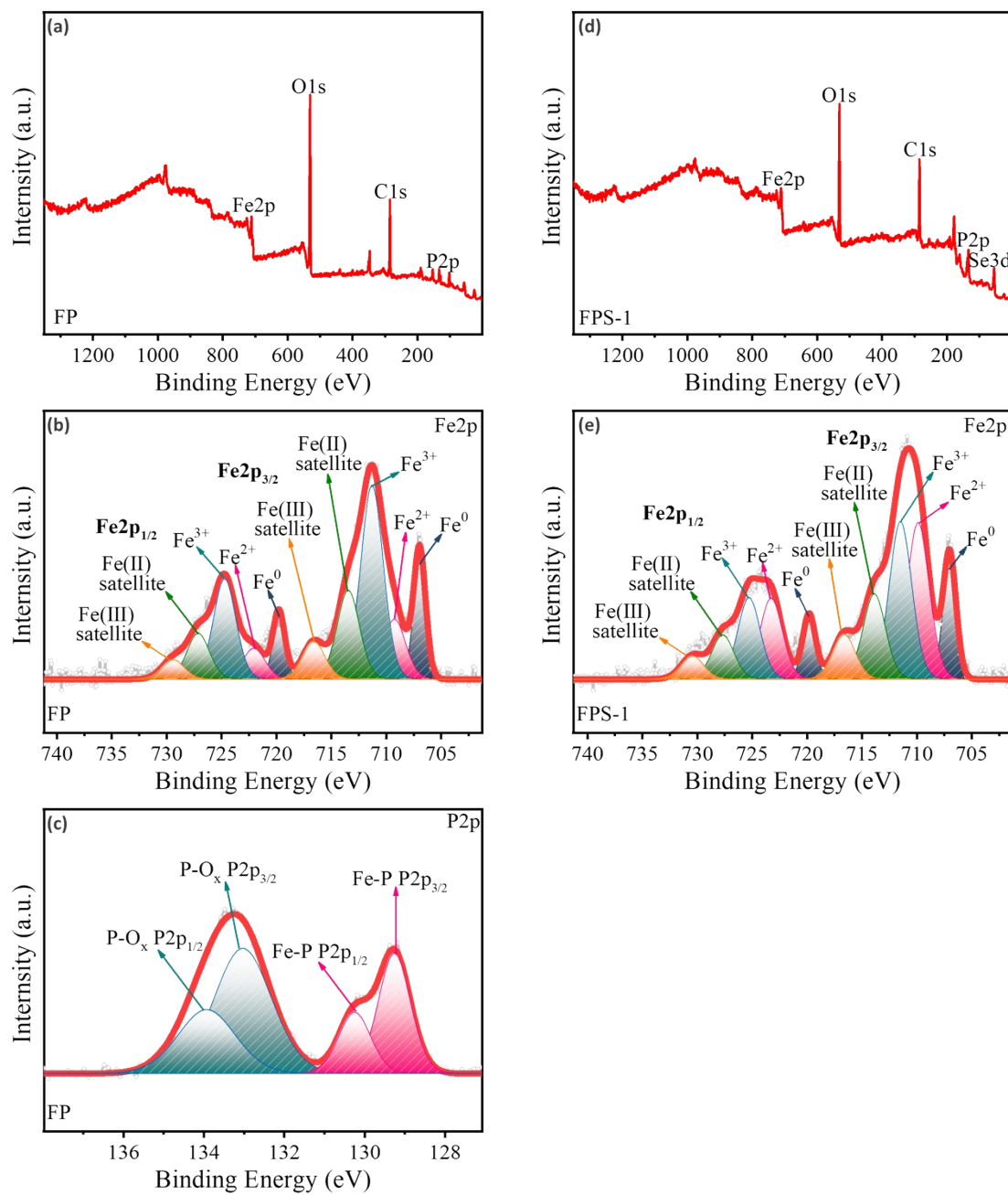
**Fig.S14** Used Celgard as separations, the cycling stability of FPS-2 at 5.0 A g<sup>-1</sup>

**Fig.S15** SEM and Mapping images of separation (glass fiber) after 2000 cycles about FP (a), FPS-1 (b), the optical images in the inset of separations

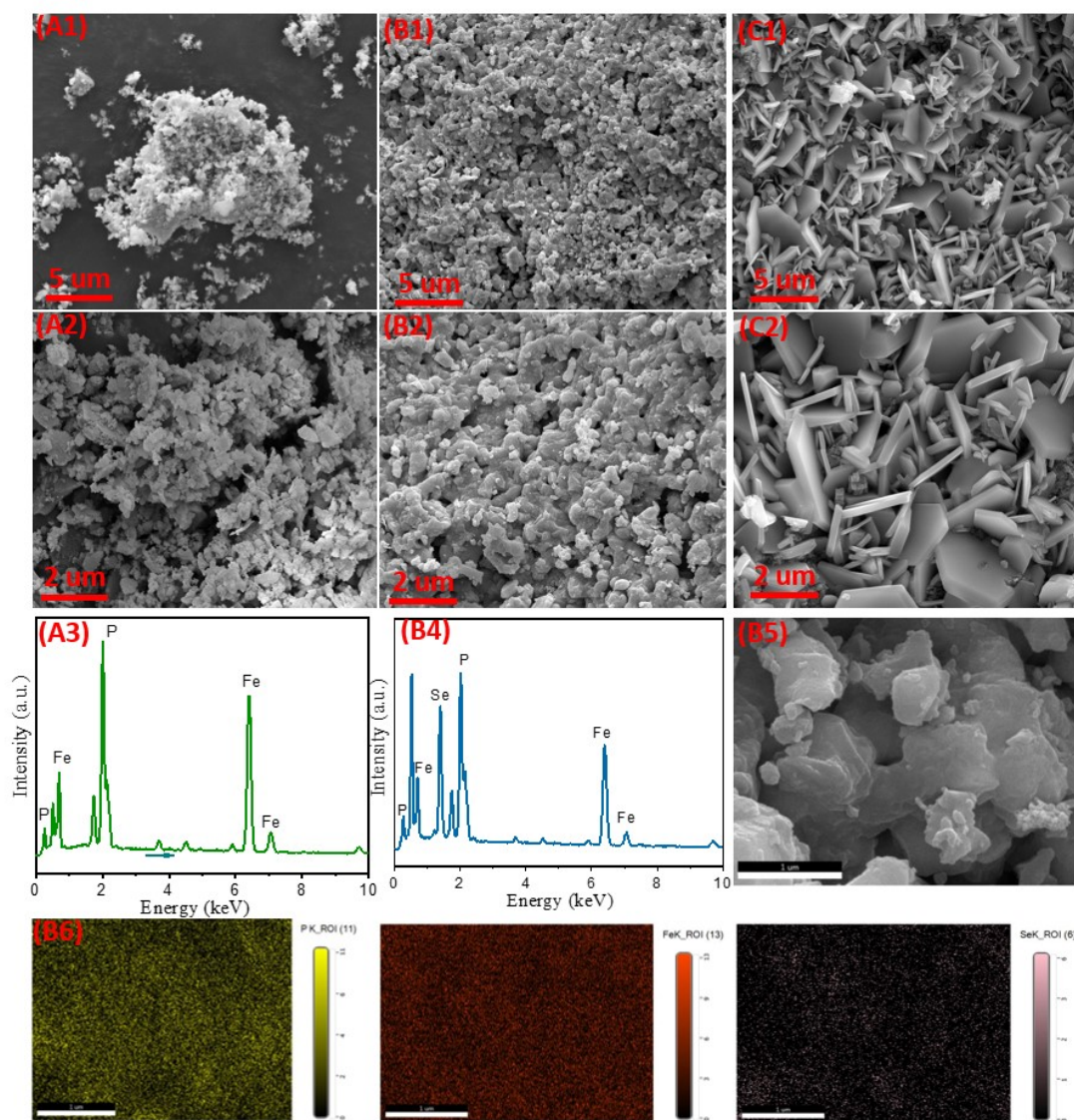
**Fig.S16** Used Celgard as separations after 300 cycles: SEM images of Cu-foils (A1), active materials (A2), separations-Celgard (B1, B2), the corresponding optical images in the inset of separations



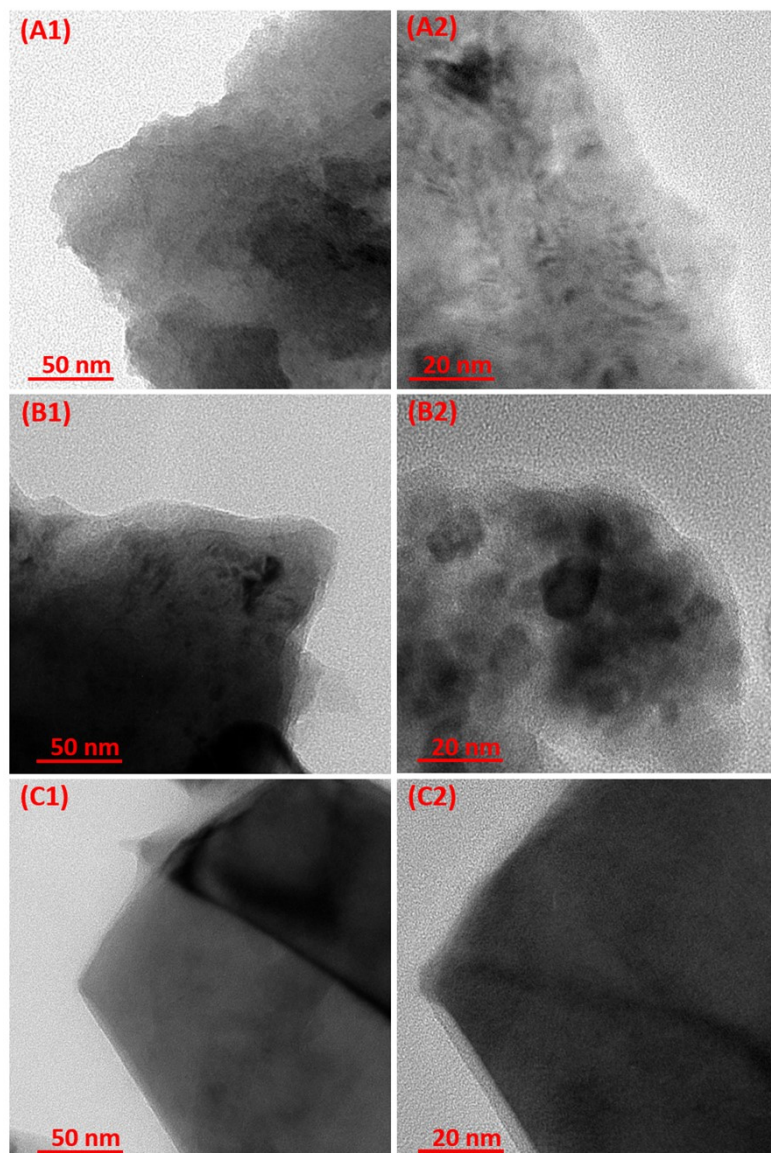
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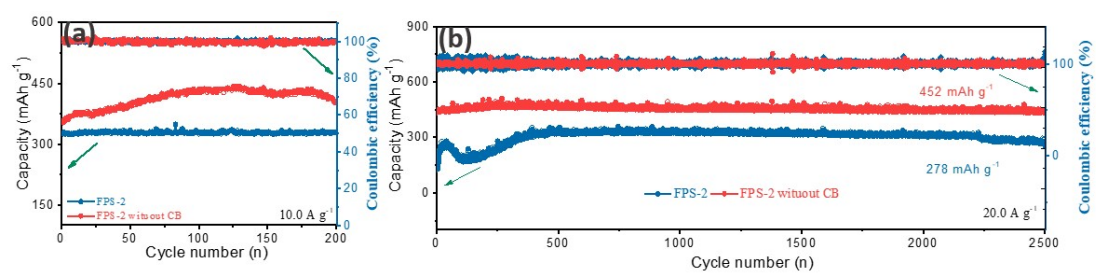
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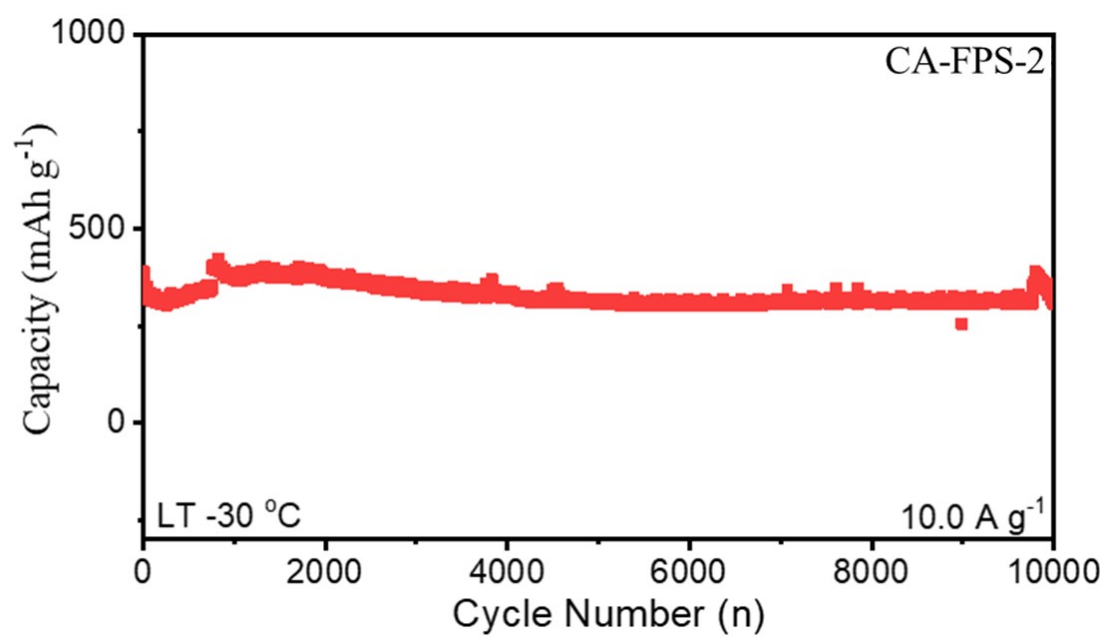
**Fig.S3** SEM, EDS, Mapping images of FP (A1-A3), FPS-1 (B1-B6), FPS-2 (C1, C2)



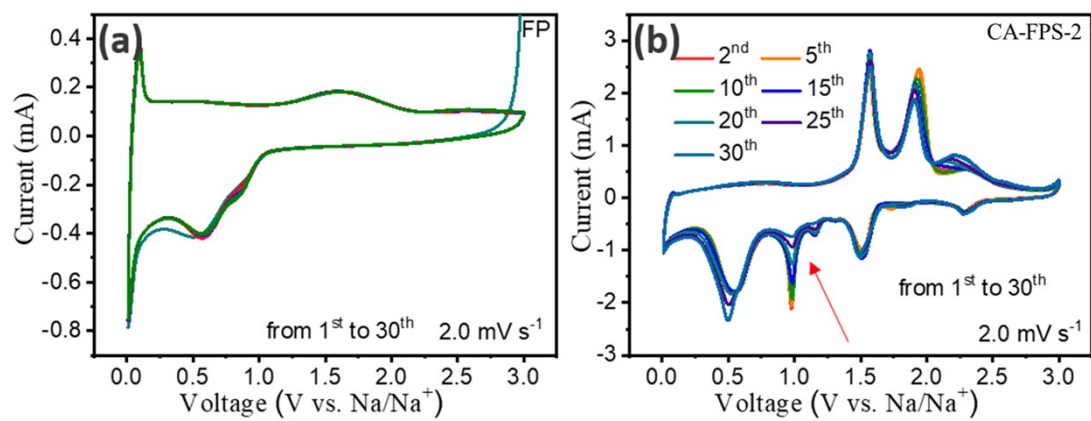
**Fig.S4** TEM images of FP (A1, A2), FPS-1 (B1, B2), FPS-2 (C1, C2)



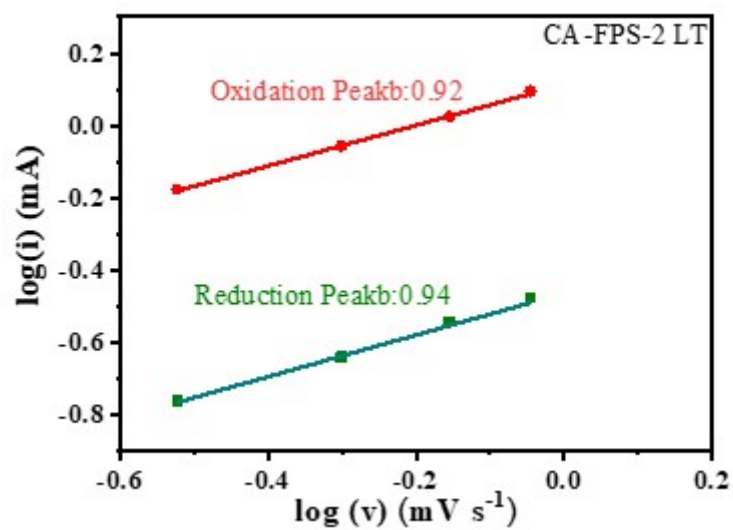
**Fig.S5** The cycling stability of FPS-2 and CA-FPS-2 at 10.0 A g<sup>-1</sup> (a) and 20.0 A g<sup>-1</sup> (b)



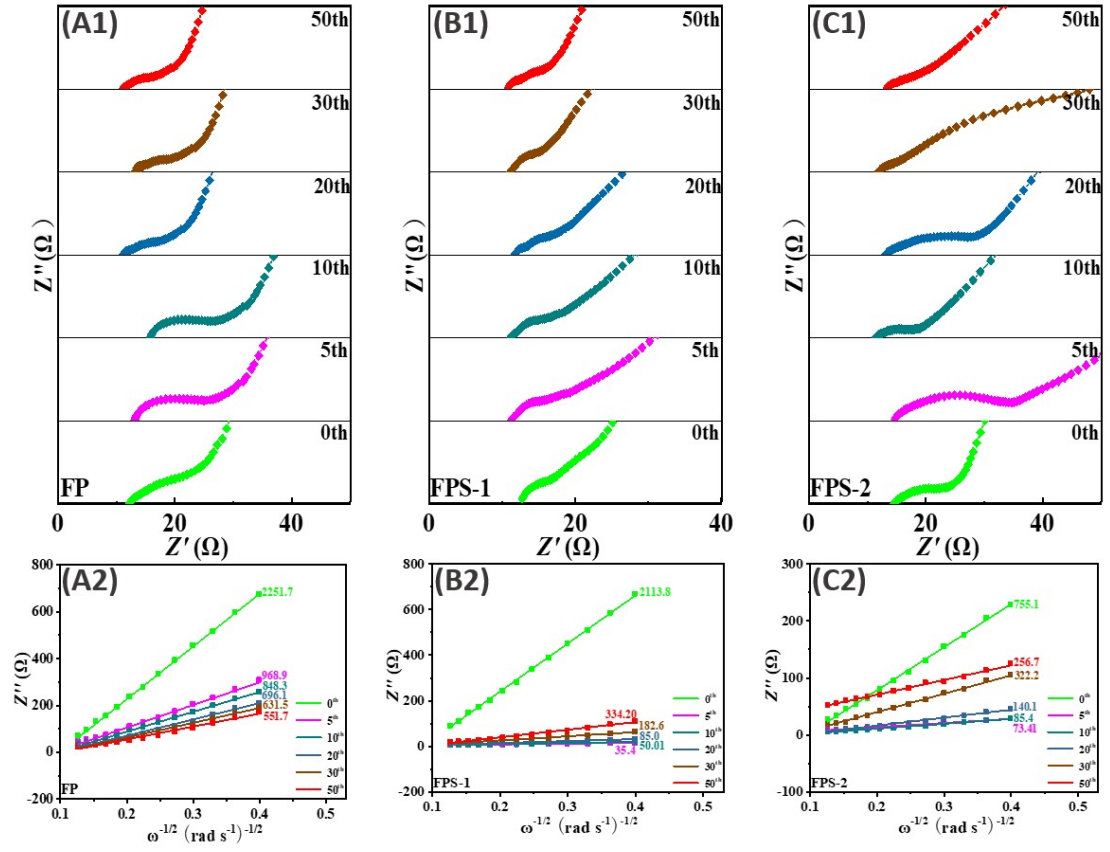
**Fig.S6** The long-term cycling stability of CA-FPS-2 at 10.0 A g<sup>-1</sup> and LT -30°C



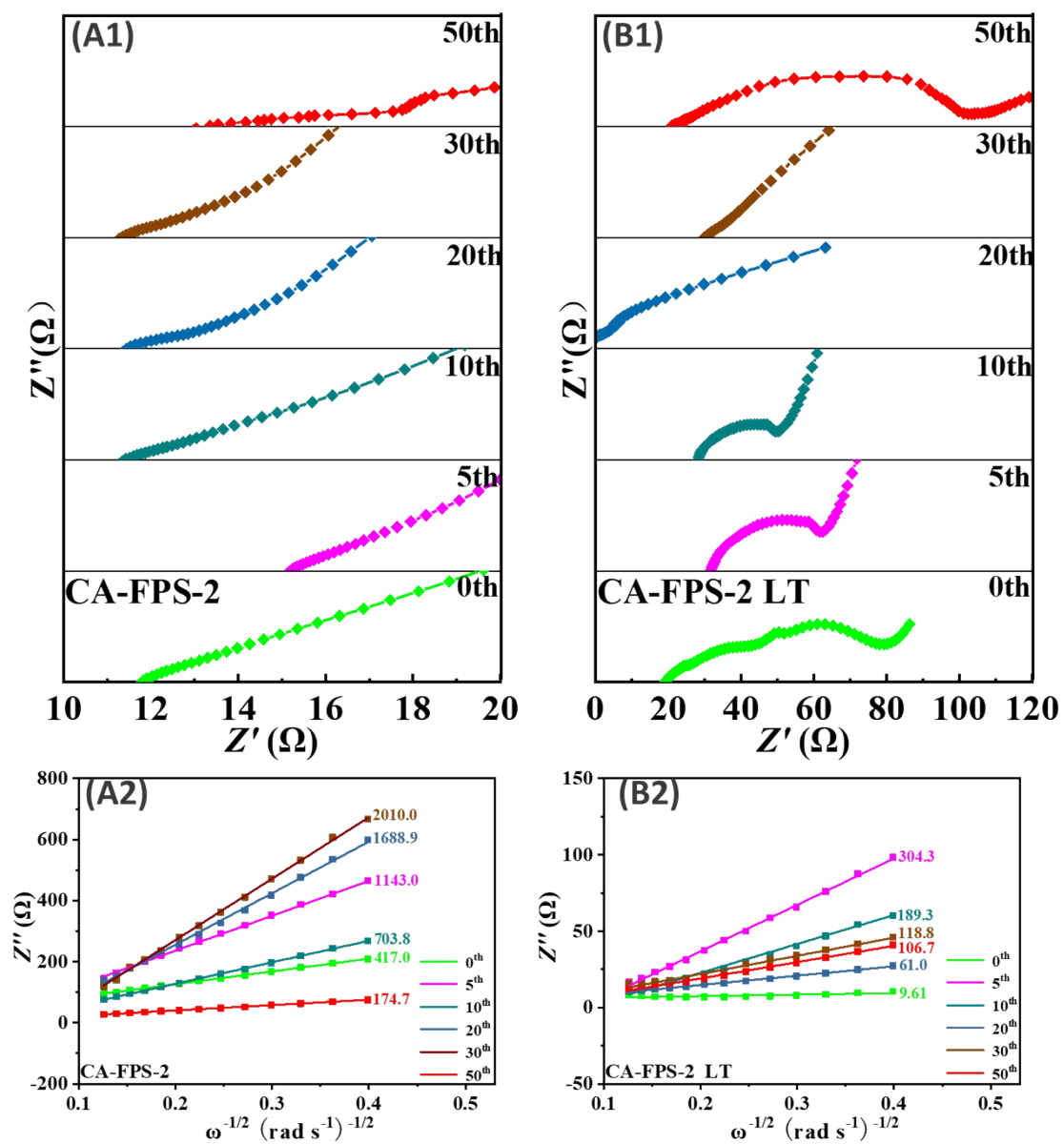
**Fig.S7** The long-term CV curves at 2.0 mV s<sup>-1</sup> from 1<sup>st</sup> to 30<sup>th</sup>



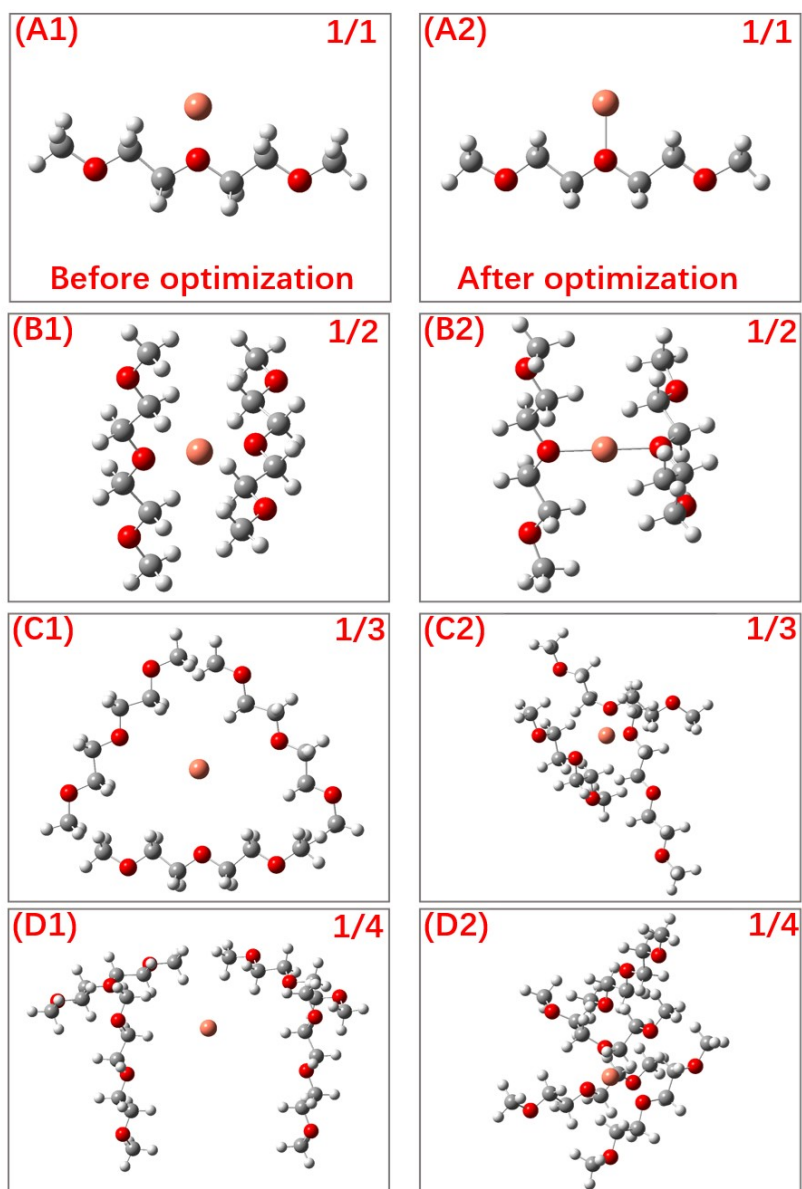
**Fig.S8** The linear relation between  $\log(i)$  and  $\log(v)$



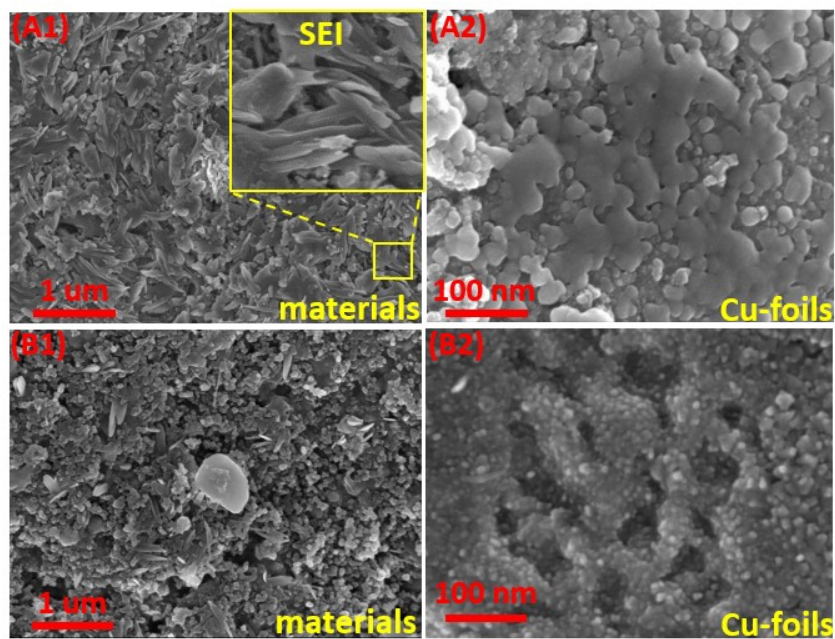
**Fig.S9** Nyquist Plots at various cycles and the relative linear of  $\omega^{-1/2}$  with  $Z''$  for FP (A1, A2), FPS-1 (B1, B2), FPS-2 (C1, C2)



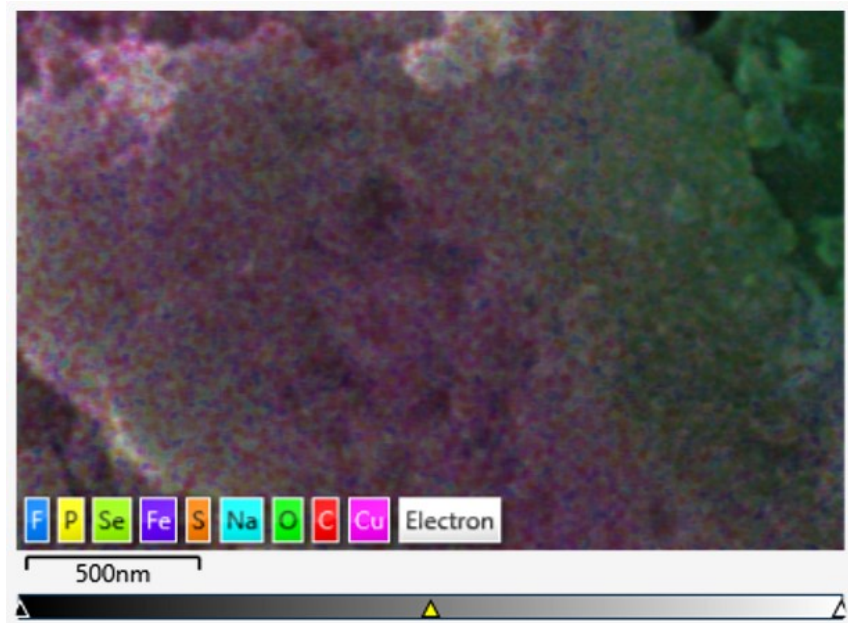
**Fig.S10** Nyquist Plots at various cycles and the relative linear of  $\omega^{-1/2}$  with  $Z''$  for, CA-FPS-2 (A1, A2) at RT, CA-FPS-2 (B1, B2) at LT



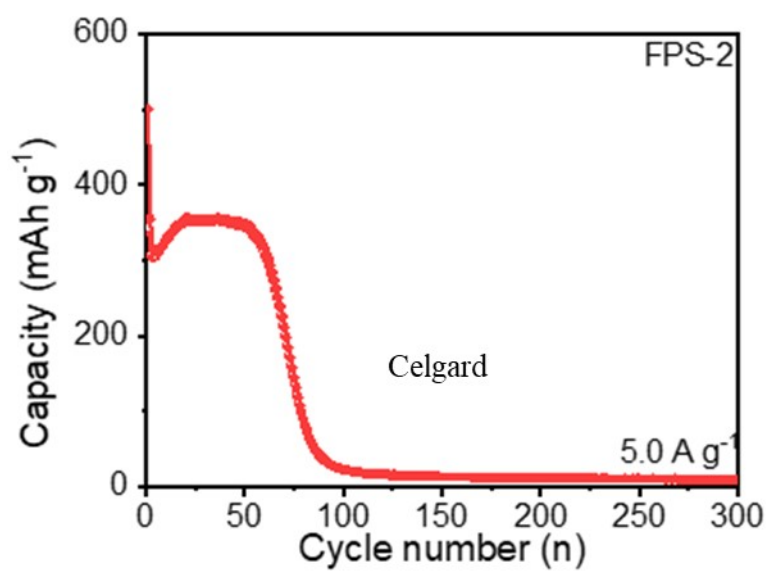
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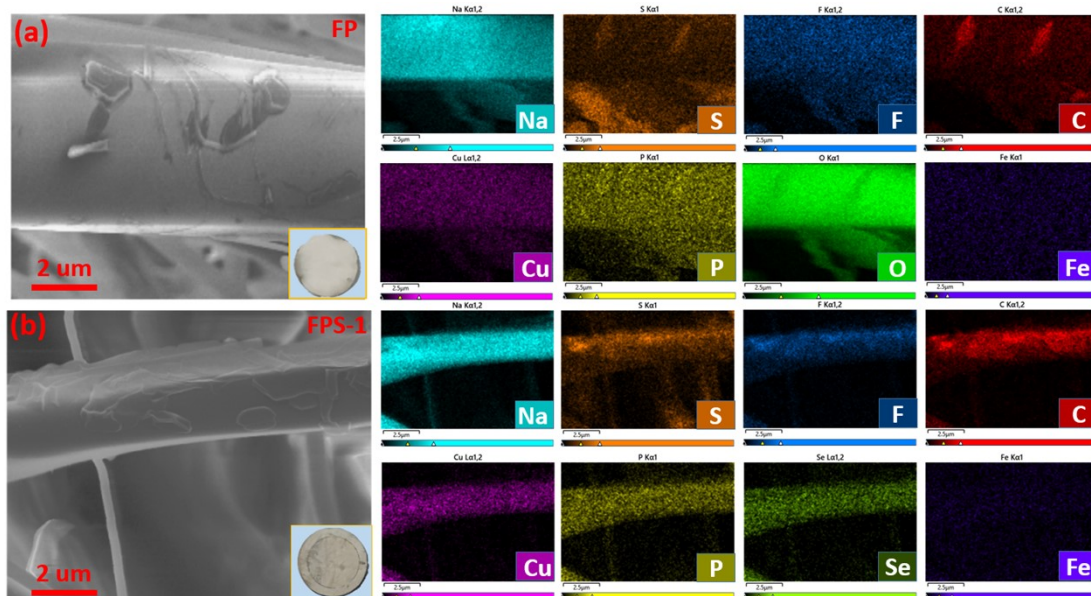
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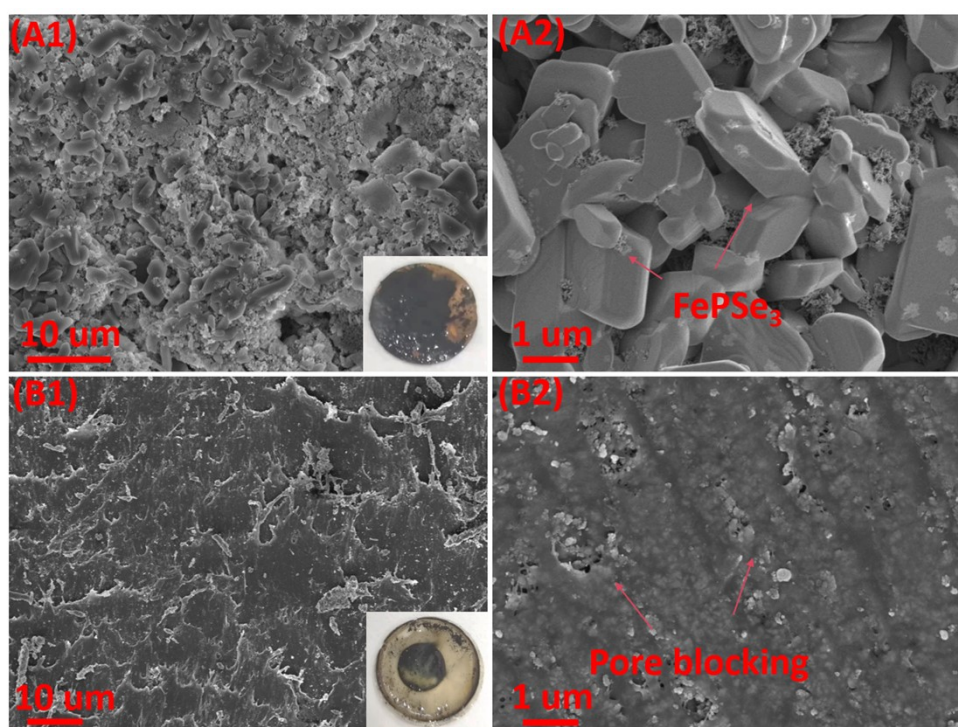
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