

Electronic Supplementary Information for

**In situ photopolymerized composite solid electrolyte
from halloysite nanotube and comb-like
polycaprolactone for high voltage Lithium metal
battery**

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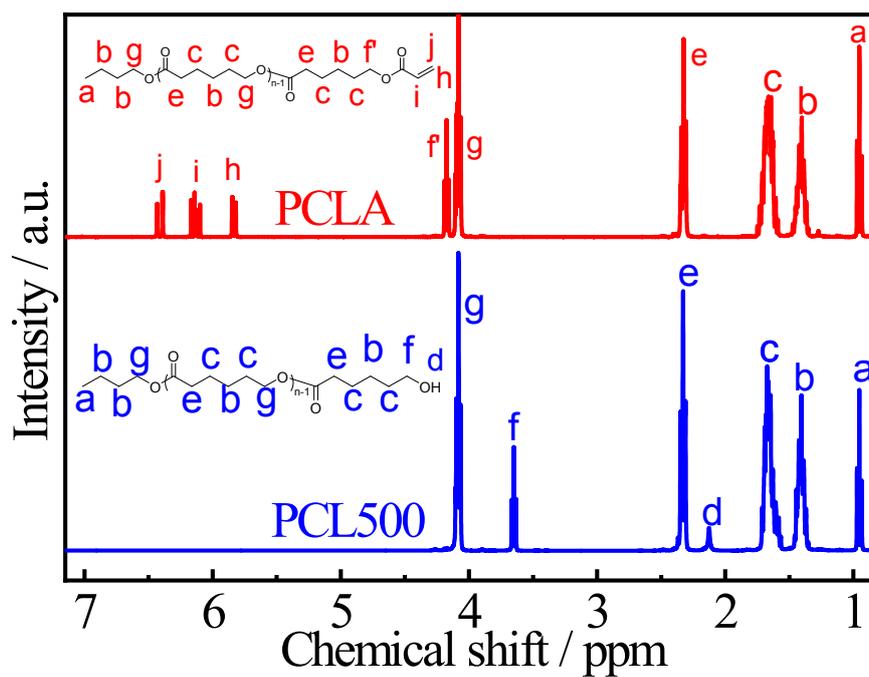


Fig. S1. ¹H NMR spectra of PCL500 and PCLA precursor. Deuterated chloroform is used as the solvent with tetramethylsilane (TMS) as the internal standard.

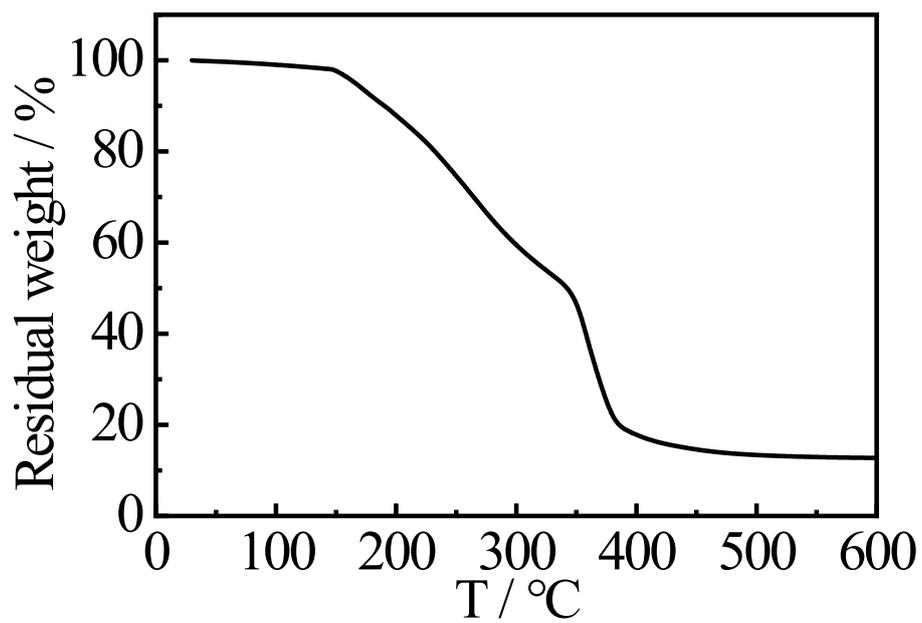


Fig. S2. TGA thermogram of CSE in the temperature range of 30 to 600 °C under N₂ at a heating rate of 10 °C min⁻¹.

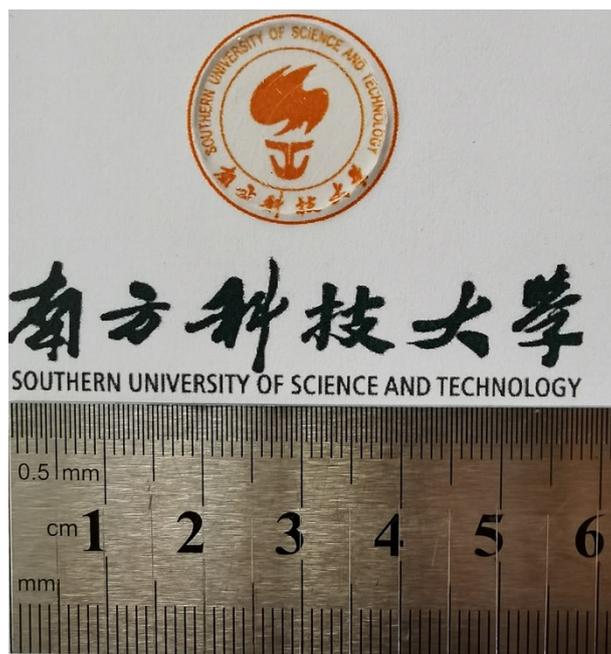


Fig. S3. Digital photograph of the transparent cured PSE film, using as control samples.

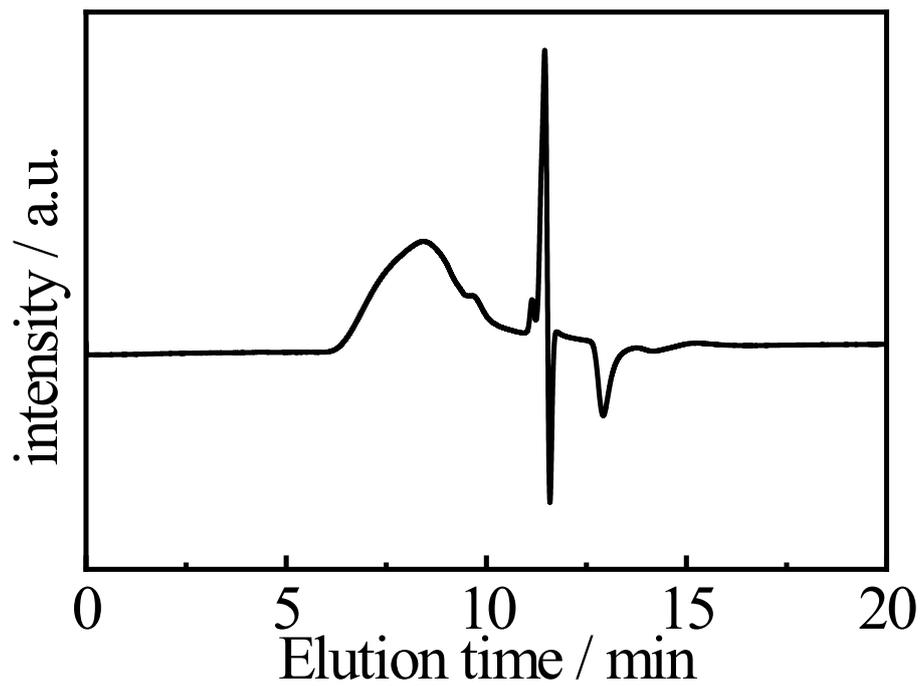


Fig. S4. GPC trace of the in situ polymerized comb-like PCL.

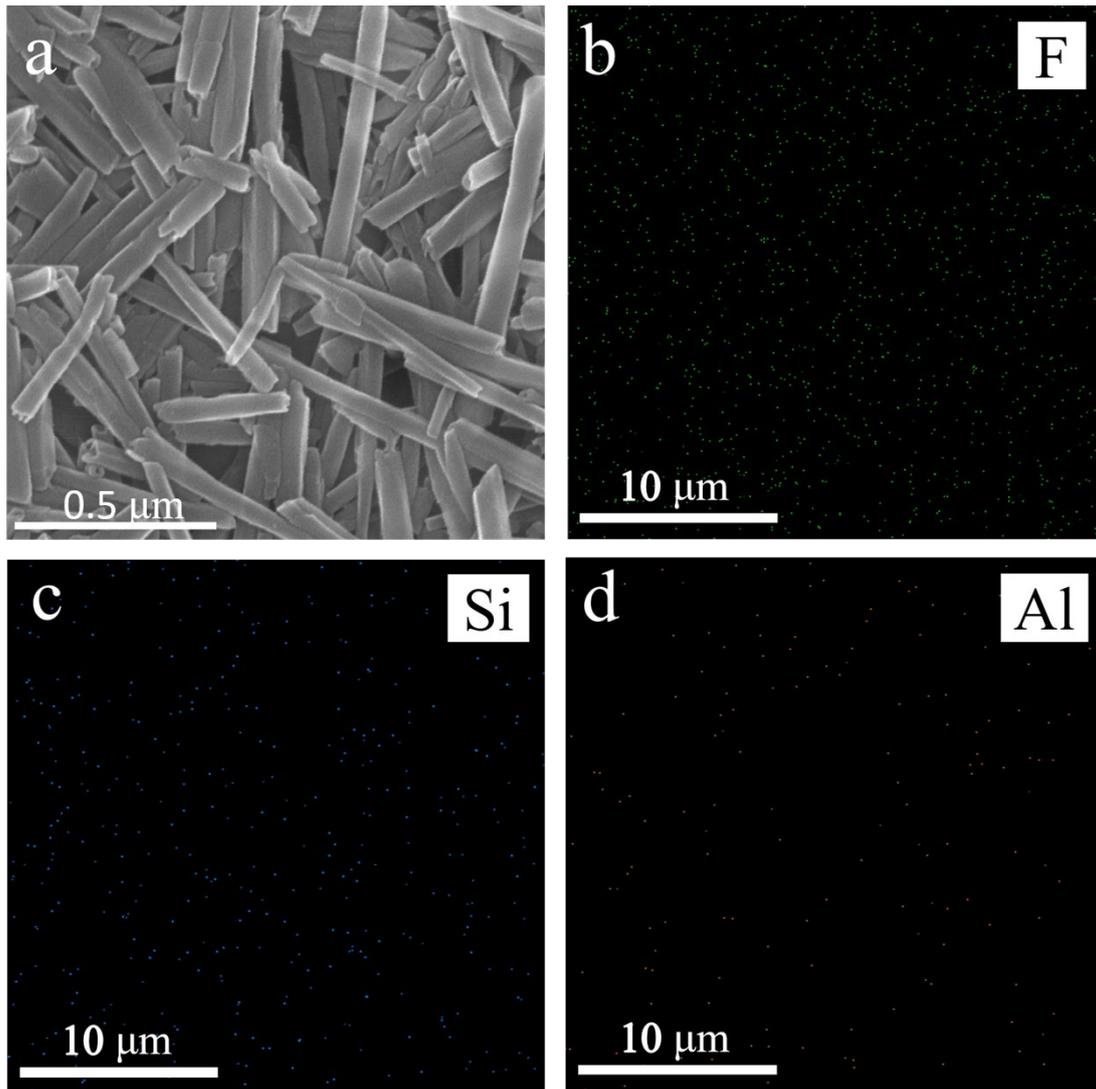


Fig. S5. (a) The SEM image of HNT, showing a self-assembled tubular structure at nanoscale and with a high aspect-ratio. EDS mapping of the (b) F, (c) Si and (d) Al elements on the surface of CSE film.

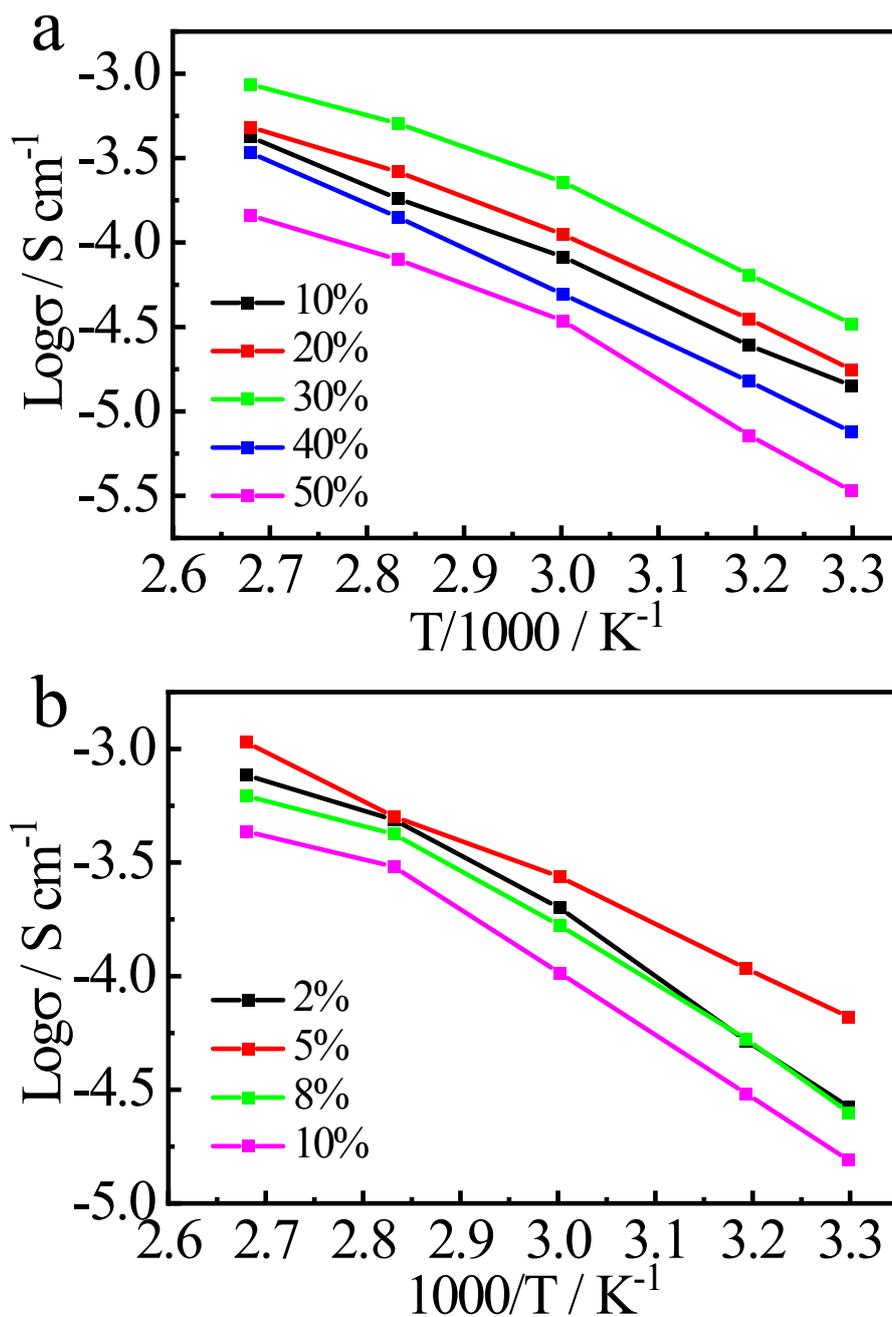


Fig. S6. (a) Ionic conductivities of the in situ polymerized PSE with different lithium salt contents as a function of temperature. (b) Ionic conductivities of the in situ polymerized CSE with different HNT contents as a function of temperature at a lithium salt concentration of 30wt%.

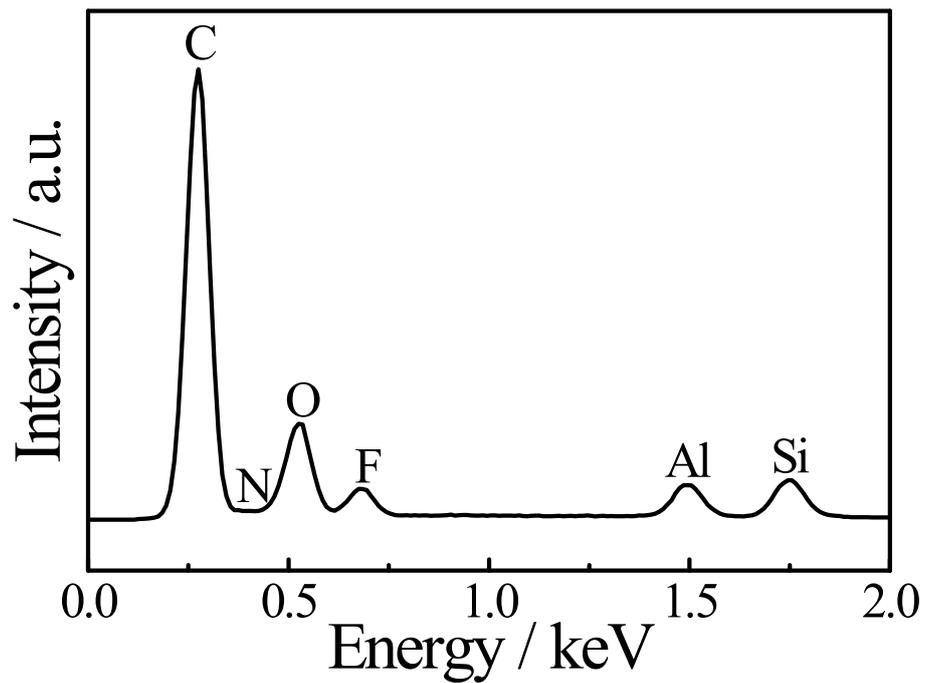


Fig. S7. EDS results obtained from TEM-EDS.

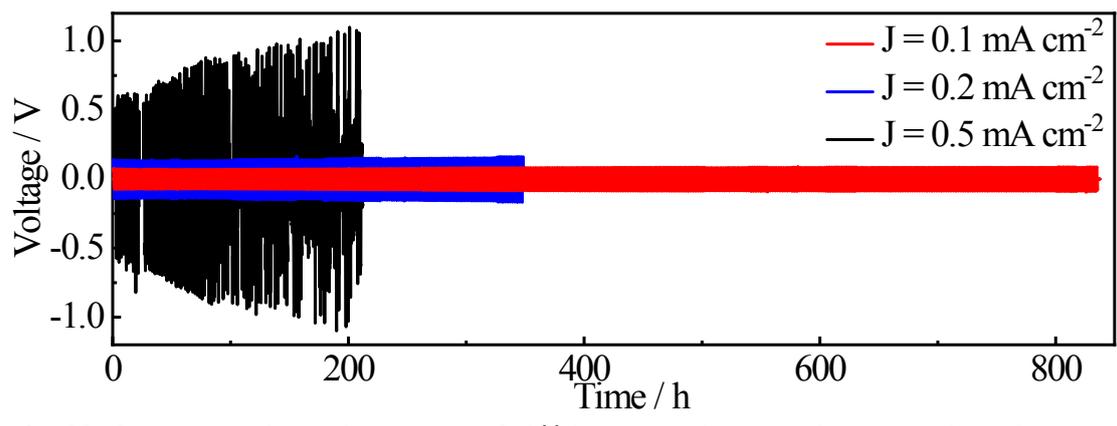


Fig. S8. Galvanostatic cycling curves of Li//Li symmetric cells with comb-like PCL based PSE.

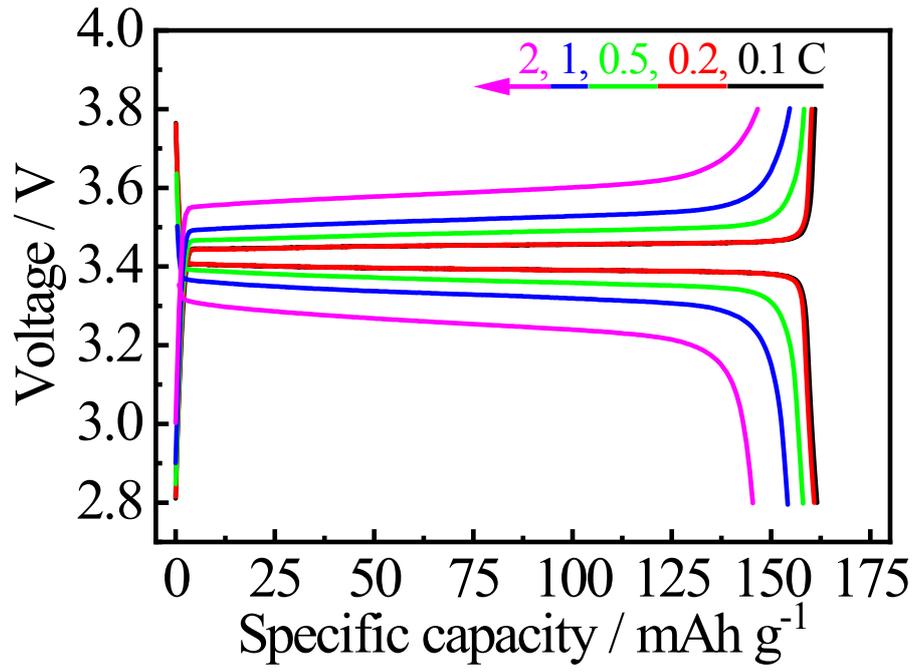


Fig. S9. Charge/discharge profiles of LFP/CSE/Li solid-state battery at various C-rate from 0.1C to 2C.

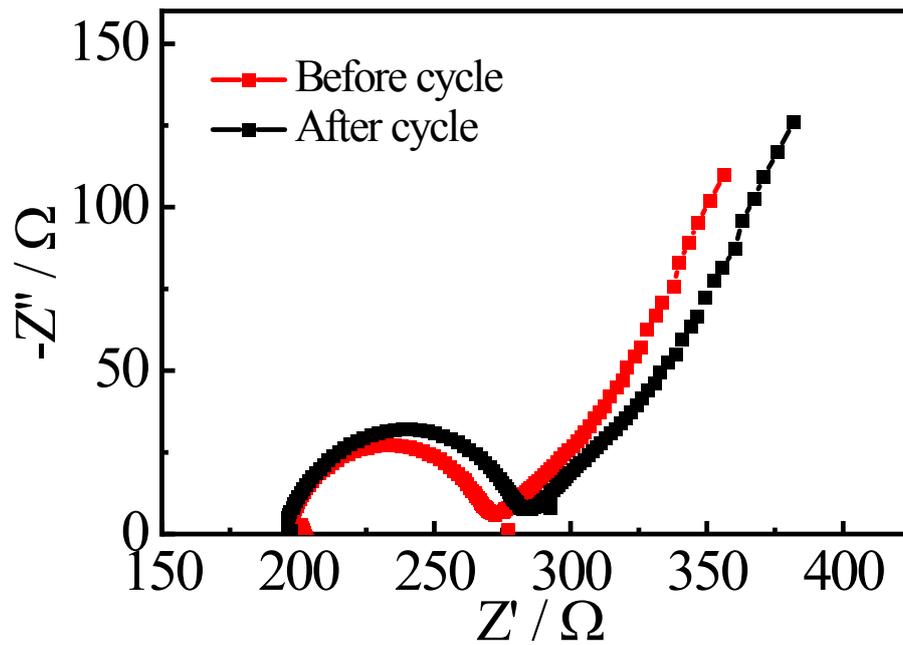


Fig. S10. EIS spectra of LFP/CSE/Li solid-state battery before and after 300 cycle at 1C.

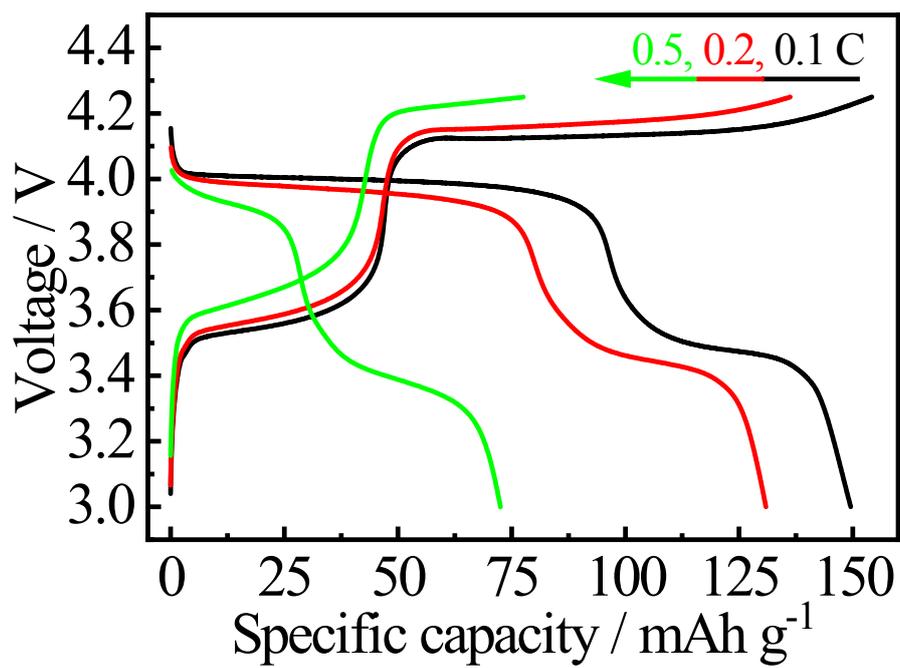


Fig. S11. Charge/discharge profiles of LFMP/CSE/Li solid-state battery at various C-rate from 0.1C to 0.5C.