Supporting Information

Lithium Phosphide/Lithium Chloride Coating on Lithium for Advanced Lithium Metal Anode

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Figure S1. EDS spectrum of as prepared LiPCl.

Figure S2. High-resolution XPS spectrum of as prepared LiPCl.
Figure S3. Optical photograph of the LiPCI a) before and b) after ambient exposure for 10 s.

Figure S4. SEM images of a pristine Li foil.
Figure S5. EIS spectra of Li-Li symmetric cells with Li foil and LiPCl after a) 10 and b) 50 cycles.

Figure S6. Galvanostatic linear polarization in 2-electrode configuration of symmetric cells.
**Figure S7.** SEM images of a,b) pristine Li foil and c,d) LiPCl anode after 20 cycles in Li-Li symmetric cells at 3 mA cm\(^{-2}\) with their areal capacity fixed at 1 mAh cm\(^{-2}\).

**Figure S8.** a) XRD pattern, b) TEM image and c,d) SEM images of the LiCoO\(_2\) cathode.
Figure S9. EIS spectra of Li-LCO batteries with Li foil and LiPCI anode a) before, after b) 10 and c) 50 cycles.
Figure S10. Voltage profiles of Li-LCO batteries with a) Li foil and b) LiPCI as anode at different current densities.
Figure S11. Voltage profiles of Li-LCO batteries with a) Li foil and b) LiPCI as anode at 300 mA g⁻¹ at different cycles.
Figure S12. a) XRD pattern, b) TGA curve, c,d) SEM images and e) TEM image of the S cathode.
Figure S13. Voltage profiles of Li-S batteries with a) Li foil and b) LiPCl as anode at different current densities.
Figure S14. EIS spectra of Li-S batteries with Li foil and LiPCI anode a) before, after b) 10 and c) 50 cycles.
**Figure S15.** Voltage profiles of Li-S batteries with a) Li foil and b) LiPCl as anode at 1 C at different cycles.