

Achievable fast charge transfer by tuning reasonable solid electrolyte interphase structures

Supplementary Information

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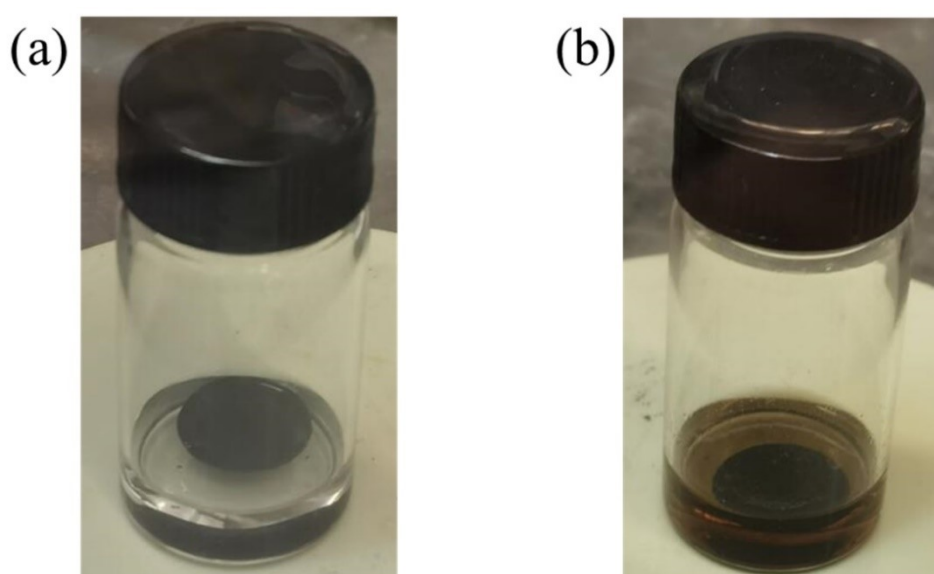


Figure S1. Digital photographs of Li-Al were immersed in tetrahydrofuran solution of pentafluoropyridine at 0 h (a) and 3 h (b).

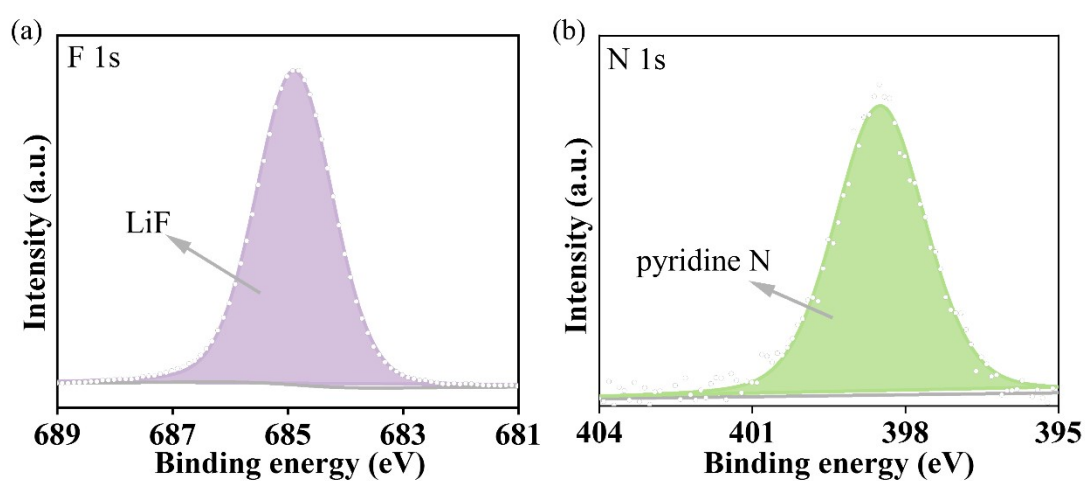


Figure S2. The F 1s (a) and N 1s (b) XPS analysis of Li-Al-LiF interface respectively.

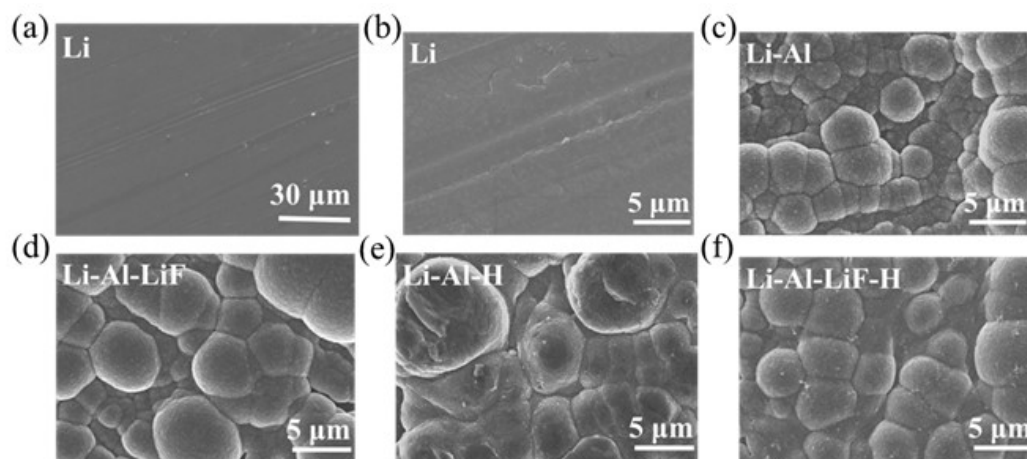


Figure S3. Top-view SEM images of Li (a, b) Li-Al (c), Li-Al-H (d), Li-Al-LiF (e) and Li-Al-LiF-H (f) respectively.

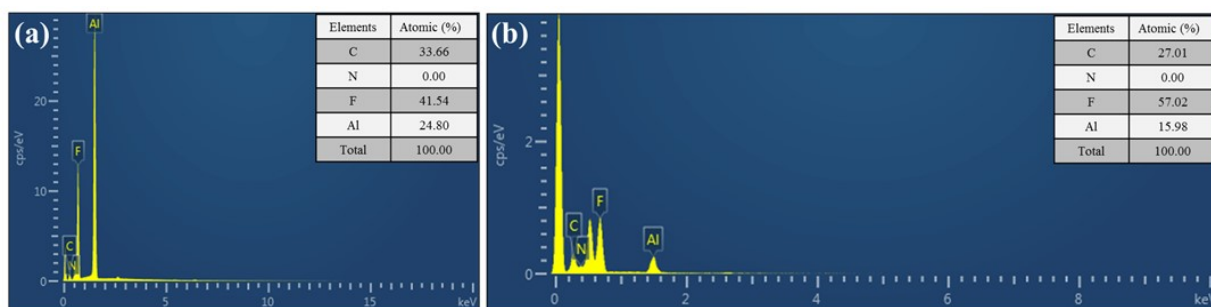


Figure S4. Area distribution images of Li-Al-LiF (a) and Li-Al-LiF-H (b) respectively.

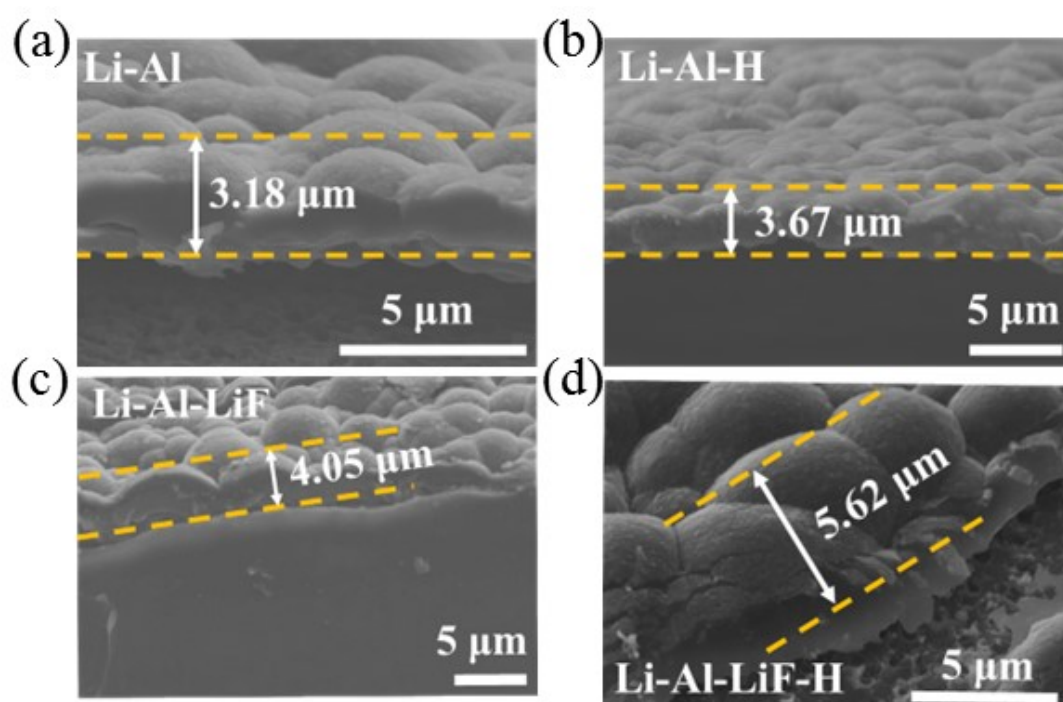


Figure S5. The cross-sectional SEM images of Li-Al (a), Li-Al-H (b), Li-Al-LiF (c) and Li-Al-LiF-H (d) respectively.

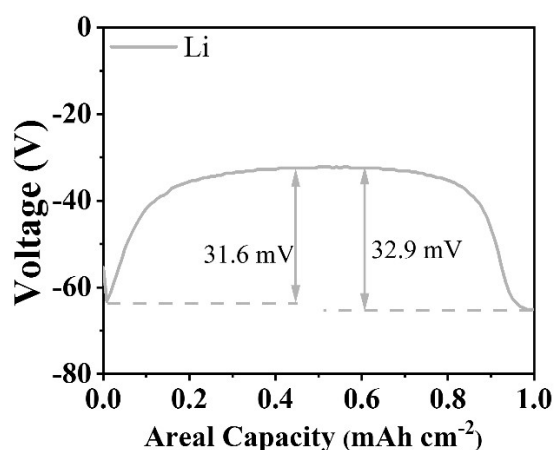


Figure S6. Overpotential of Li||Li at 1 mA cm^{-2} with a capacity of 1 mAh cm^{-2} when the battery is stably cycled.

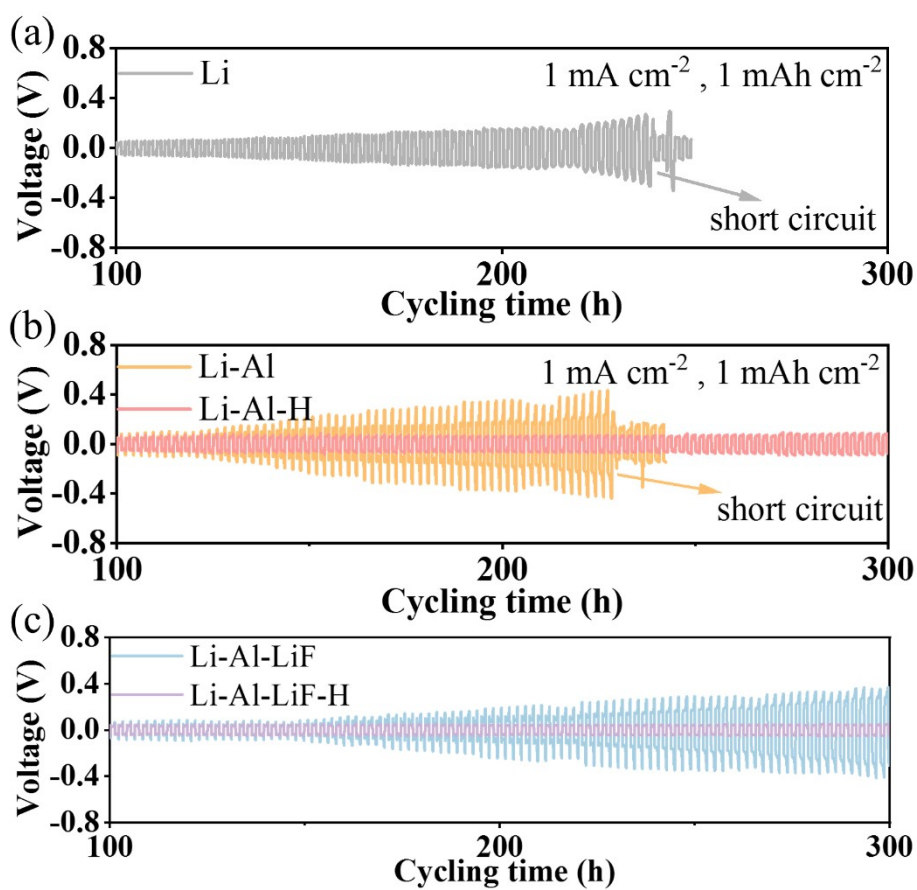


Figure S7. Voltage profiles of Li||Li (a), Li-Al||Li-Al, Li-Al-H||Li-Al-H (b), Li-Al-LiF||Li-Al-LiF and Li-Al-LiF-H||Li-Al-LiF-H (c) at 1 mA cm^{-2} with a capacity of 1 mAh cm^{-2} from 100 h to 300 h.

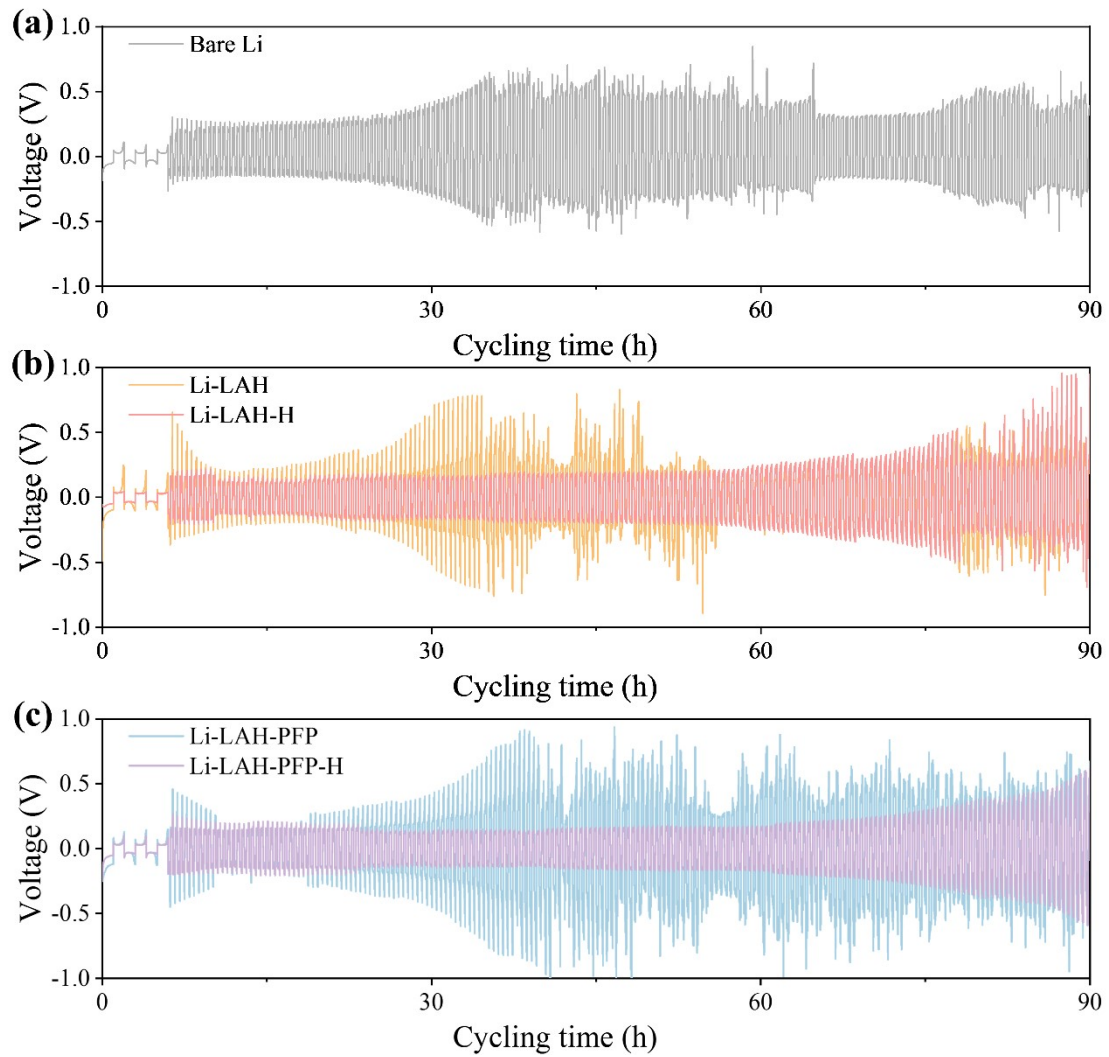


Figure S8. Voltage profiles of Li||Li (a), Li-Al||Li-Al, Li-Al-H||Li-Al-H (b), Li-Al-LiF||Li-Al-LiF and Li-Al-LiF-H||Li-Al-LiF-H (c) at 5 mA cm^{-2} with a capacity of 1 mAh cm^{-2} .

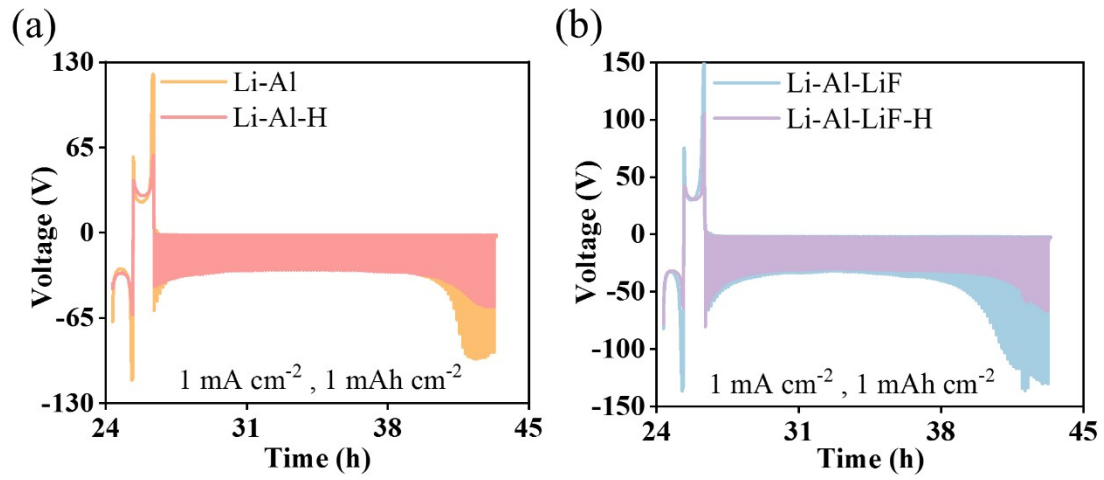


Figure S9. The GITT curves of Li-Al||Li-Al, Li-Al-H||Li-Al-H (a), Li-Al-LiF||Li-Al-LiF and Li-Al-LiF-H||Li-Al-LiF-H (b) at 8-minute rest.

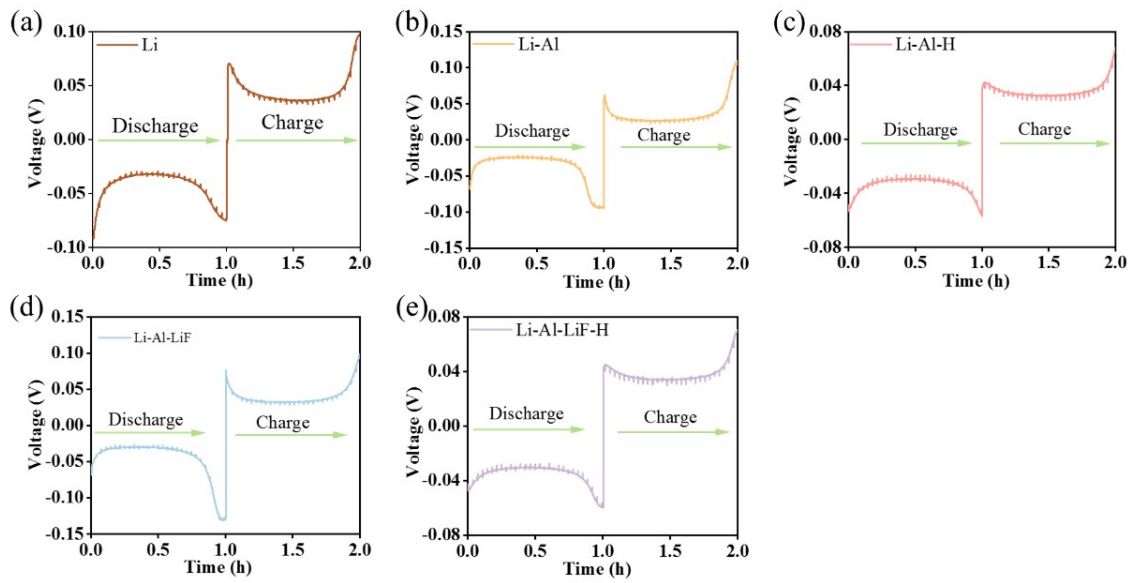


Figure S10. Voltage-time curves for ISEIS at 1 mA cm⁻² with a capacity of 1 mAh cm⁻² of Li||Li (a) Li-Al||Li-Al (b), Li-Al-H||Li-Al-H (c), Li-Al-LiF||Li-Al-LiF (d) and Li-Al-LiF-H||Li-Al-LiF-H (e).

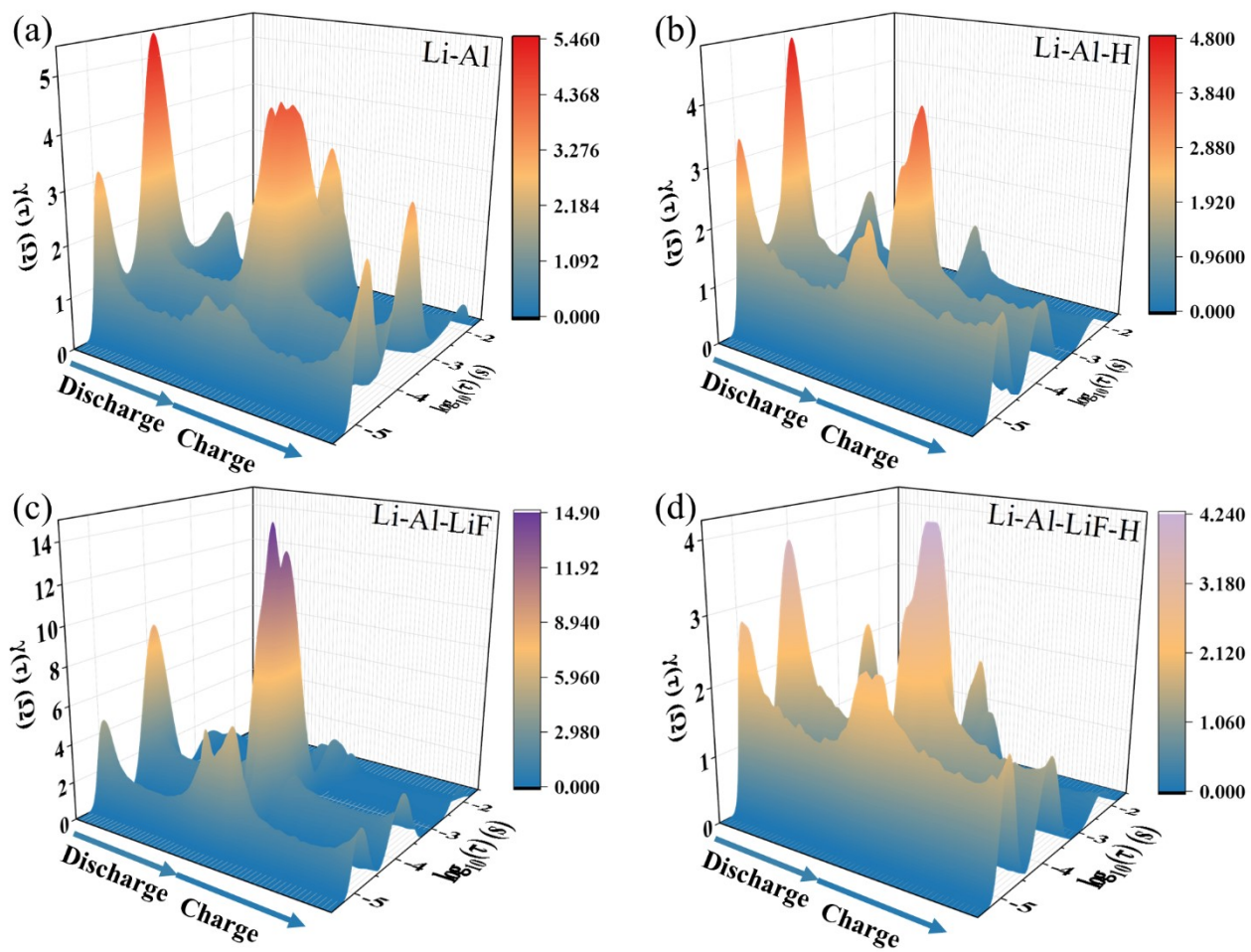


Figure S11. DRT transformation of ISEIS results of Li-Al||Li-Al (a), Li-Al-H||Li-Al-H (b), Li-Al-LiF||Li-Al-LiF (c) and Li-Al-LiF-H||Li-Al-LiF-H (d) respectively.

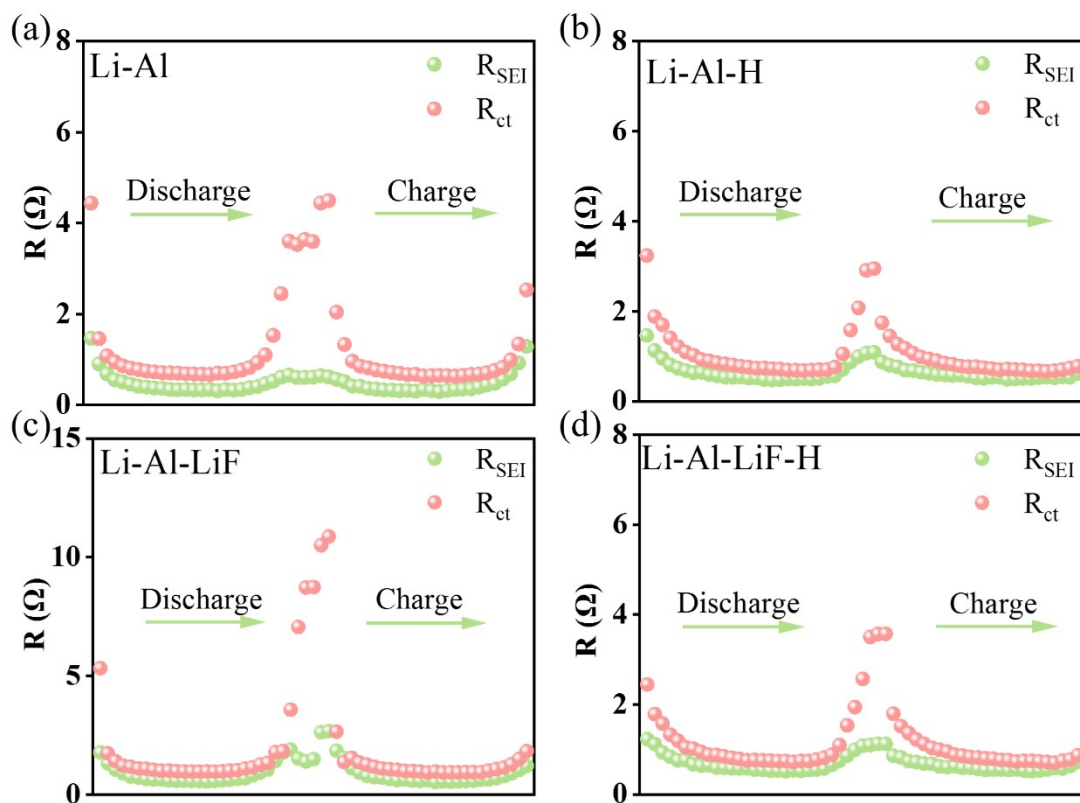


Figure S12. R_{SEI} and R_{ct} evolution of Li-Al (a), Li-Al-H (b), Li-Al-LiF (c) and Li-Al-LiF-H (d) during lithium plating/stripping at 1 mA cm^{-2} with a capacity of 1 mAh cm^{-2} .

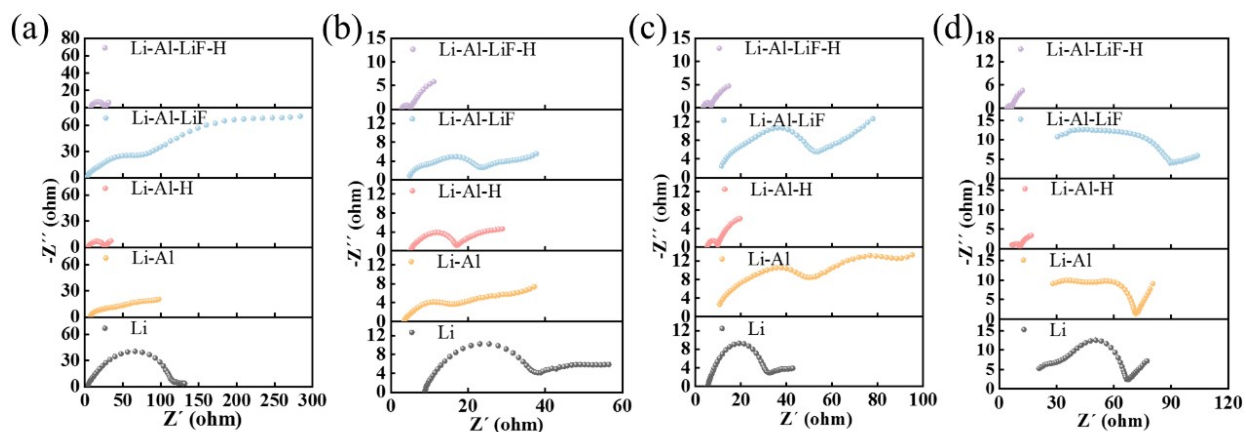


Figure S13. Nyquist plots of lithium symmetrical batteries at fresh state (a), 10th cycle (b), 50th cycle (c) and 100th cycle (d) respectively.

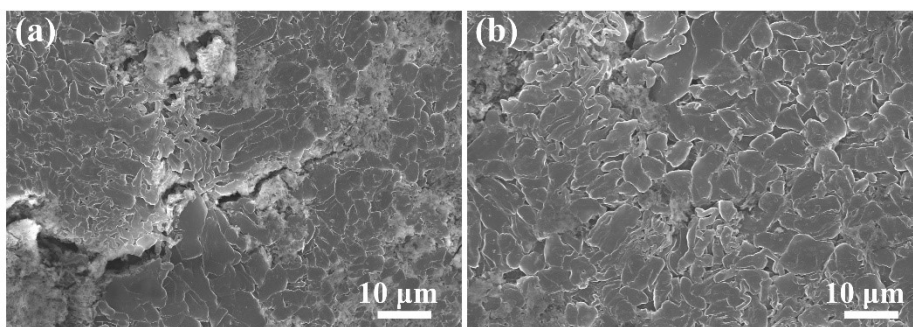


Figure S14. Top-view SEM images of Li-Al (a) and Li-Al-LiF (b) anode after 2 mAh cm⁻² of lithium is deposited at 1 mA cm⁻² respectively.

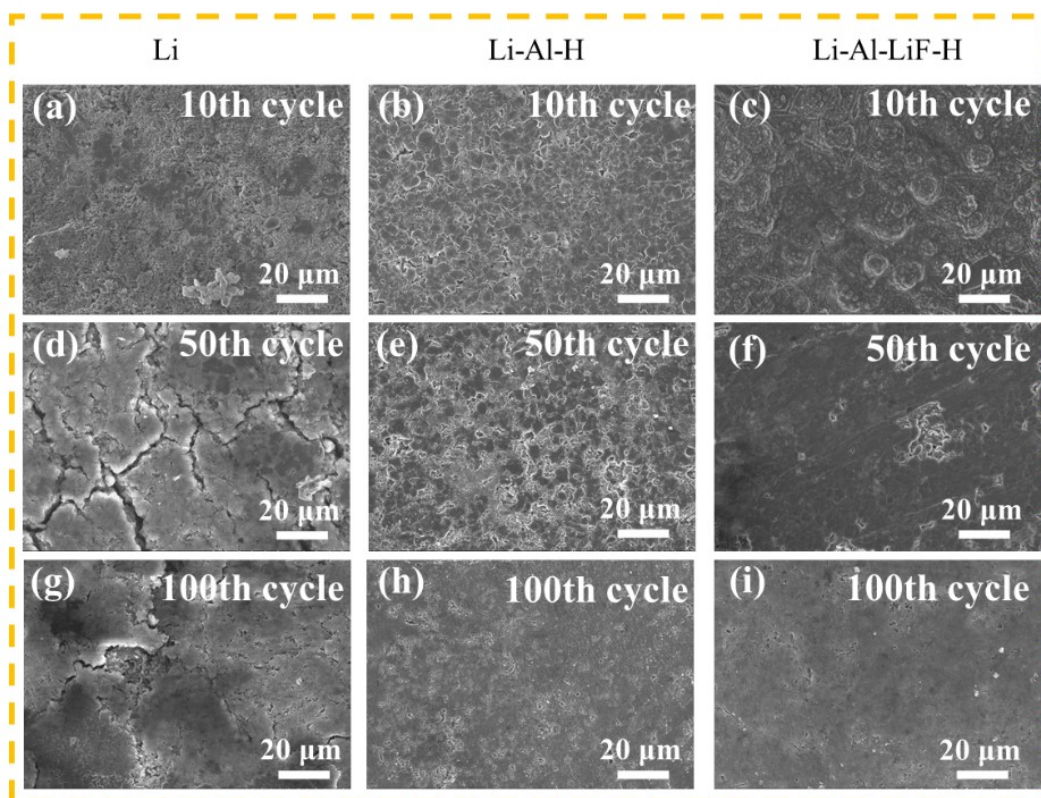


Figure S15. SEM images of bare Li (a, d, g), Li-Al-H (b, e, h) and Li-Al-LiF-H (c, f, i) anode with different cycle numbers at 1 mA cm⁻² with a capacity of 1 mAh cm⁻².

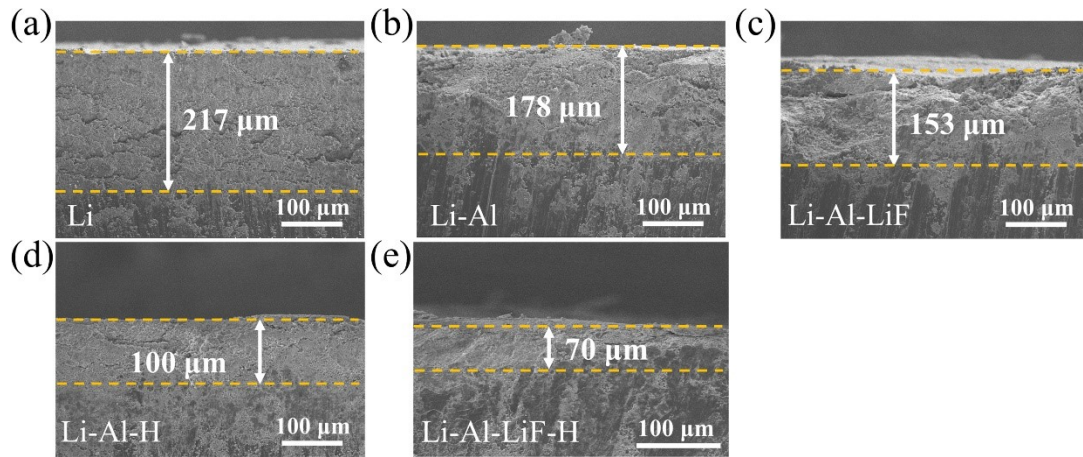


Figure S16. The cross-sectional SEM images of Li (a), Li-Al (b), Li-Al-LiF (c), Li-Al-H (d) and Li-Al-LiF-H (e) after 100 cycles respectively.

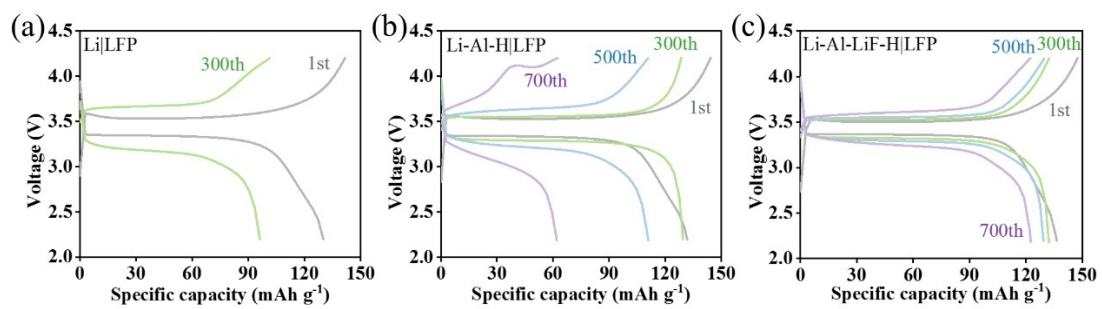


Figure S17. Charge-discharge voltage profiles of Li||LFP (a), Li-Al-H||LFP (b) and Li-Al-LiF-H||LFP (c) at 2 C.