Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Stabilize Li metal anode through constructing LiZn alloy/polymer hybrid protective layer towards uniform Li deposition

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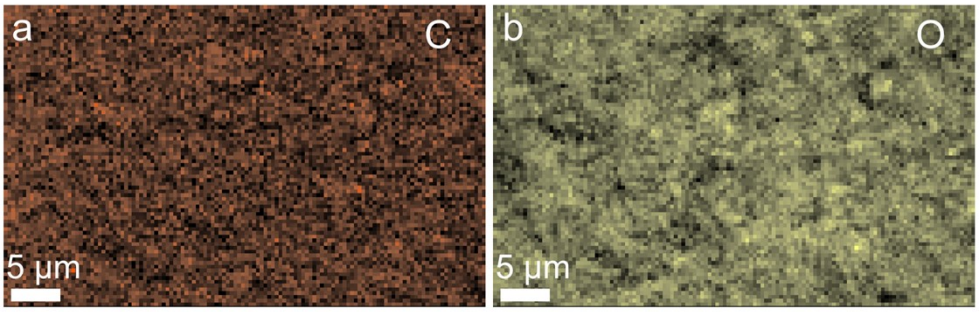

Fig. S1. The corresponding (a) C and (b) O signals of EDS mapping on the Li@LZP surface.

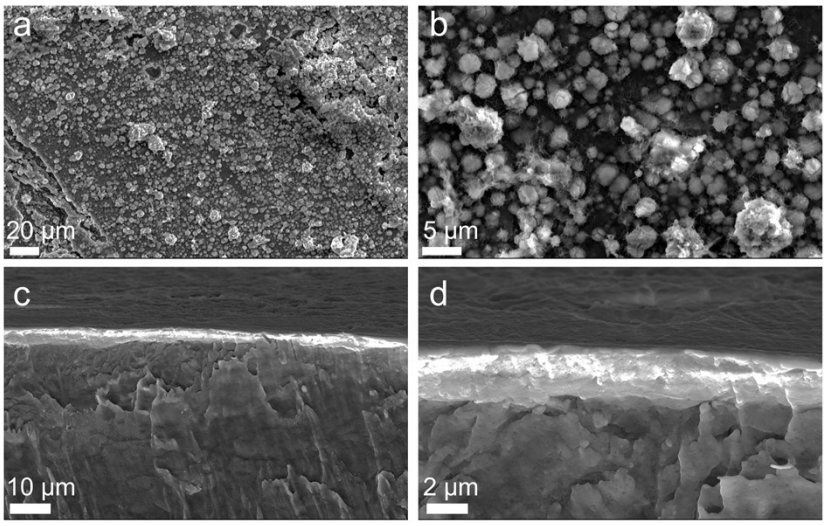

Fig. S2. (a, b) The top-view and (c, d) side-view SEM image of the Li@LiZn anode showing LiZn alloy particles.

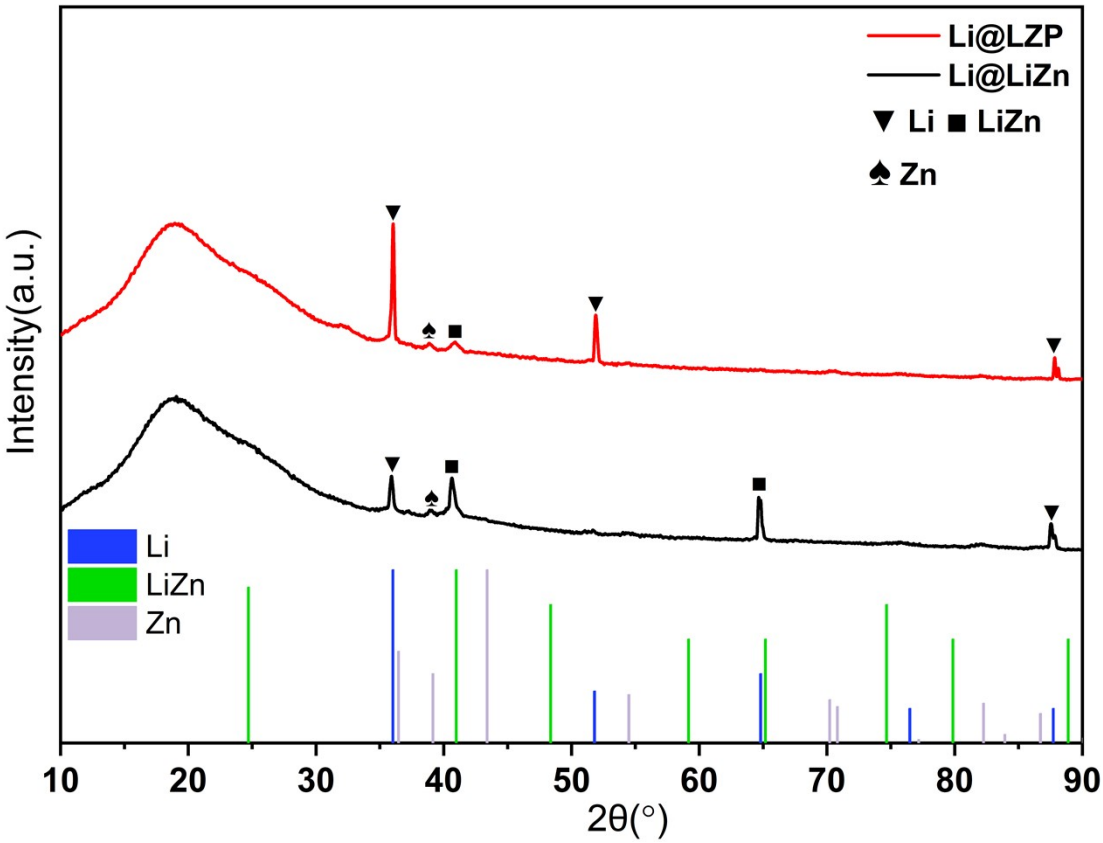

Fig. S3. The XRD pattern of Li@LiZn and Li@LZP electrode.

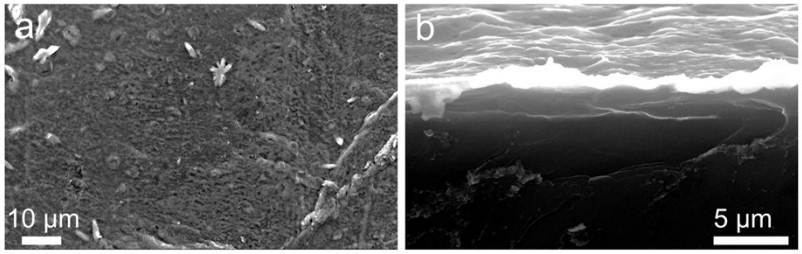

Fig. S4. The (a) top-view and (b) side-view SEM image of Li@LZP after striping 3 mAh cm^{-2} Li.

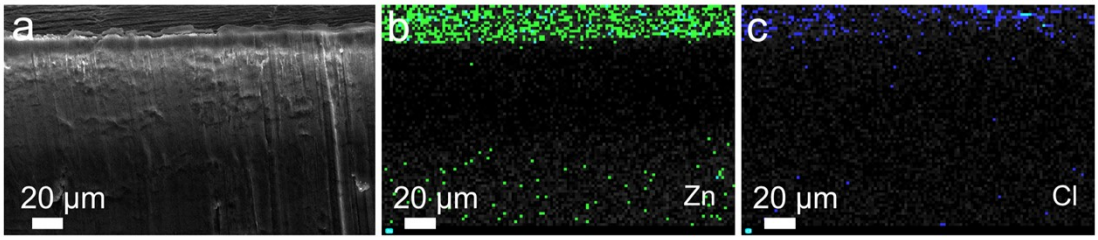

Fig. S5 (a) The cross-sectional SEM images of Li deposition on Li@LZP with a plating capacity of 3 mA h cm^{-2} at 1 mA cm^{-2} (Fig. 2f). The (b) Zn and Cl signals in the cross-sectional EDS mapping images of Fig. 2f.

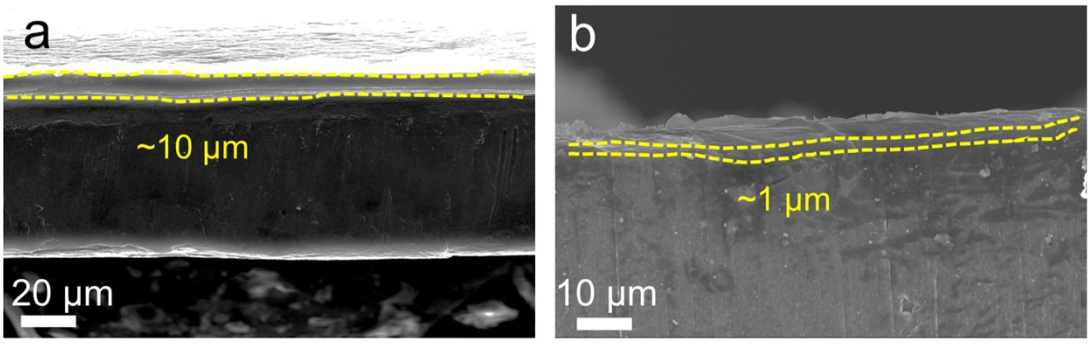

Fig. S6 The side-view SEM images of hybrid layer with different thickness of (a) 10 μm and (b) 1 μm.

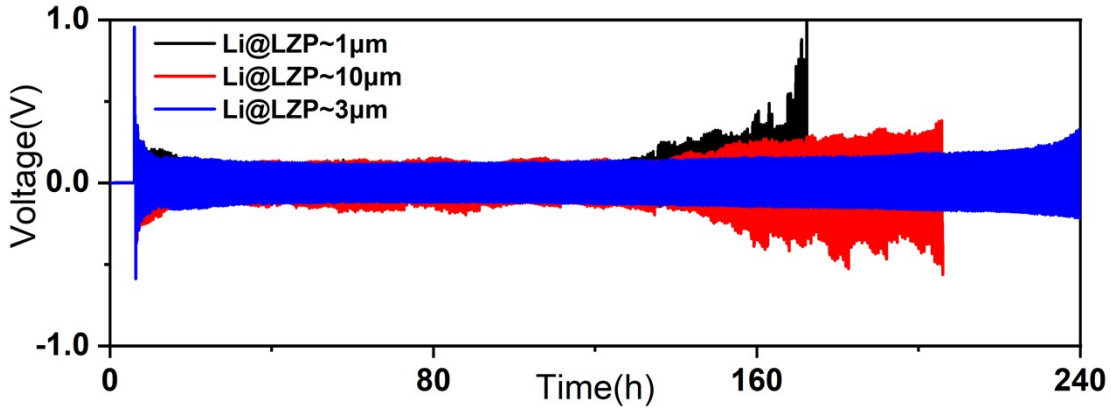

Fig. S7 The voltage profiles of symmetric cells with different thickness for hybrid layer at 3 mA cm^{-2} and 1 mA h cm^{-2}.

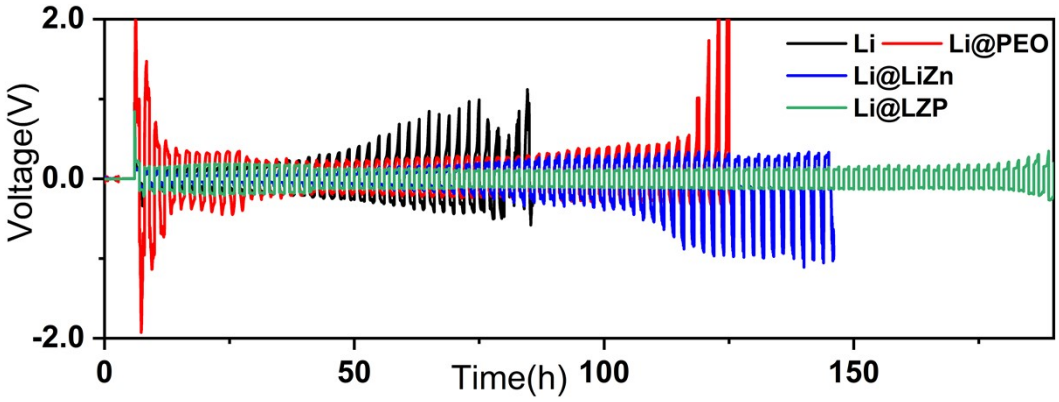

Fig. S8 Cycling performance of the symmetric cells with Li, Li@PEO, Li@LiZn and Li@LZP anode under a condition of 3 mA cm^{-2} and 3 mA h cm^{-2}.

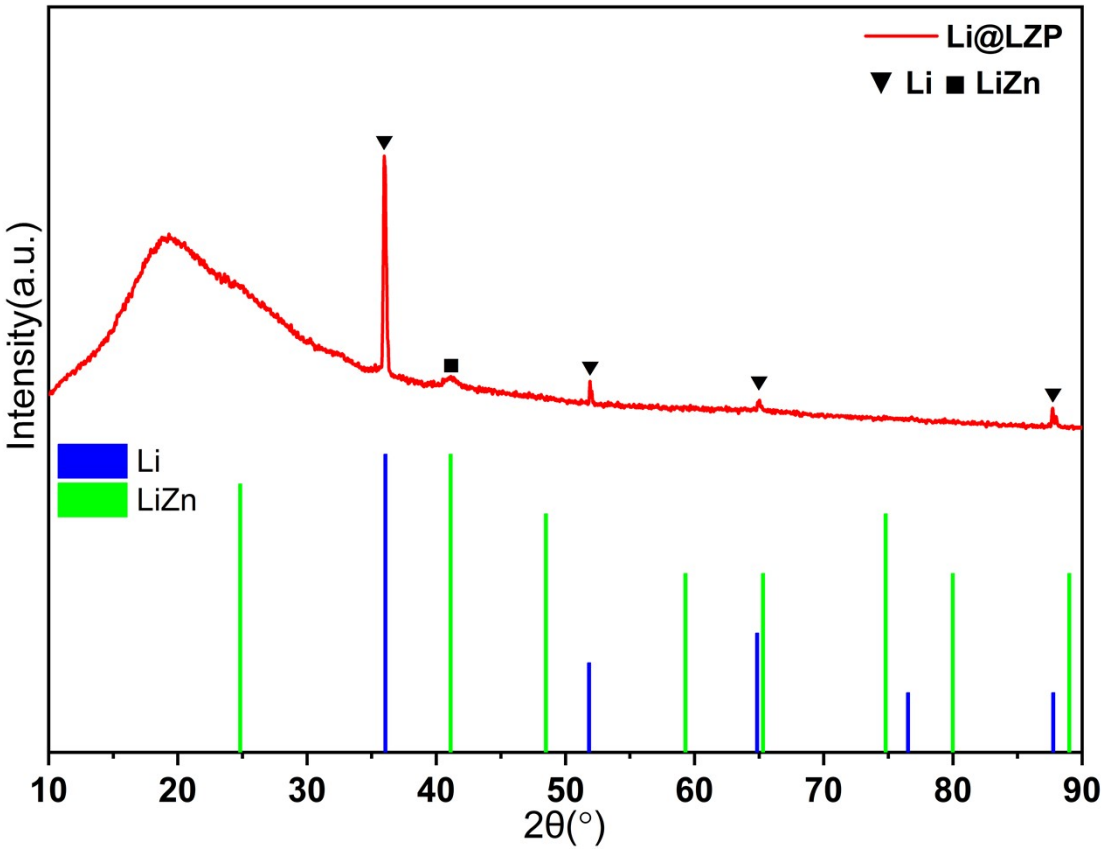

Fig. S9. The XRD pattern of Li@LZP anode after 50 cycles under a condition of 1 mA cm^{-2} and 1 mAh cm^{-2}.

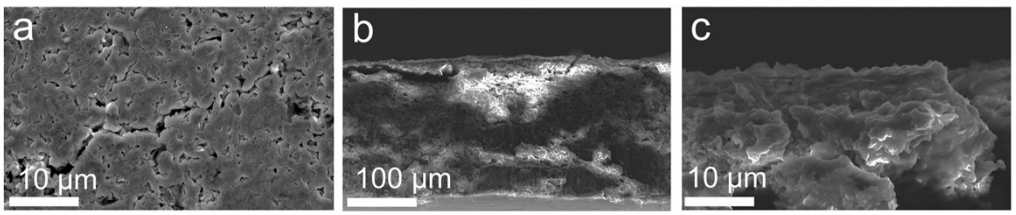

Fig. S10. The (a) top-view and (b-c) side-view morphology of Li@LiZn anode after 50 cycles under a condition of 1 mA cm^{-2} and 1 mAh cm^{-2}.

Table S1. The comparison between Li@LZP and other treated Li anodes reported in the previous literatures.

	Current density & capacity	Cycling time	Reference
Li/Zn	1 mA cm^{-2}, 1 mAh cm^{-2} 3 mA cm^{-2}, 1 mAh cm^{-2}	500 h 200 h	[1]
Li|double-layer	1 mA cm^{-2}, 1 mAh cm^{-2}	500 h	[2]
Li@(EBC-LiTFSI)	1 mA cm^{-2}, 1 mAh cm^{-2} 2 mA cm^{-2}, 1 mAh cm^{-2}	500 h 220 h	[3]
Li-LiI	1 mA cm^{-2}, 1 mAh cm^{-2}	700 h	[4]
ZPO-Li	1 mA cm^{-2}, 1 mAh cm^{-2} 3 mA cm^{-2}, 1 mAh cm^{-2}	600 h 210 h	[5]
PAA-Li	1 mA cm^{-2}, 1 mAh cm^{-2}	250 h	[6]
LiF/PEO	1 mA cm^{-2}, 1 mAh cm^{-2}	1000 h	[7]
w/U-CD	1 mA cm^{-2}, 1 mAh cm^{-2}	250 h	[8]
LMCA	0.5 mA cm^{-2}, 1 mAh cm^{-2}	650 h	[9]
Li@LZP	1 mA cm^{-2}, 1 mAh cm^{-2} 3 mA cm^{-2}, 1 mAh cm^{-2}	1050 h 240 h	This work

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