Supporting information

Locally regulating Li^+ distribution on electrode surface with Li-Sn alloying nanoparticles for stable lithium metal anodes

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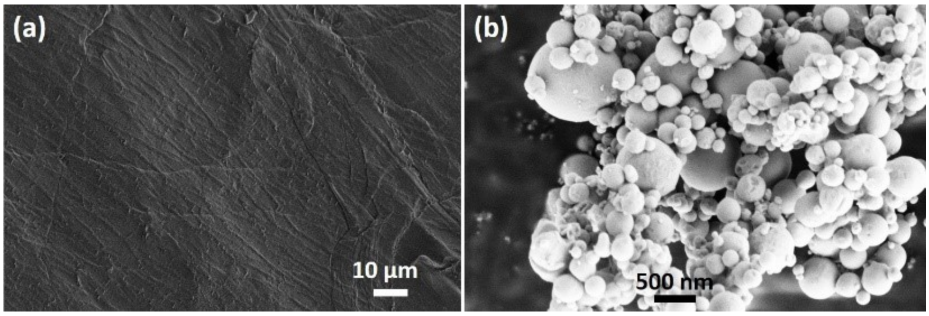

Fig. S1 The SEM images of (a) bare Li and (b) Sn powders.

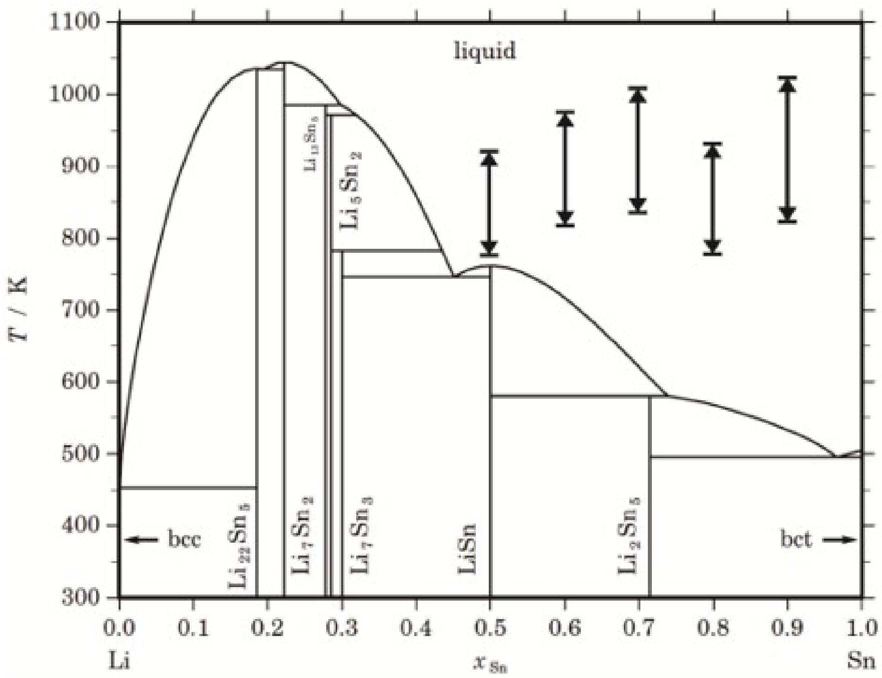

Fig. S2 The binary phase diagram of Li-Sn.

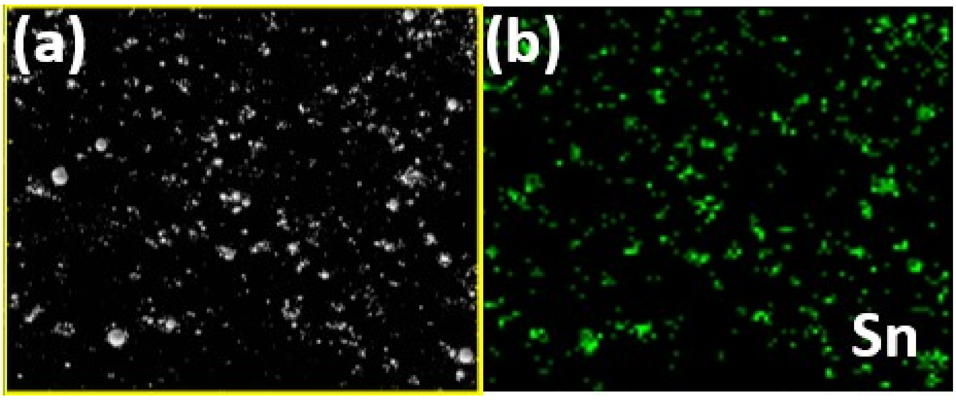

Fig. S3 The elemental distribution of Sn on the surface of Li-Sn anode.

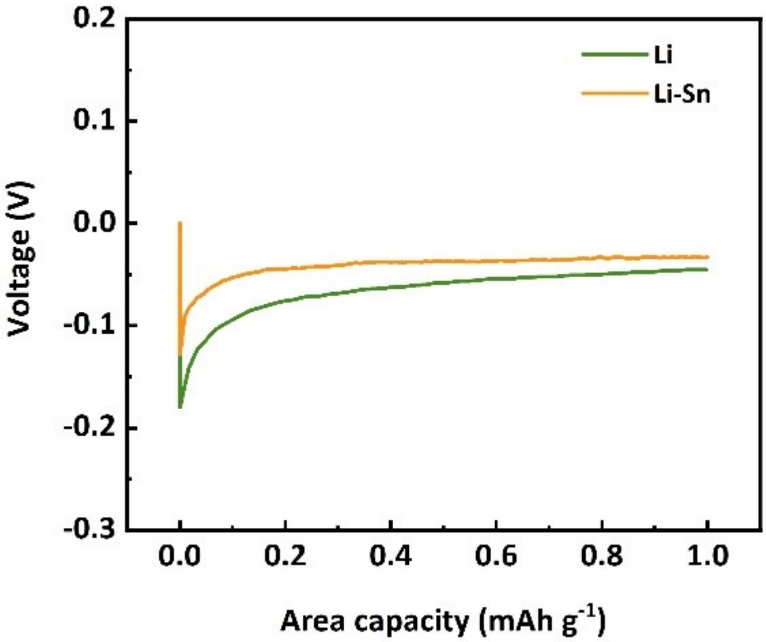

Fig. S4 Comparison of Li nucleation overpotential on the bare Li and Li-Sn anode.

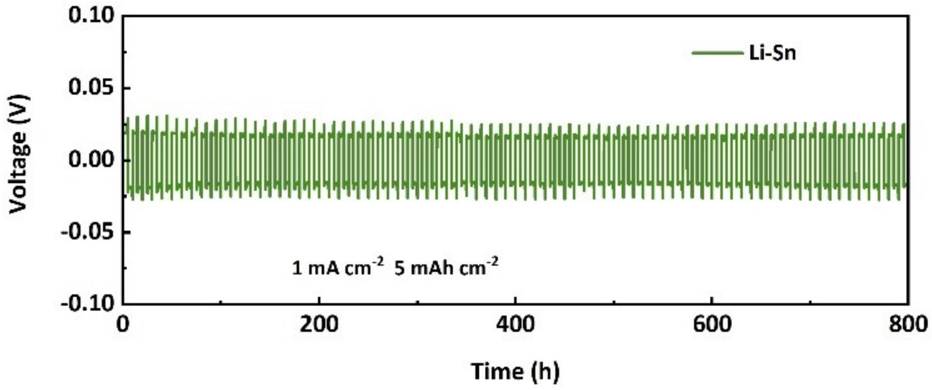

Fig. S5The cycling performance of Li-Sn symmetrical cell with the plating/stripping capacity of 5 mAh cm^{-2} at the current density of 1 mA cm^{-2}.

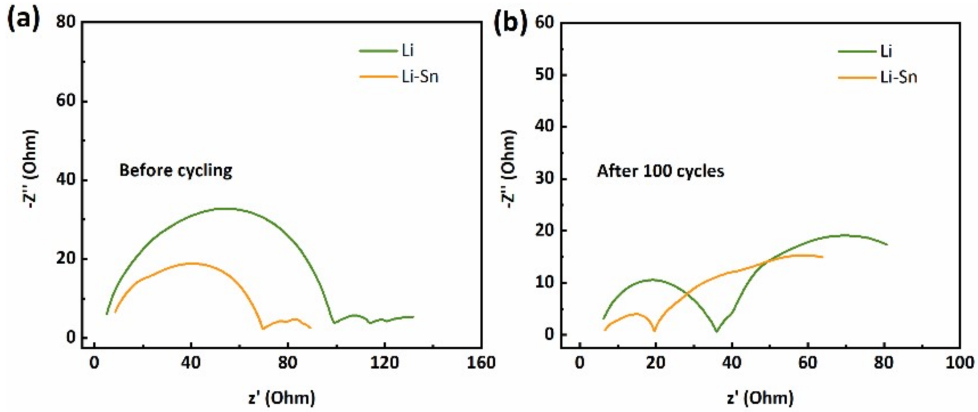

Fig. S6 Comparison of impedance of bare Li and Li-Sn symmetrical cells before cycling and after 100 cycles.

Table S1 Comparison of electrochemical performance of similar configuration of anode.

Li-M alloy anode	Modification method	Current density-capacity ($mA\ cm^{-2}$-$mAh\ cm^{-2}$)	Hysteresis voltage (mV)	Cycling time (h)	Reference
Li@NFZO	Li melting infusion	1-1	57	700	[1]
Li-LiAl	Li-Al thermal melting	1-1	15	1100	[2]
Li@Li-Zn	Depositing Zn on Cu foam- electrochemical deposition	1-1	23	400	[3]
Li@CuSn	Electroless Sn plating-electrochemical deposition	1-1	~20	800	[4]
CP/Sn/SnO_2@Li	Heat treatment (SnO2, Li)	1-1	~25	800	[5]
Li-Mg alloy	Melting-spontaneous reaction	1-1	23	1000	[6]
Sn-Li scaffold	Electrodeposition	1-1	21.3	750	[7]
Li-Sn	Rolling	1-1	10	1200	This work
		1-5	20	800	

Table S2 Simulation parameters of impedance for bare Li and Li-Sn symmetrical cells before and after cycling.

Electrode	Before cycling		After 100 cycles	
	R_{SEI} (Ω)	R_{ct} (Ω)	R_{SEI} (Ω)	R_{ct} (Ω)
Li	93.4	14.2	30.5	68.1
Li-Sn	60.7	9.3	13.2	59.6

References:

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