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SUPPLEMENTARY INFORMATION

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High-purity electrolytic lithium obtained from low-purity sources using solid electrolyte

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Supplementary for

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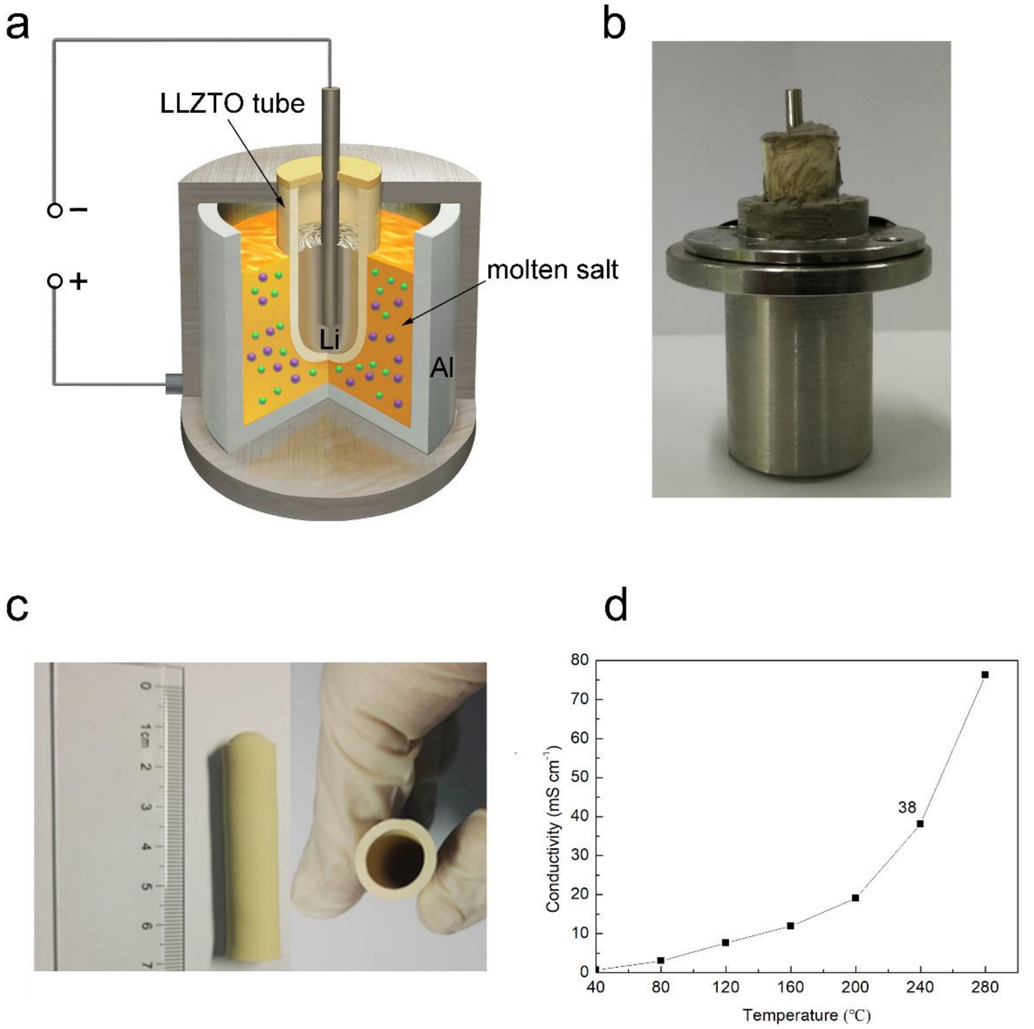
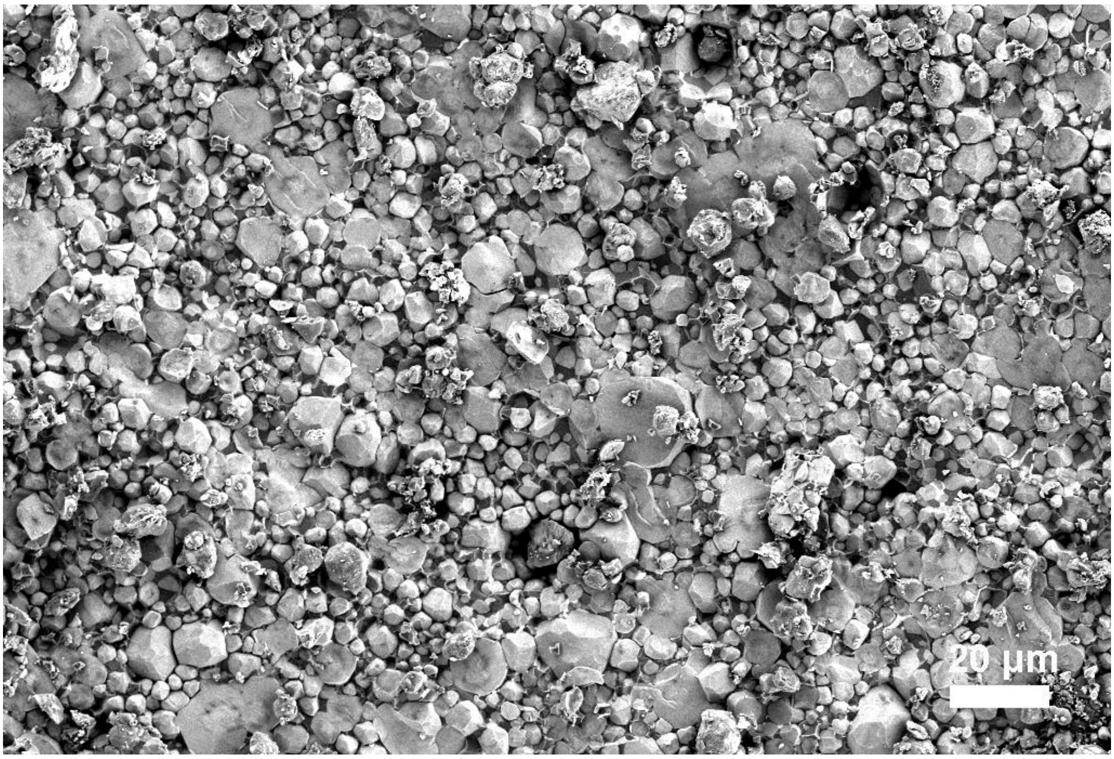
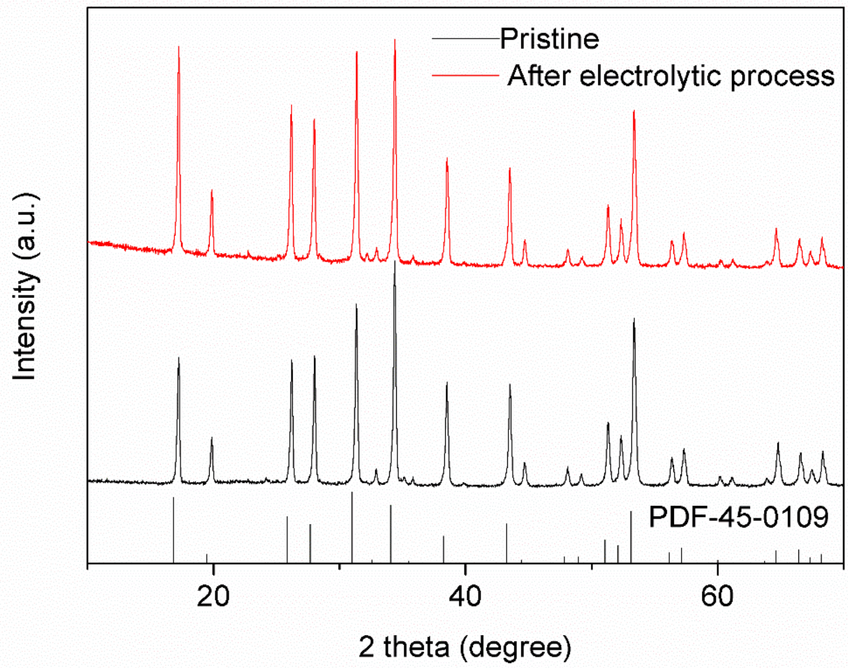


Supplementary Figure 1 | The electrolytic device. a, The schematic of the electrolytic device. The stainless steel shell is used as the anode current collector, and the stainless steel rod is used as the cathode current collector. **b,** The digital photo of the electrolytic device. **c**, Digital photos of the LLZTO solid electrolyte tube. **d**, Ionic conductivity of LLZTO solid electrolyte from 40 ºC to 280 ºC.



Supplementary Figure 2 | Scanning electron microscope image of the LLZTO solid electrolyte.



Supplementary Figure 3 | X-ray diffraction patterns of the LLZTO solid electrolyte before and after the electrolytic process.

Supplementary Table 1 | ICP-MS measurement results of the electrolytic Li, the commercial Li and the ultra-pure water.

	Li	La	Zr	Ta	Br	I	S	Cl	Na	Al
electrolytic Li (ppm)	1020	<0.01	<0.01	<0.01	<0.01	<0.01	0.18	1.68	1.53	0.59
commercial Li (ppm)	1031	<0.01	<0.01	<0.01	<0.01	<0.01	0.20	1.72	1.54	0.63
ultra-pure water (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.20	1.66	0.28	0.02

Supplementary Table 2 | ICP-MS measurement results of the electrolytic Li obtained from the mixed salt with low Li ion concentration.

	Li	La	Zr	Ta	Na	K	Mg	Al
electrolytic Li (ppm)	1025	<0.01	<0.01	<0.01	1.53	0.22	0.05	0.59

Supplementary Table 3 The production cost of the electrolytic Li (1 kg).

		Price ($)
LiCl	6 kg	24
Al	1.34 kg	3
Electricity	8.4 kWh	1