

Supporting Information for

Fast Lithium-Ion Conduction in Atom-Deficient *closo*-Type Complex Hydride Solid Electrolytes

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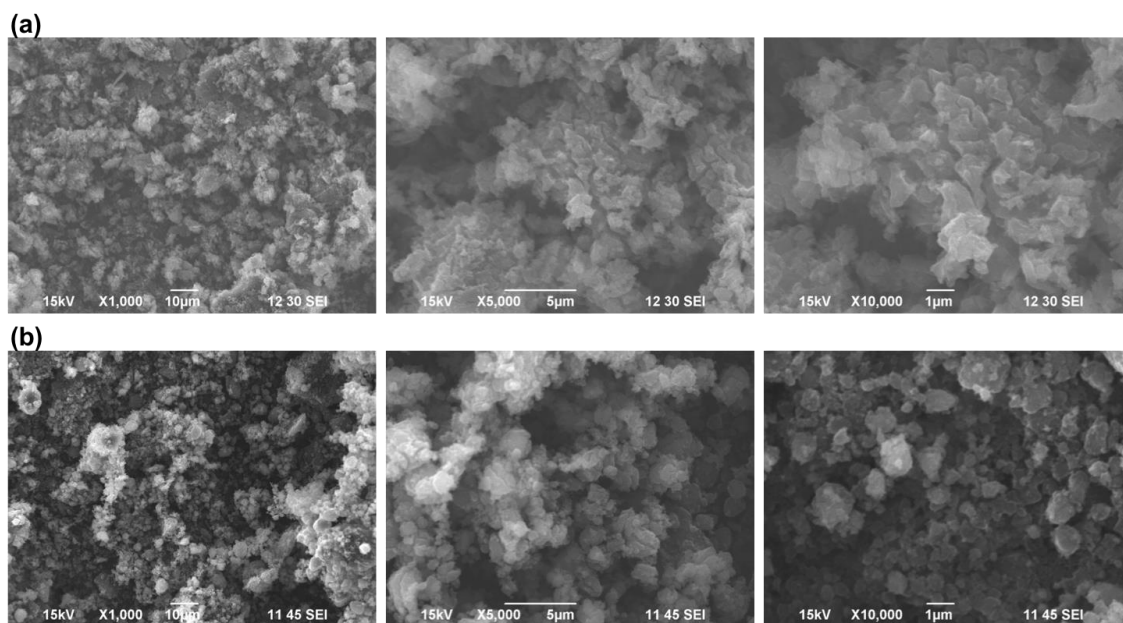


Figure S1. SEM images of (a) pristine and (b) ball-milled $\text{Li}_2\text{B}_{12}\text{H}_{12}$ at various magnifications.

Table S1. Ratios of integral intensities of the (021) and (111) peaks.

	$I_{(021)}/I_{(111)}$
Pristine	0.015
Ball-milled	0.008
Disordered HT phase ¹	~ 0

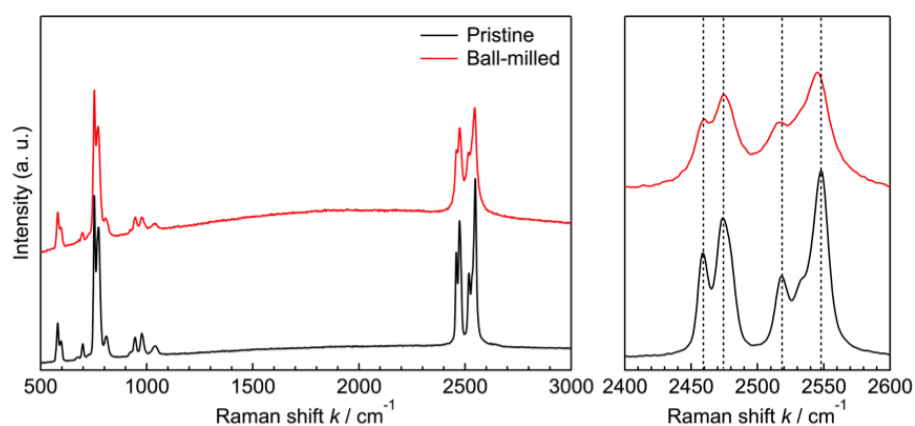


Figure S2. Raman spectra of pristine and ball-milled $\text{Li}_2\text{B}_{12}\text{H}_{12}$.

After ball-milling, the Raman peaks at ~ 2520 and 2550 cm^{-1} resulting from B-H stretching modes are shifted to lower wavelength, indicating the local distortion of B-H bonding in the ball-milled sample.

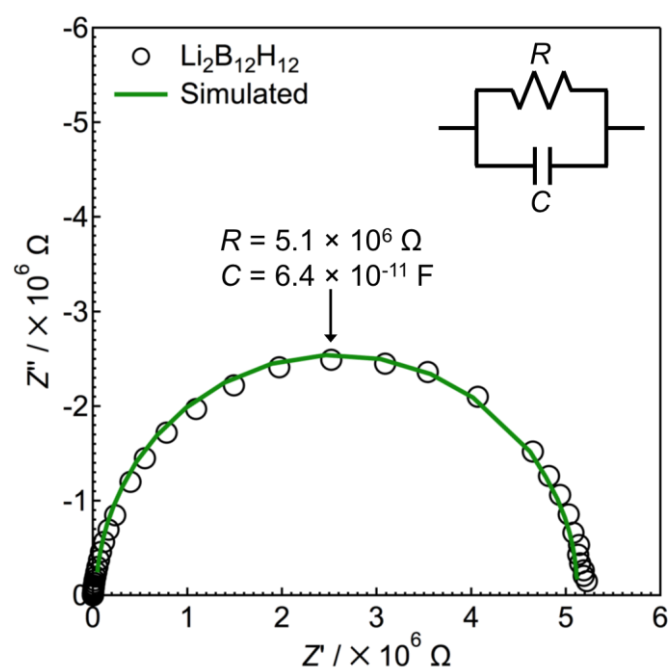


Figure S3. Nyquist plot and simulated curve for pristine $\text{Li}_2\text{B}_{12}\text{H}_{12}$ at 30 °C. The inset shows the equivalent circuit that was used for fitting.

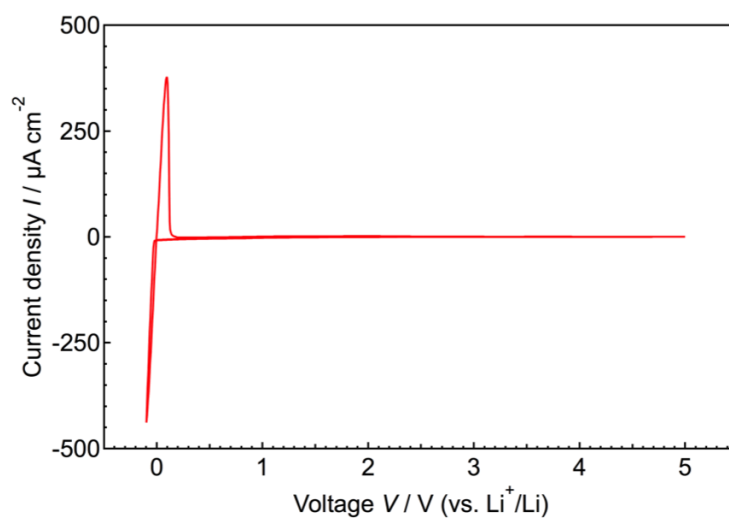


Figure S4. CV curve of an SS/ball-milled $\text{Li}_2\text{B}_{12}\text{H}_{12}/\text{Li}$ cell at a scan rate of 5 mV s^{-1} and a scan range of -0.1 to $5 \text{ V (vs. Li}^+/\text{Li)}$.

References

- (1) Paskevicius, M.; Pitt, M. P.; Brown, D. H.; Sheppard, D. A.; Chumphongphan, S.; Buckley, C. E. First-order phase transition in the $\text{Li}_2\text{B}_{12}\text{H}_{12}$ system. *Phys. Chem. Chem. Phys.* **2013**, *15*, 15825-15828.