

Supporting Information

Electrochemical Oxidative Stability of Hydrobo- rate-Based Solid-State Electrolytes

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FIGURES

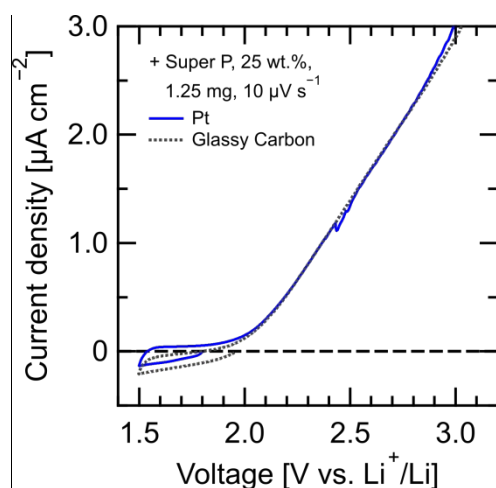


Figure S1. Linear sweep voltammograms of a $\text{Li}/\text{LiBH}_4/\text{LiBH}_4\text{-C}/\text{Pt}$ cell (blue) and $\text{Li}/\text{LiBH}_4/\text{LiBH}_4\text{-C}/\text{Glassy Carbon}$ cell (gray) with 25 wt % Super P in the 5 mg $\text{LiBH}_4/\text{carbon}$ composite at a scan rate of $10 \mu\text{V s}^{-1}$ from 1.5 to 4.0 V vs Li^+/Li at 60°C .

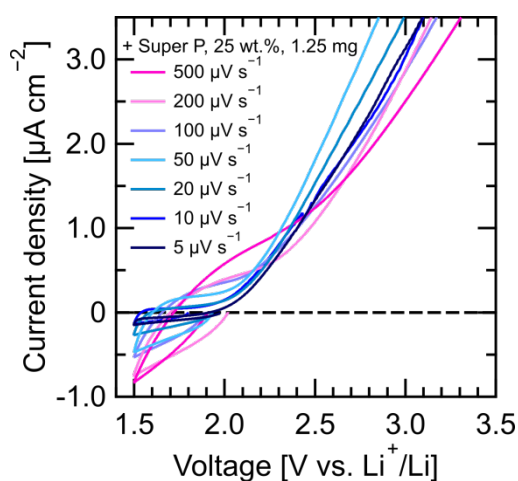


Figure S2. Linear sweep voltammograms of a $\text{Li}/\text{LiBH}_4/\text{LiBH}_4\text{-C}/\text{Pt}$ cell with 25 wt % Super P in the 5 mg $\text{LiBH}_4/\text{carbon}$ composite at scan rates of 5, 10, 20, 50, 100, 200, and $500 \mu\text{V s}^{-1}$ from 1.5 to 4.0 V vs Li^+/Li at 60°C .

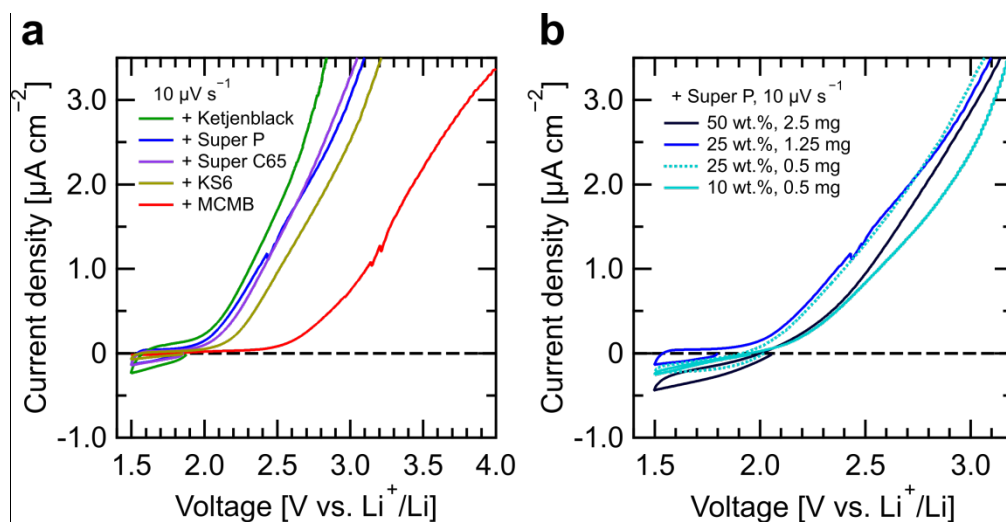


Figure S3. (a) Linear sweep voltammograms of Li/LiBH₄/LiBH₄-C/Pt cells with 5 wt % Ketjenblack (green), 25 wt % Super P (blue), 25 wt % Super C65 (purple), 25 wt % KS6 (yellow), and 25 wt % MCMB (red) in the 5 mg LiBH₄/carbon composite at a scan rate of $10 \mu\text{V s}^{-1}$ from 1.5 to 4.0 V vs Li⁺/Li at 60 °C. (b) Linear sweep voltammograms of Li/LiBH₄/LiBH₄-C/Pt cells with 10, 25, and 50 wt % Super P in the 2 (dotted curve) or 5 (solid curves) mg LiBH₄/carbon composite at a scan rate of $10 \mu\text{V s}^{-1}$ from 1.5 to 4.0 V vs Li⁺/Li at 60 °C.

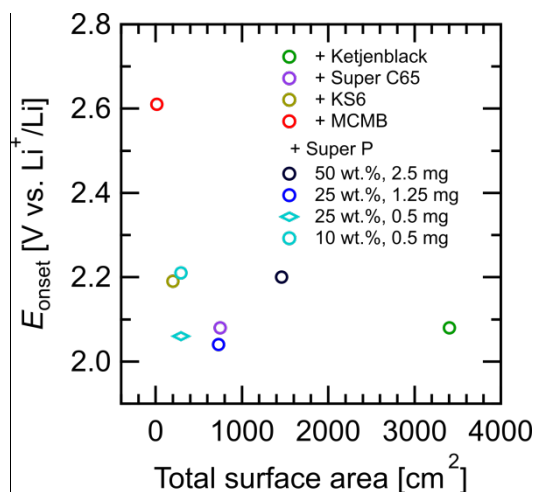


Figure S4. E_{onset} at a scan rate of $10 \mu\text{V s}^{-1}$ at 60 °C plotted against the total surface area of the conductive carbon in the LiBH₄/carbon composite. The circle symbol stands for a 5 mg composite, while the diamond symbol stands for a 2 mg composite. The total surface area was calculated from the BET specific surface area and weight of the respective conductive carbon in the composite.

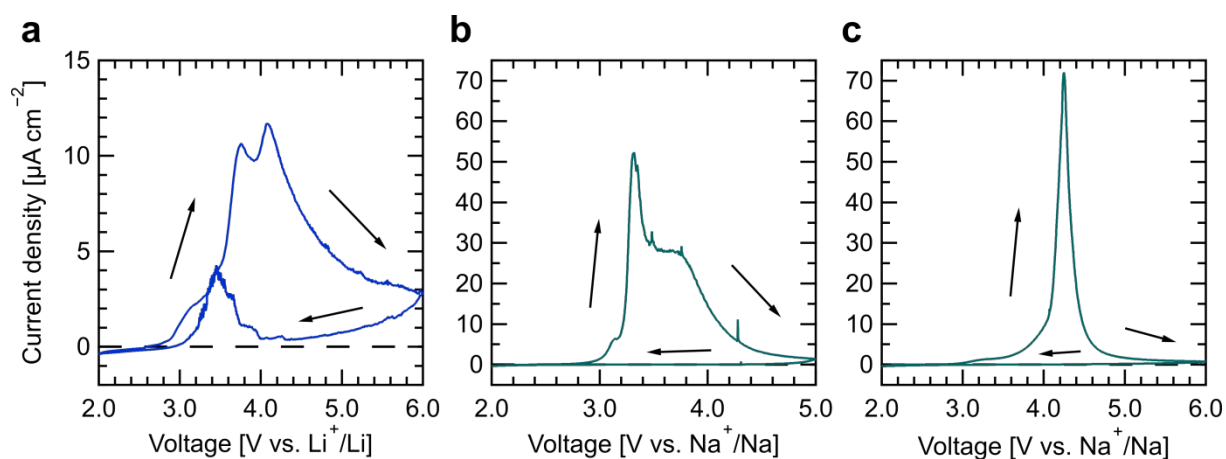


Figure S5. Cyclic voltammograms of Li or Na/SSE/SSE-C/Pt cells using (a) $\text{Li}_2(\text{CB}_9\text{H}_{10})(\text{CB}_{11}\text{H}_{12})$ between 2.0 and 6.0 V vs Li^+/Li , (b) $\text{Na}_4(\text{B}_{12}\text{H}_{12})(\text{B}_{10}\text{H}_{10})$ between 2.0 and 5.0 V vs Na^+/Na , and (c) $\text{Na}_4(\text{CB}_{11}\text{H}_{12})_2(\text{B}_{12}\text{H}_{12})$ between 2.0 and 6.0 V vs Na^+/Na , with 25 wt % Super C65 in the 5 mg SSE/carbon composite at a scan rate of $10 \mu\text{V s}^{-1}$ at 60°C . A cyclic voltammogram using $\text{Na}_3(\text{BH}_4)(\text{B}_{12}\text{H}_{12})$ is not shown due to the failure of a cell.