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Supporting Information

High Capacity and Rate Performance of $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ Composite Cathode for Bulk-Type All-Solid-State Lithium Battery

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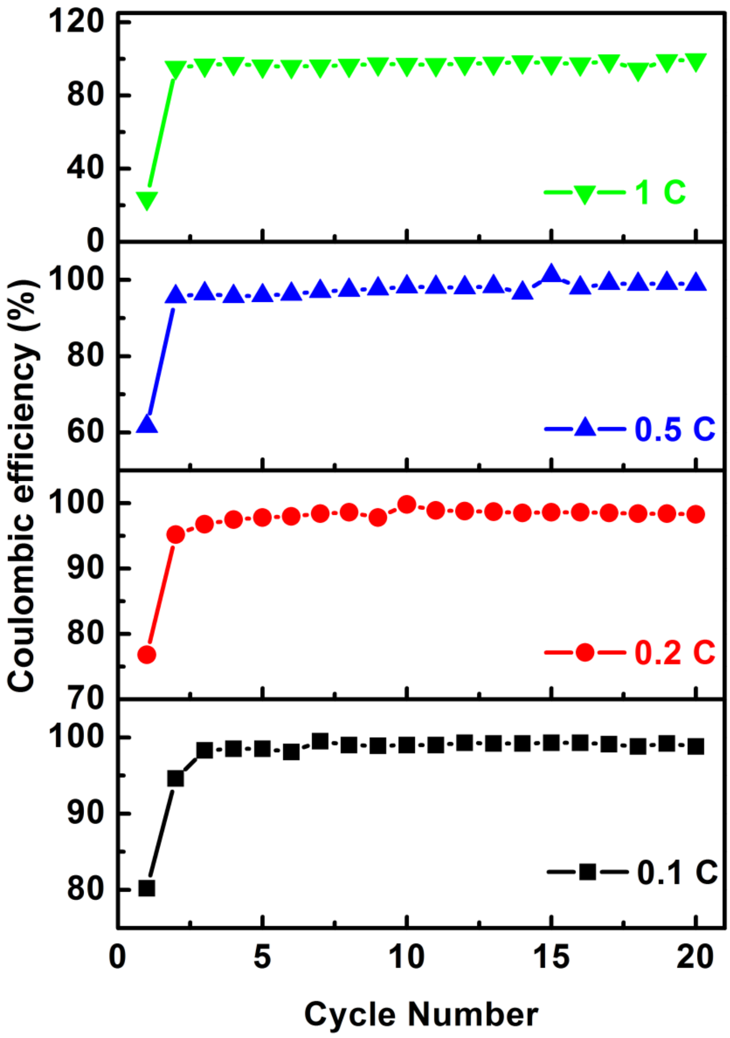

Fig. S1 The Coulombic efficiency of the 811 composite electrodes at various discharge current rates.

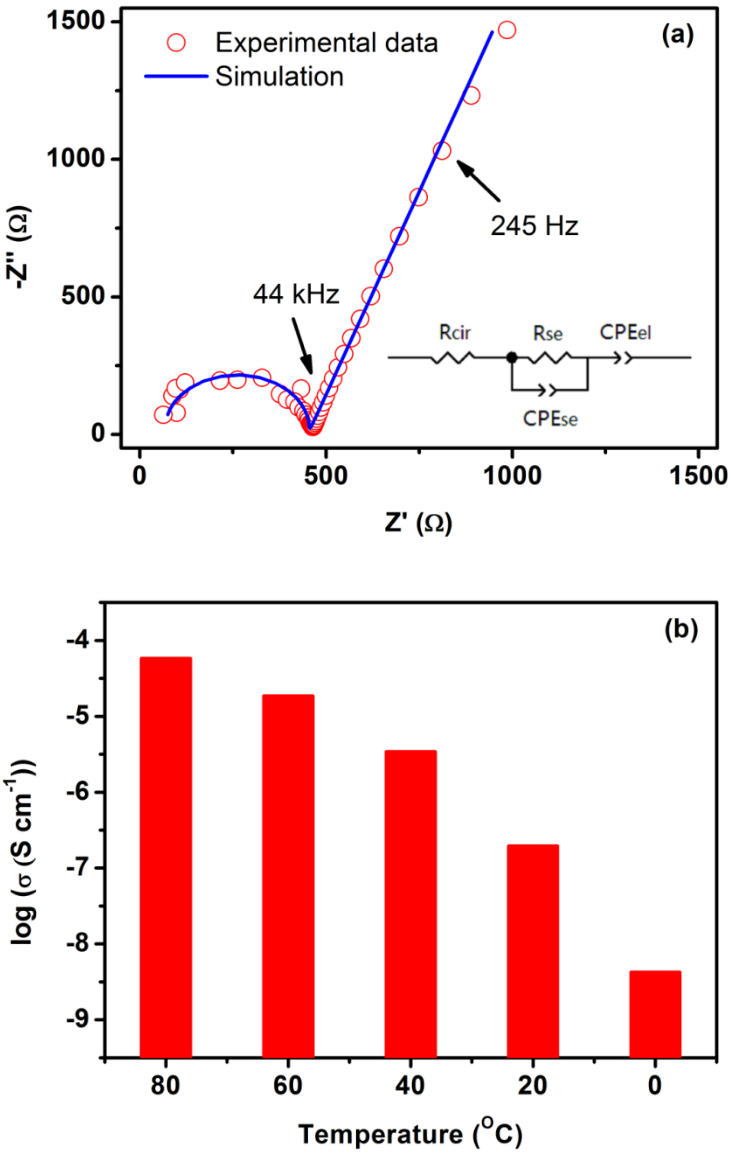

Fig. S2 (a) Electrochemical impedance spectroscopy (EIS) profile of the dry polymer electrolyte at 80 °C. The inset shows the equivalent circuit utilized for simulation. (b) The conductivities of the dry polymer electrolyte at different temperature.

Figure S2a shows the typical Nyquist plots of the EIS measurements for the dry polymer electrolyte at 80 °C, which is used for assembling the all-solid-state lithium battery. The open dots are the experimental data and the solid curve is the fitting line with an equivalent circuit of (R_{cir})($R_{se}CPE_{se}$)(CPE_{el}), as shown in the inset of Fig. S2a, where R is the resistance, CPE is the constant phase element and the subscripts “cir”, “se” and “el” refer to circuit, solid electrolyte and electrode, respectively. The solid curve fits the experiment data very well, indicating that the equivalent circuit is suitable to the samples and the impedance plots could be well-resolved into circuit, solid electrolyte, and electrode contributions.

The conductivities of the dry polymer electrolyte at different temperature can be obtained by fitting the EIS data, as shown in Fig. S2b. It can be observed that the conductivity of the dry polymer electrolyte is improved notably with increasing the testing temperature, which reaches 1.8×10^{-5} S cm^{-1} at 60 ^{o}C and 5.8×10^{-5} S cm^{-1} at 80 ^{o}C. However, these conductivities at high temperature are still too low to meet the needs for application in high-performance all-solid-state lithium battery.