Supporting Information

The role of cobalt content in improving low temperature performance of layered lithium-rich cathode materials for Li-ion batteries

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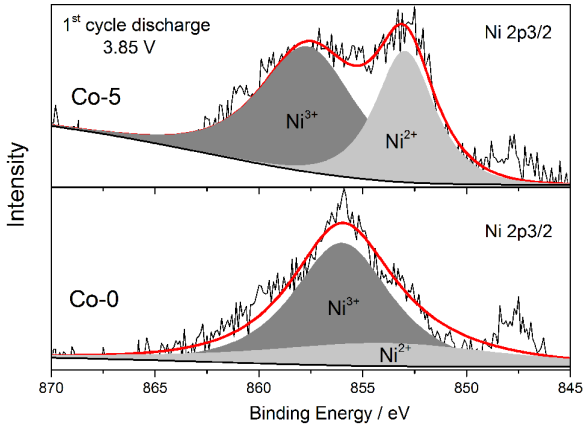

Figure S1. XPS spectra of Ni 2p3/2 for Co-0 and Co-5 electrodes: the measurements were conducted to the first discharge process

The XPS spectra and fitting spectra of Ni 2p3/2 for Co-0 and Co-5 electrodes are displayed in Figure S1 to demonstrate the variations in the chemical states. Before the test, the electrodes fully discharged to 3.85 V in the initial cycle were disassembled from coin cells and rinsed with dimethyl carbonate several times in a glove box, and then dried at room temperature. Due to the fact that the XPS can only identify the surface chemistry of samples, it is hard to get specific data from XPS analysis. However, the mole fractions of the transition metal ions could still offer some meaningful comparison values and truly reflect the effect of Co doping on the reduction process of $Ni^{4+/2+}$. As shown in Figure S1, via the peak integral on Ni^{2+} and Ni^{3+}, we find that the ratio of Ni^{3+}/Ni^{2+} in Co-0 is more than that of Co-5 at 3.85V during the first discharge process, indicating a larger reduction degree of Ni in sample Co-5. Namely, the reduction reaction of Ni^{4+} is facilitated by Co doping.