Improved Cycling Performance and Surface Chemistry Studies of 4.8 V Li-rich Layered Oxide Cathode Using Fluorinated Linear Carbonate as a High-Voltage Additive

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Li-rich layered oxide of $xLi_2MnO_3.(1-x)Li(Mn,Ni,Co)O_2$ is one of the most promising cathode materials for high-energy density Li-ion batteries due to their high discharge capacities of ≥ 250 $mAhg^{-1}$ on the operation above 4.6 V vs. Li/Li+. Its cycling performance, however, has been limited at high-voltage operation (> 4.3 V), due to anodic instability of conventional electrolyte and interfacial instability of the cathode. Here we report significantly improved cycling performance of 4.8 V half-cell and full-cell with $Li_{1.2}Mn_{0.525}Ni_{0.175}Co_{0.1}O_2$ cathode and fluorinated linear carbonate as a novel high-voltage electrolyte additive. Interfacial reaction (SEI formation) mechanism, the SEI composition and stability, and their relations to high-voltage cycling performance would be discussed.