Stabilization of High-Voltage Cathode-Electrolyte Interface for Stable Battery Performance

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Nickel-rich three-components layered oxides as known as $Li(Ni_{x-y}Co_xMn_y)O_2$(NCM, 1-x-y>0.5) are the rising cathode active materials for high-energy density Li-ion batteries. $LiNi_{0.8}Co_{0.1}Mn_{0.1}O_2$ shows a high reversible capacity because of high nickel portion. The reversible capacity can be increased more by elevating the charge cut-off voltage above conventional voltage, 4.2V. However, its high-voltage performance is limited due to the anodic instability of conventional electrolyte and cathode-electrolyte interface, and the structural degradation under high-voltages. Interface stabilization by using a small fraction of functional electrolyte additive as a high-voltage stabilizer is a cost effective approach to improve high-voltage stability and cycling performance. We present improved cycling performance and the correlation between performance, surface and structural stability.

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