

Comparative Study on the Effect of Coating on Li[Ni_{0.5}Mn_{0.3}Co_{0.2}]O₂/graphite Pouch Cells

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Coated Li[Ni_{0.5}Mn_{0.3}Co_{0.2}]O₂ (NMC532)/graphite and uncoated NMC532/graphite pouch cells were examined with or without electrolyte additives using the ultra high precision coulometry (UHPC), high temperature storage testing, electrochemical impedance spectroscopy (EIS), gas evolution measurements, 4-wire frequency response analyzer (FRA) and long-term cycling testing. The electrolyte additives tested were vinylene carbonate (VC), 2% prop-1-ene-1,3-sultone (PES) + 1% ethylene sulfate (DTD) + 1% tris(trimethylsilyl) phosphite (TTSPi)¹ (PES211) and some other promising electrolyte additive combinations which will be disclosed during the conference. The interaction between charged positive electrode and negative electrode was also investigated using the pouch bag method developed by Xiong et al.². Coating materials and electrolyte additives show synergistic effect on cell performance.

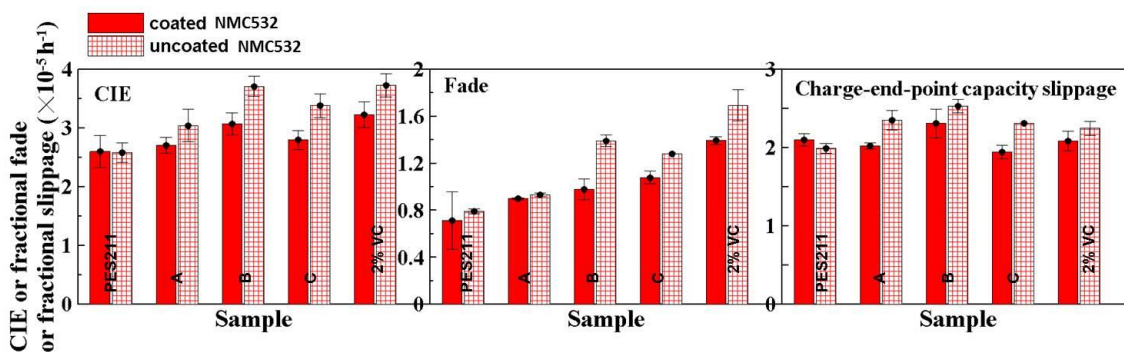


Figure 1. A summary of UHPC test results for coated and uncoated NMC532/graphite pouch cells filled with different electrolytes as indicated after 16 cycles between 3 and 4.3 V with currents corresponding to C/20 at 40°C including (a) coulombic inefficiency per hour, (b) fractional discharge capacity fade per hour and (c) fractional charge end-point capacity slippage per hour. The data shown is the average of two cells.

References:

- [1] K.J. Nelson, G.L. d'Eon, A.T.B. Wright, L. Ma, J. Xia, J.R. Dahn, *J. Electrochem. Soc.* 162 (2015) A1046–A1054.
- [2] D.J. Xiong, R. Petibon, M. Nie, L. Ma, J. Xia, J.R. Dahn, *J. Electrochem. Soc.* 163 (2016) A546–A551.