

Electrolytes for High Voltage Cathode Materials

Li Yang, Jung Hyun Kim and Mei Cai
 Chemical Sciences and Materials Systems Lab, General Motors
 30500 Mound Road, Warren, MI 48090

The state of art electrolyte (1.0 M LiPF₆-EC: DEC (2:1 v: v)) has an anodic stability lower than 4.7 V vs. Li/Li⁺, due to the decomposition of the carbonates. The graphite-LiNi_{0.5}Mn_{1.5}O₄ full cells were fabricated and tested with/without additives (LiBOB, LiODFB and Tris(2,2,2-trifluoroethyl) phosphate) at 60 °C.

From the preliminary data, it is found that the columbic efficiency of the baseline electrolyte has a value around 70%, while for the LiBOB and LiODFB based electrolyte, which are typically reduced at graphite at around 1.8V vs. Li/Li⁺ and form a protecting film, has a columbic efficiency around 95%.

Further investigations (such as 3-electrode cell) will be conducted to confirm the origins of these additive benefits and this will be greatly helpful for 5 V electrolyte searching.

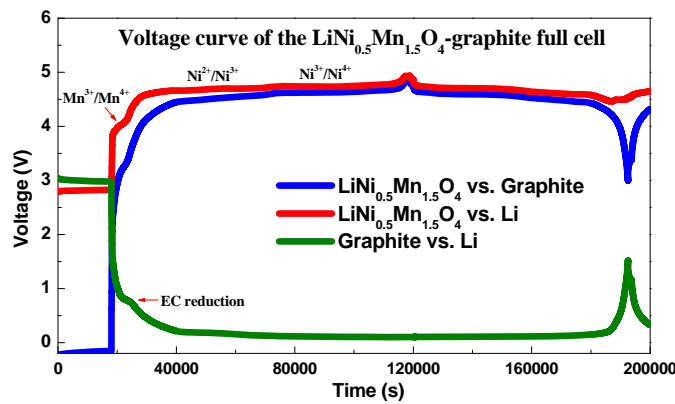


Fig. 1 3-electrodes cell of LMNO-Graphite

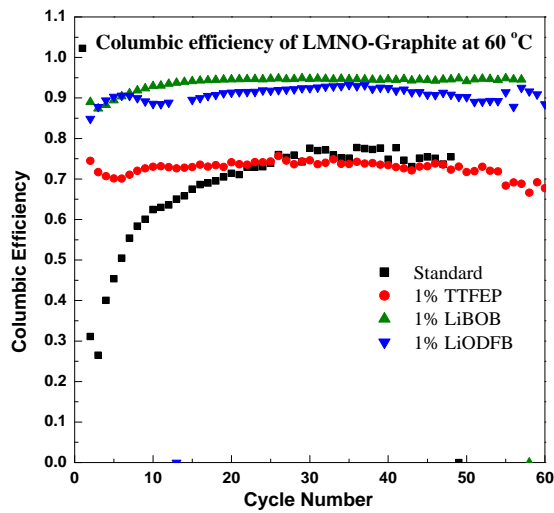


Fig. 2 Columbic efficiency of LMNO-Gra. at 60 °C

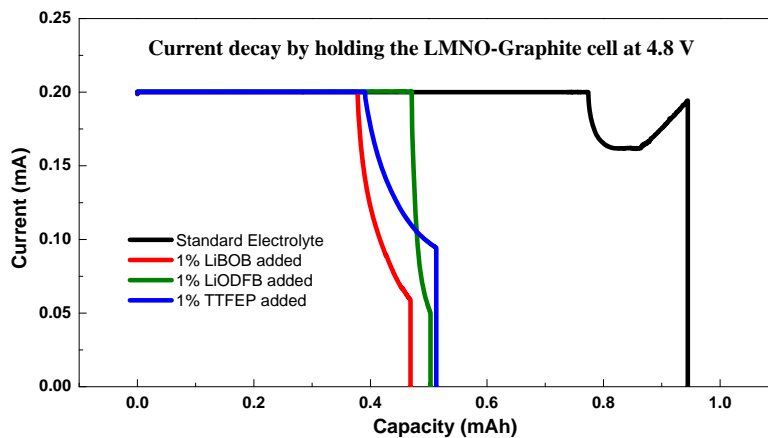


Fig. 3 Current decay of LMNO-graphite at 60 °C