

Study on high energy lithium-ion battery with lithium-rich transition metal oxides

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ABSTRACT:

The lithium-rich transition metal oxides show a larger first charge capacity and larger cycling capacities than the non-lithium-rich transition metal oxides. In this study, $x\text{Li}_2\text{MnO}_3 \cdot (1-x)\text{LiMO}_2$ (M=Mn,Ni) and Commercial LiMn_2O_4 were used as cathode materials.

We describe electrochemical characterizations of graphite, MCMB(Mesophase Carbon Micro Bead) and hard carbon anodes paired with $x\text{Li}_2\text{MnO}_3 \cdot (1-x)\text{LiMO}_2$ cathodes in 413453-type thin Li-ion battery(Figure 1.) and the electrochemical performance is significantly improved after surface modification. The surface of layered $x\text{Li}_2\text{MnO}_3 \cdot (1-x)\text{LiMO}_2$ was coated with FePO_4 by co-precipitation method. The obtained materials were characterized by X-ray diffraction(XRD) and transmission electron microscopy(TEM).

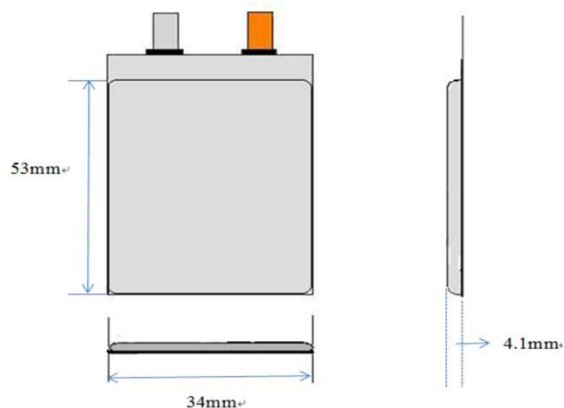


Fig. 1 413453-type thin Li-ion battery

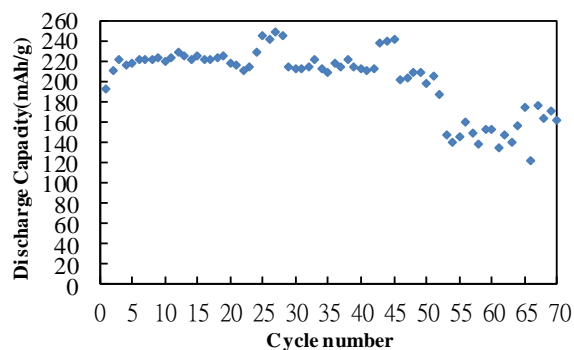


Fig. 2 Cycling performance of pristine $x\text{Li}_2\text{MnO}_3 \cdot (1-x)\text{LiMO}_2$ in the voltage range 2.7-4.8V at 0.2C.

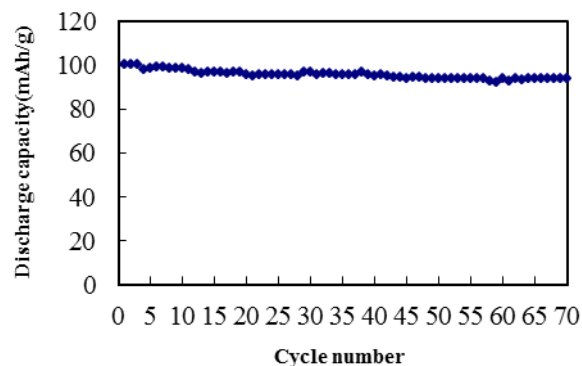


Fig. 3 Cycling performance of commercial LiMn_2O_4 in the voltage range 3.0~4.3 at 0.2C.

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