Electrochemical and structural properties of layered LixMn1-yMyO2 (M = transition metal) cathode materials for lithium secondary batteries

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LixMn1-yMyO2 powders using glycolic acid as a chelating agent at the various calcinations temperature. The structural and electrochemical properties of the prepared materials were investigated using various analytical techniques and correlated to explain the electrochemical activity of the materials. This materials shows that the initial capacity is over 180 mAh/g with excellent cyclability in the 2.4-4.5 V range. The transition metal doped structure is very effective to increase the cycle performance of LixMn1-yMyO2 layered.

Lithiated transition metal oxides LiMO2 (M = Co, Ni, Mn) have been extensively studied as cathode materials for commercial rechargeable lithium ion batteries. The layered LiMnO2 are promising candidates as cathodes material because of their high theoretical capacity (285 mAh/g), low cost, abundance and nontoxic. Unfortunately, solid-state reaction at high temperature to prepare layered LiMnO2 has been unsuccessful due to the non-layered structure such as spinel LiMn2O4, orthorhombic LiMnO2, or rock salt Li2MnO3. In order to obtain layered LixMnO2 structrue are required soft chemistry methods. But layered manganese oxides are transform to the spinel phases upon electrochemical cycling and this problems are associated with the Jahn-Teller distortion.

In this work, a sol-gel method was employed to prepare transition metal doped