

Electrochemical and Safety Performance of Lithium Rich (Li-Mn-O) based Cathode Materials for Li-Ion Batteries

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Abstract

The lithium ion (Li-ion) batteries are rechargeable batteries and reliable to store electrical energy in electronic devices such as Mobile Phones and Hybrid Electric Vehicles (HEV). Among other cathode materials, Li-Mn-O based materials are most attractive for their safe, durable and high energy density. In this paper, nanostructured Li-Mn-O based cathode materials were synthesized by sol-gel method using acetate materials as precursors with chelating agent in a stoichiometric ratio. From the TGA/DTA measurements of the sample, weight loss intervals were identified to study the decomposition temperature and mass loss. The XRD analysis of the sample indicates that the synthesized material was crystalline in nature and found to be in monoclinic phase. From the FESEM images, layered stack like morphology was observed and the elemental composition of the materials were studied using EDAX. The cathode materials were coated on aluminium foil and the half-cells (2032) were coined. The fabricated cells were studied using Cyclic Voltammetry (CV), Electrochemical Impedance Spectroscopy (EIS), and Charge-Discharge curve and its cycle life behaviour was investigated.

Keywords: Li-ion battery, monoclinic phase, layered stack morphology, cyclic voltammetry, Electrochemical Impedance Spectroscopy, cycle life behaviour