

XRD, FT-IR, SEM and Electrical Studies of $\text{Li}_4\text{Mn}_{4.5}\text{V}_{0.5}\text{O}_{12}$

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Abstract In the present work, molten salt method has been used to synthesize cathode material ($\text{Li}_4\text{Mn}_{4.5}\text{V}_{0.5}\text{O}_{12}$) and the structural, morphological and electrical properties have been analyzed. XRD pattern revealed the formation of cubic spinel structure without any impurity or secondary phase. The presence of functional groups was revealed from FT-IR spectrum. SEM analysis elucidates the formation of sub-micron sized polyhedral shaped particles without any agglomeration. dc conductivity of the sample was studied with the help of complex impedance spectroscopy in a wide range of temperature. Maximum conductivity of $2.09 \times 10^{-3} \text{ S cm}^{-1}$ has been obtained at 380 °C.

1 Introduction

A rechargeable Li-ion battery plays a vital role in electronic equipment such as mobile phones, laptops, camcorders, etc. [1]. Commercially, Li-ion batteries use graphite as an anode and LiCoO_2 as a cathode due to long cycle life, low working potential, and high energy density. The limiting factor behind this cathode material is high cost and toxicity, which opens a new challenge to the researchers to identify an eco-friendly material with good electrical performance. A number of research works has been carried out on different electrode materials such as Ni oxides, Mn oxides, vanadate and phosphates as cathodes [2]. Among these cathodes, Mn based oxides receives great interest due to its main advantages such as low cost and

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417