

**PROCESSING OF NANOSTRUCTURES AND THEIR VOLTAGE-TIME
CHARACTERISTICS**

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ABSTRACT

PROCESSING OF NANOSTRUCTURE MATERIAL AND THEIR VOLTAGE-TIME CHARACTERISTICS

The $\text{LiCo}_{0.55}\text{Ni}_{0.4}\text{Fe}_{0.05}\text{O}_2$ was prepared as nanostructure cathode materials using a high-energy ball milling method with different parameters. The nanostructure cathode materials was milling for 3 hours, 5 hours and 10 hours. The nanostructure cathode materials prepared by high-energy ball milling method exhibit much smaller particle size than the non-ball milled cathode materials. The voltage-time curves for first cycle of nanostructure cathode material prepared by ball-milled was improved. The voltage-time was tested by using the Wonatech Electrical Tester. The 1mA was use to charging up to 4.3 V and 1Ma discharge up to 2.5 V. We tested the particle size by using SEM. The particle size was different for every parameter. The particle size of nanostructure cathode material ball-milled at 10 hour was smaller compared to non-ball milled nanostructure cathode material.

CHAPTER 1

INTRODUCTION

1.1 Background of study

Sparked primarily by the need for safe, portable, high voltage energy storage, lithium ion (Li-ion) batteries have been heavily researched over the past three decades. Global energy demand from both the grid and portable applications such as hybrid electric vehicles have created a need for environmentally responsible energy storage. Lithium-ion batteries are one such energy storage system which has been investigated intensively owing to their high energy density, high operating voltage and low self-discharge (D.Im et al, 2003).

Lithium rocking chair or rechargeable batteries are gaining importance because of their high kinetic energy density and long shelf life. Layered LiCoO_2 and LiNiO_2 are being intensively studied because of their interesting properties as cathode materials for lithium power sources (G. Ting-Kuo Fey et al, 2001).

Cathode materials are typically oxides of transition metals, which can undergo oxidation to higher valence when lithium is removing. The cathode materials most commonly used in lithium ion batteries are LiCoO_2 , LiNiO_2 , and LiMn_2O_4 (Jeffrey W. Fergus, 2010).