ELECTROCHEMICAL BEHAVIOR OF LITHIUM CHROMIUM OXIDE

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ABSTRACT

Cyclic Voltammetry (CV) is an electrochemical method which can be used to understand the basic electrochemistry of a reaction. The cyclic voltammetry tester is an instrument that controls the potential of the working electrode with respect to the reference electrode while also measuring the current flow between the working electrode and counter electrode. In CV, the potential of a working electrode is cycled linearly between two potential values at which the oxidation and reduction of a solute occurs. The resulting current-potential curve is called a cyclic voltammogram. This is a very useful technique and has several applications such as understanding the redox behaviour of a given molecule, mechanistic understanding of organic reactions, etc. In this study, the two sample of Lithium Chromium Oxide (LiCrO2) with anneal at 650℃ and 850℃ were tester in CV. After that the electrochemical behaviors of each sample were determined. The result of each sample is reversible reaction and the potential difference of $LiCrO_2$ with anneals at 650℃ and 850℃ is 3.0V and 2.87 V respectively. This result is approximately with theoretical difference potential value of $LiCrO_2$ and it shown the $LiCrO_2$ can be a good active electrode material inside Li-ion batteries.

CHAPTER 1

INTRODUCTION

1.1 Background

The increased demand for power distribution systems, portable electronics and zero emission vehicles have led to the examination of the electrochemical battery as a solution to our energy storage needs. In particular, the rapid development in the field of portable electronics including laptop computers, camcorders, cell phones and wireless communication devices require high energy density batteries to power them. Consumers have simple demands; they want a long lasting, lightweight, cheap, safe battery. To meet these demands, the development of rechargeable (secondary) batteries has been the focus of considerable research. Portable, rechargeable lithium ion batteries offer several advantages when compared to current primary and secondary power sources. Lithium ion batteries have higher cell voltages 3.5-4.2 V (Plicht *et al.*, 1987; Megahed *et al.*, 1995; Berndt, 1997), higher energy density and longer cycle life. Improving the performance of current lithium-ion batteries in these three areas (voltage, energy density, and cycle life) is very important.

However, it is crucial to improve both the safety aspects of this high voltage system and the performance while using more abundant and low cost materials (Dai *et al.*, 2000). Many research groups have focused on improving the characteristics of the positive electrode, particularly developing high voltage cathode materials. Lithium manganese oxides spinel is an interesting and