

CHAPTER 1

INTRODUCTION

Introduction of this dissertation composed of motivation, objectives, scope and limitation, outcomes and dissertation structures.

MOTIVATION

The basic electrochemical unit is called “cell” consists of anode and cathode. A battery is consists of one or more of these cells, connected in series or parallel, or both, depending on the desired output voltage and capacity (Elwin L. Rooy, 1990). Batteries are an important source of energy storage, most of which are used as backup power sources to supply electric power to electrical equipment. In present the electrical energy is normally converted from mechanical energy, solar energy, and chemical energy etc. A battery is a device that converts chemical energy to electrical energy. The first battery developed by Alessandro Volta in 1800. In 1836, John Frederic Daniell a British chemist developed the Daniell cell as an improved version of the voltaic cell. The battery has been the most popular source of electricity in many daily life applications. In our daily life, we generally use two types of battery; one of them is which can be used once before it gets totally discharged. Another type of battery is rechargeable which means it can be used multiple times by recharging it externally. The former is called primary battery and the later is called secondary battery (Linden, D. and Reddy, 2002). Batteries can be found in different sizes, a shirt button or may be so big in size that a whole room will be required to install a battery bank. The battery is used anywhere from small wrist watches to a large ship (Linden, D. and Reddy, 2002). There are two types of batteries: primary and

secondary zinc-carbon, alkaline and lithium-Iron. Secondary batteries include lead acid, nickel-cadmium, nickel-melon-hydride and lithium-Ion (Isidor Buchmann, 2016). However, most commonly used lead acid battery, because of its long life and high discharge capacity (Nithi Intrakrathuk, 2015). Lead-Acid battery is consists of anode, lead powder, peroxide, PbO_2 , cathode, pure lead or porous lead, and electrolyte solution of sulfuric acid (H_2SO_4). Lead-Acid battery is highly toxic from lead to human and environment. Lead is the most commonly encountered toxic metal pollutant in the environment as a result of its current and previous used for example, batteries, gasoline, plumbing, and paints. Considerable effort is, therefore, being directed toward solving this environmental problem. In this regard, the toxicological properties of lead are associated with its interactions with proteins and, in particular, 5-aminolevulinate dehydratase (ALAD). The influence of lead on the latter enzyme is particularly harmful because ALAD is responsible for the asymmetric dimerization of 5-aminolevulinic acid (ALA) to porphobilinogen, a monopyrrole which is essential for heme synthesis. Thus, not only does inactivation of ALAD result in anemia because it inhibits the formation of heme, and hence hemoglobin, but it also results in a build-up of ALA, a neuropathogenic agent. ALAD is a zinc-dependent enzyme, and, in this paper, we address aspects of lead inactivation of ALAD by investigating the reactivity of a synthetic analogue towards Pb (Brian M. Bridgewater and Gerard Parkin, 2002). This work has objectives: to prepare Cu anode and Al, Alloy Al-Zn cathode by hot press method, to measure characteristic, crystal structure, microstructure, resistance and to discharge of Cu anode and Al, Alloy Al-Zn cathode and to study possibility of electrochemical cells of Cu anode and Al cathode in NaCl+DI water.

OBJECTIVES

1. To synthesize Al-Zn alloy cathode and Cu anode by hotpress method.
2. To measure characteristic, crystal structure, microstructure and resistance of Al-Zn alloy cathode and Cu anode.
3. To study electrochemical cells of Al-Zn alloy cathode and Cu anode.
4. To study possibility of electrochemical batteries.

SCOPE AND LIMITATION

1. Zn (0, 1, 2, 3, 4 and 5 by wt%) - doped Al.
2. Characteristic (hardness and density), Crystal structure (X-ray diffraction; XRD), microstructure (Scanning Electron Microscopy; SEM) and Resistance (Pico test multimeter).
3. Measure voltage and current by Cyclic Voltammetry technique.
4. Electrochemical batteries use 4 couples of cathode and anode.
5. The NaCl 2 mol dm^{-3} was used for electrolyte.

OUTCOMES

1. Al-Zn alloy cathode and Cu anode.
2. Electrical properties of Al-Zn alloy cathode and Cu anode.
3. Paper publication on international journal.
4. Prototype electrochemical batteries.

DISSERTATION STRUCTURE

The dissertation consists of 5 chapters; Firstly, Chapter 1 introduces the motives, objectives, scope, limitations, anticipated outcomes of this dissertation, and the place for the work of the dissertation. Secondly, Chapter 2 reviews the basic principles of battery history, the properties of battery terminals. Thirdly, Chapter 3 show materials and method, apparatus for measurement, how to synthesize cathode electrode, Al-Zn alloy and Cu anode. Fourthly, Chapter 4 show the results and discussion of this dissertation. Finally, Chapter 5 the conclusions and suggestion for further work.

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