UNIVERSITI TEKNOLOGI MARA

ANDROID-CONNECTED ARM-BASED VOLTAMMETRY TECHNIQUE FOR AMPEROMETRIC SENSING SYSTEM

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ABSTRACT

Potentiostat is a common device or tool that been used in the nanobiotechnology research. This project addresses the need for a potentiostat that is capable of performing differential pulse voltammetry (DPV) technique on an electrochemical detection in research and development industry. The objective of the project is to design a microcontroller based on measurement instrumentation for an amperometric sensing system to detect hybridization and redox reaction that can happen by using differential pulse voltammetry technique. Furthermore, the device also includes the output interface of the potentiostat by display the output in Androids apps via bluetooth connection. To control the 3-electrode sensor, a potentiostat is required. A specific type of control signal, generated and fed to the potentiostat and data obtained from the potentiostat is further processed using system that has been setup in the microcontroller. The microcontroller acts as both, a control unit to drive the electroanalytical technique Differential Pulse Voltammetry as well as data interpretation of potentiostat electrical output based on signal processing algorithm and transfer it to the Android app via bluetooth module. The data analysis is based on the IV characterization and theory of redox reaction that occurs in ferrocyanide solution.

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CHAPTER 1

INTRODUCTION

1.1   OVERVIEW OF STUDY

Over the past few decades, many sorts of research have been conducted and numerous devices have been developed utilizing technique and method to create a device that can clarify the detection of amperometry sensor technique. Based on that statement, its leads this project to develop a device that using 3-electrode electrochemical biosensor with a microcontroller-based measurement instrumentation. A potentiostat is an electronic instrument that controls the voltage contrast between a Working terminal and a Reference terminal. Both terminals are contained in an electrochemical cell. The potentiostat actualizes this control by infusing current into the cell through a helper or Counter terminal [1].

The development of the invention that use amperometric sensor as a method for the analysis of chemical in liquids is accomplish with many experiment and most of is in the chemistry field. By all means, this method can be carried out by any chemistry systems such as wet chemistry or dry chemistry. It is widely used in both manual and automated analytical methods. In U.S. chemist department, a multi-layered test device analysis of liquids is described that the project used this amperometry sensor as their method. The project is used a permeable layer to the detectable species and within which the species can be detected by using amperometry sensor [2].

Not only in the chemistry department, this system is also used by biologist to detect DNA [3] and enzymes [4] in the human body by collecting human cell and test