FABRICATION OF OPTICAL FIBER SENSOR FOR DISSOLVED OXYGEN

SITI AISHAH BINTI SAIDI

FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITY TEKNOLOGI MARA
MALAYSIA

ACKNOWLEGEMENT

In the name of Allah, the Most Gracious and the Most Merciful.

All praises and glories to Allah who gave me the courage and patience to carry out this project. Peace and blessings to Prophet Muhammad S.A.W., His companions and those on the path as what He preached upon, might Allah the Almighty keep his blessing and tenders.

I would like to convey my genuine gratitude and appreciation to my project supervisor, Mr Uzer Mohd Noor for precious suggestion, guidance, advice and discussions for the completion and success of this project. Also to Dr. Suhairi, Saharudin and Mr Zulkifli Mahmud for helping me in this research. I'm also thankful to Nano-Electronic Center (NET), Faculty of Electric Engineering (FKE) for providing equipments and material for this research. I would like to take this chance to express my appreciation to Photonics Department, MIMOS Berhad, Technology Park Malaysia, my family and friends for gives a lot of support until completion of my study.

Thank you very much.

ABSTRACT

This paper presents the work on the fabrication of optical fiber sensor for oxygen gas in air and in aqueous state. In order to prepare the sensor, certain type of thin film layer was deposited on top of the glass substrate. The thin film deposited is Tetraethylorthosilicate(TEOS) mix with dye ruthenium and the technique used is spin coating. The spin coating speed is 2000rpm/min and temperature used for drying is 80°C for each layer of sample for 5 minute. For this project TEOS were doped with the complex [RuII-tris(4-7-diphenyl-1,10-phenanthroline)], whose fluorescence emission intensity is quenched by oxygen. The sensor was constructed from 1 cm to 5 cm of plastic optical fiber (POF) with 980 µm core diameter. For the fluorescent measurement it is use under high-intensity blue LED excitation. The sensor fabricated in found to response to different concentration of oxygen in both gaseous and aqueous stater. The sensor is also tairly linear.

TABLE OF CONTENT

CHAPTER 1

INTRODUCTION

1.1 OVERVIEW OF THE OPTICAL SENSOR

An optical sensor is a device that converts light into electronic signals [1]. One of the features of an optical sensor is its capacity to measure the changes from one or more light beams. This change is most often based around alterations to the intensity of the light [1]. Given the nature of the material used in optical components (generally dielectric) and the use of light in the transduction processes and/or in the communications, optical sensors generally, and especially fiber optic ones, have technical and economic advantages and disadvantages compares to conventional non-optical sensors [2]. Given the sizes and nature of optical fiber, small, light-weight optical transducers can be made. This benefit will become more important when integrated optical and optoelectronic technology is used on a massive scale [2].

The distance to the measuring point can be great (kilometers even) and is made possible to the excellent features of optical fiber as a transmission channel [2]. The sensitivity, dynamic range and resolution can potentially be much greater than conventional sensors [2].