

**INVESTIGATION OF TiO₂ THIN FILMS PREPARED VIA SOL-
GEL DIP COATING TECHNIQUE FOR HIGH ABSORBANCE**

This thesis is presented in partial fulfilment for the award of the Bachelor of
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ABSTRACT

In this study, a Titanium Dioxide (TiO₂) thin films layers was deposited onto glass substrate for high absorbance by using sol gel dip coating technique. The glass substrate were coated with several layers of TiO₂ thin films which is 1, 3, 5, 7 and 9 layers. The characterization of the optical and physical properties of TiO₂ thin film coated layers of the glass substrate were characterized using Field Emission Scanning Electron Microscopy (FESEM) for surface morphology, UV-VIS spectrometer for transmittance and absorbance, Surface Profiler for the thin films thickness and Atomic Force Microscope (AFM) for surface topology of the films. The end result shows that by increasing the number of thin films layers will increase the optical absorbance and thickness of the TiO₂ thin films.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND STUDY

Nowadays, many research and commercial applications using optical sensors. For example, this sensor usually used for quality and process control, metrology, medical technology, imaging and remote sensing. Generally, there are three types of optical sensor such as through beam, reflective and retro reflective that based on imaging systems, laser and fibers optic. An advances in material and fabrication techniques have led to the development of novel sensing method such as Meta materials, Micro and Nano structured materials [1].

Titanium dioxide films have widely used for optical sensor applications because of their electrical and optical properties such as high refractive index, high dielectric constant, good physical and chemical stability, excellent transmittance in the visible light and near infrared range [2]. Sol gel dip coating technique is one of the several method to prepare TiO₂ thin films on a glass substrate. This method can be prepared at a low cost, large coating area and the process is easy to control [3].

In the past research, there are numerous study focuses on the optical, chemical and physical properties of the TiO₂ thin films deposited on glass substrate via sol gel dip coating technique. It has been observed by researchers that, the increasing number of film layers will increased the optical absorbance in UV region. The absorption edge of the TiO₂ thin films prepared by 1, 2 and 3 layer was observed at a shorter wavelength range [4]. The UV absorption spectra of prepared TiO₂ thin films was annealed at difference temperature. The spectra shows that the absorption edge is shifted to higher wavelength when annealing temperature is increases [5]. Several method were used to