

**PREPARATION OF TITANIUM DIOXIDE VIA SOL GEL
METHOD: EFFECT OF MOLARITY CONCENTRATION**

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ABSTRACT

In this project, TiO₂ thin film was deposited by using sol gel deposition process. The TiO₂ thin film prepared by sol gel method and utilizing titanium tetra (IV) isopropoxide, (TTiP) as precursor. This paper is focused on the effect of varying the precursor to the electrical properties, optical properties and surface morphologies. The molarity of the TiO₂ was varied by 0.01M, 0.05M, 0.10M, 0.15M, 0.20M and 0.25M. The electrical properties were characterized by 2 probes Solar Simulator while optical properties are observed by Uv-vis. The surface morphologies were examined by Atomic Force Microscope AFM. When increasing the molarity concentration of TiO₂, the conductivity increased while the resistivity decreased respectively. The responsivity shows that the highest molarity concentration has highest response to the present of UV light. For optical properties, the higher molarity concentration has lower transmittance. It effect to the absorbance coefficient and optical band gap. The surface morphology shows that the higher molarity concentration has the highest roughness and the best uniformity of the AFM result. Based on the result of the experiment, it can be conclude that the highest molarity concentration which is 0.20M of TiO₂ gave the best properties of electrical, optical and surface morphology.

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CHAPTER 1

INTRODUCTION

1.0 BACKGROUND STUDY

In fabrication field, TiO_2 have been investigated due to their remarkable chemical, optical and electrical properties. The TiO_2 gaining because of their interesting properties such as chemical stability, non-toxic, highly oxidative photogenerated holes, high energy conversion, high transparency and high refractive index [1, 2]. Nanoparticles of TiO_2 has a widely-known in many application such as antireflection coatings for photovoltaic cells and passive solar collectors [3], photocatalytic refinement of polluted air or wastewater and excellent degradation for organic pollutants [4]. Moreover, The TiO_2 thin film deposited on conducting glass can be used in new types of solar cells which are liquid and solid dye-sensitized photo-electrochemical solar cells [5, 6].

There are several methods to prepare TiO_2 thin film. TiO_2 films can be synthesized by several deposition procedures including sol-gel [7, 8], chemical vapour deposition [9], electrophoretic [10], screen printing [11] and sputtering method [12]. Among the method available to prepare TiO_2 thin film, sol-gel is one of the most favourable methods because of several advantages such as ability varying properties of the thin film, cheaper, and convenient to coat on large areas [13]. Recently, researcher believe that the synthesized of thin film by sol gel method have big influence by composition of the precursor solution, the preparation conditions such as solution preparation arrangements, ageing temperature and time taken [14].