

# **ELECTRICAL PROPERTIES OF SOL GEL DERIVED LEAD TITANATE THIN FILM BY DIP COATING**

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I seek refuge from Allah from the wrath of Satan.. In the name of Allah, Most Gracious and Most Merciful..

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## ABSTRACT

Lead Titanate ( $\text{PbTiO}_3$ ) thin films derived from metal alkoxide precursor solution through sol-gel method were deposited onto silicon substrates by dip coating. These films were deposited at different withdrawal speeds and different immerse times. The films were then annealed at a fixed temperature of  $650^\circ\text{C}$ . The CV measurement and IV characteristics were measured using LCR meter and solar simulator respectively. While the structural properties were studied using scanning electron microscope (SEM). From this study, it was found that electrical properties were influenced by the changes in withdrawal speeds and immerse times. The results show that the resistivity of the  $\text{PbTiO}_3$  thin films decreases as the withdrawal speed increases. Increasing in immerse time result in low resistivity. This result is supported by surface morphology of the thin films which indicated that smaller grain size can be obtained with high immerse time and withdrawal speed.

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

Ferroelectric thin films have attracted the attentions of many researchers in view of their potential application to dynamic random access memories, non-volatile memories and infrared sensors [1]. One of the most promising well-known ferroelectric materials having excellent ferroelectric, pyroelectric and piezoelectric properties is lead titanate [2]. Since lead titanate can exhibit high dielectric constant and low dielectric loss, thus it can result in smaller electrical devices and can potentially be used as a dielectric material for low and high frequency application [3].

This ferroelectric thin film can be prepared using preparation techniques. One of the most widely used techniques is sol-gel. This is due to its ability to allow excellent compositional control and compatible with semiconductor processing techniques. Moreover, this technique is simpler and cheaper compared to other preparation methods [4-6].

Since different parameters of coating technique may result in different film properties, it is therefore necessary to investigate the effect of coating process on the property of sol-gel derived thin films. This paper reports on the structural and