INVESTIGATION ON P-N JUNCTION I-V CHARACTERISTICS OF p-Si/n-TiO_2

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ABSTRACT

The effect of annealing time on electrical properties and physical properties (surface morphology) of p-n junction between p-type silicon (Si) and n-type titanium oxide (TiO_2) were investigated. By varying the parameter of the annealing time, the TiO_2 thin films were deposited on silicon and glass substrates by using spin coating technique. Characterizations were done using current-voltage *(I-V)* measurement and atomic force microscope (AFM).The TiO_2 thin films were annealed at the 450°C. The annealing time varies from 30, 40, 60, 80, and 100 of minutes. The *(I-V)* measurement showed that at 80 minutes annealing time, the conductivity is higher than other annealing time. The AFM investigation showed roughness of thin film increase with longer annealing time. The result showed that the electrical and physical properties of TiO_2 could be affected by changing the annealing time.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The Titanium Dioxide (TiO_2) was of one of the most widely studied due to physical, optical and electrical properties. The TiO_2 has many important applications such as solar cell, gas sensor and photocatayst[1]. The TiO_2 are widely used in our life, such as pigment [2] ,in sunscreens [3, 4]paints [5], and toothpaste[6].

The transparent thin film of titanium dioxide TiO_2 can be applied for coating such as for a solar cell application and self-cleaning glass. There are many research of the TiO_2 solar cells because of the low cost and easy to fabricated [7]. Additionally there are many method to prepared the titanium dioxide TiO_2 film such as thermal [8] or anodic [9] oxidation of titanium, electron beam evaporation [10], ion sputtering [11],chemical vapor deposition [12], including plasma-enhanced chemical vapor deposition[13] and the Sol-gel method [14, 15].

The titanium dioxide TiO_2 has three phase; anatase, brookite, and rutile [16]. The rutile phase is transparent and birefreactive with indices of 2.9 and 2.6. In solar cell the phase is used is anatase.