

**SYNTHESIZE AND CHARACTERIZATION OF ZnO-
TiO₂ COMPOSITE NANOPARTICLE**

WAN MUHAMMAD FAHMI BIN WAN ABD GHANI

**FACULTY OF CHEMICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
SHAH ALAM**

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ABSTRACT

The present study was focused on synthesizing ZnO-TiO₂ nanoparticles. To achieve this, the ZnO-TiO₂ nanoparticle was synthesized by using modified sol-gel method. The precursors used were Titanium isopropoxide and Zinc acetate. Each precursor was prepared separately. Titanium isopropoxide was first mixed with ethanol forming solution A and zinc acetate was mixed with deionized water to form solution B. These solutions were then mixed together by titration while stirring for better solubility. The nanoparticles were characterized by using Fourier transform infrared spectroscopy (FTIR) to identify the functional groups present in the sample, scanning electron microscope (SEM) to observe the sample's surface topography and particle size analyzer (PSA) to characterize the size of the particles produced.

Keywords: ZnO-TiO₂ Nanoparticle, sol-gel method, characterization, FTIR, SEM and PSA

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

Nanoparticle are extremely fine sized material ranging between 1 to 100 nanometers that works as a group of unit when conveying its properties. Nanoparticles were studied due to its variety possibilities in application. The ultrafine size of nanoparticles could ease the interaction of atomic structured materials to bulk-sized materials. Their superior properties are highly due to their large surface area that allows better contact with the atmosphere or any other reactants. Though nanoparticles are originated from its bulker structure, when its length physical character exhibit an almost similar or lesser than the wavelength of light, the material may show various new properties (Dan Guo, 2013). Each nanoparticle of different material shows their own distinct properties thus opening up myriad of possibilities for industrial applications.

Nanoparticles had been widely studied by scientist and researchers nowadays. Its physical and chemical properties was extendedly discovered and exploited to fit the requirement of certain process. Zinc oxide nanoparticles, for example, shows good ultraviolet light blocking properties thus it is used in the process of making sunscreen lotion. Some material, shows greater ability to absorb solar radiation in nanoparticle form due to the surface area ratio. This ultimately leads to the application of a more efficient photovoltaic cell. Nanoparticles can also exhibit quantum confinement effect due to their nano-scale sized which is small enough to confine their electrons. They exhibit great transport and optical properties that is applicable in a better resolution of cellular imaging, biological sensors, light detector and many other. Hard nanoparticles are nanoparticles in clay form incorporated into polymer matrices, that results into stronger plastic.