UNIVERSITI TEKNOLOGI MARA

SYNTHESIS OF ZINC OXIDE NANOPARTICLES WITH BANANA PEEL EXTRACT (BPE) FROM MUSA CORNICULATA (*PISANG TANDUK*): EFFECTS OF PRECURSOR CONCENTRATION AND REACTION TEMPERATURE

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ABSTRACT

Synthesis of zinc oxide nanoparticles (ZnO NPs) has become intention to the researchers as advanced technological materials that have unique structure and also their electrical and optical characteristics give many beneficial applications to the industry. However, the used of conventional synthesis methods often required usage of reducing and stabilizing agent that are non-benign and highly toxic to the environment. Thus, green approach method is used in this study that focusing on using plant extract which is banana peel extract (BPE) from Musa Corniculata. Zinc acetate dehydrate is used as the precursor to synthesis the ZnO NPs with different concentration and reaction temperature. There were six analysis equipment used to characterize the ZnO NPs which are X-ray Diffractometer (XRD), UV-visible Spectrometer (UV-Vis), Fourier Transform Infrared Spectroscopy (FTIR), Brunauer-Emmett-Teller (BET), High Performance Liquid Chromatography (HPLC) and Zeta Potential Nanosizer. From XRD result, it shown that the crystallite size of NPs is in between 13 to 16 nm while BET indicated that the surface area of particle plays an important role because some of the particle were identified as NPs but they had small surface area that contribute to the larger value of average particle size. Beside, from Zeta Potential Nanosizer analysis, there were samples that meet the criteria as monodisperse while other samples may not suitable for this measurement which indicate as polydisperse The band gap calculated from absorbance wavelength of UV-Vis is ranging from 3.28 eV - 3.41 eV and HPLC result identified that zinc oxide component was present in the samples with stretching vibrational bond of Zn-O from FTIR allocated between 400 and 600 cm^{-1}. As conclusion, the green synthesis method use is successfully conducted by using banana peels extracts as it can produce high yield of zinc oxide in a short period of time, thus it can help industry to achieve higher profit with the low time consume in the production line.

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

In the past decades, nanotechnology is widely used in the field of material science. A part from that, nanoparticles can be synthesized by 'bottom-up' methods or derived from larger molecules to the smaller molecules. Recently, due to the desirable properties and applications of nano-sized particles in different areas such as catalysts, highly functional and effective devices made those the semiconductor materials to the one's interest. The most attractive factor in using zinc oxide nanoparticle is that it has versatile application where some of them is shown in Figure 1.1.

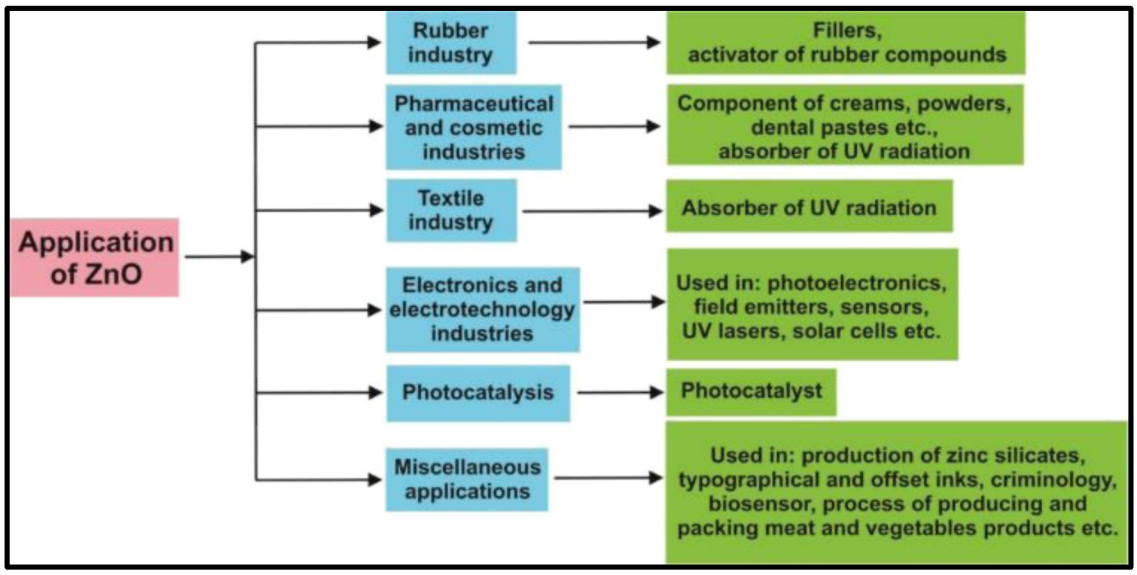

Figure 1.1 Applications and uses of Zinc Oxide Nanoparticles (Kołodziejczak-Radzimska & Jesionowski, 2014)