Cawangan Terengganu
Kampus Bukit Besi

TITLE:

EXTRACTION OF NATURAL DYE LEAVES & FLOWERS TO DOPE ON METAL OXIDE

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ABSTRACT

The combination of post covid recovery, depleted fossil fuel reverse and extreme weather conditions led to surge in demand for energy. Solar energy is a sustainable industry that captures the interest of the energy industry in the world. The material that is most used nowadays is from synthetic dye. Therefore, natural dye from the plant is proposed. This is because the natural never pollutes like synthetic dye as they are obtained. The objective of this study is to find out the best extraction time of natural dye in metal oxide. The natural dye was extracted from Pandanus Amaryllifolius (leaf) using conventional extraction method and doped into metal oxide which is Calcium Oxide (CaO) for 6 to 8 days. The result obtained showed the concentration of dye increasing as the time extract is increased. The natural dye is also tested with conductivity and the result showed a decreasing trend. To conclude, natural dye has the potential to be used for the solar film material.

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CHAPTER 1

BACKGROUND

1.1 Introduction

In order to provide alternative energy sources and lessen reliance on current energy sources, the utilization of solar energy technology has risen globally. Using dye-sensitized solar cells, solar energy is transformed into electric energy by sensitizing wide-band-gap semiconductors (DSSC). Solar cell manufacturing and assembly are inexpensive and simple. Clarifying potential photo-sensitization reduction responses was the main goal of dye sensitization studies. Since then, DSSCs have been a focus of research on solar cells. Tsubomura employed porous ZnO as the working electrode of a DSSC in 1976 and achieved a photon-electricity conversion efficiency of 2.5%. Nevertheless, until Grätzel et al. created a solar cell, dye sensitization was ineffective.

Due to their outstanding chemical stability, high conversion efficiency, and intensive charge-transfer absorption over the whole visible light spectrum, synthetic inorganic compounds (ruthenium polypyridyl complexes) are among the most efficient sensitizers. These compounds do, however, include metals, which are both costly and environmentally risky. In order to substitute scarce and expensive ruthenium dyes, several varieties of natural organic dyes that are produced from the leaves, fruits, and flowers of diverse plant species have been extensively researched and tested. Simple techniques may be used to extract natural plant dyes. Due to their low cost, environmental friendliness, non-toxicity, availability, and complete biodegradation capability, these dyes have been the focus of several investigations. Chlorophyll, anthocyanins, carotenoids, betalains, flavonoids, cyanine, and tannins are natural colours that are often researched.

Depending on the source, chemical makeup, and degree of adsorption, different dyes obtained from diverse plant species exhibit varying solar energy-to-electric conversion efficiency. Due to their limited ability to attach to the surface of the semiconductor oxide film, natural dyes function poorly as sensitizers in DSSCs. This behavior decreases stimulated electron transport from the sensitizer to the conduction band of the porous film. Chlorophyll dyes are powerful photosensitizers in photosynthesis and possible sources of eco-friendly dyes, according to several research. According to Calogero et al. (2009), cells using chlorophyll derivatives as sensitizers have a conversion efficiency of more than 2%, and cells using chlorin-e6 have a conversion efficiency of more than 4%. Chlorophyll gets its color from reflecting green light after absorbing light of red, blue, and violet wavelengths. As a result, in the visible light spectrum, this pigment serves as a good photosensitizer. Chlorophyll is largely present as chlorophyll A in the leaves of most green plants, cyanobacteria, and algae. Because it can be extracted using straightforward procedures, chlorophyll is the ideal dye sensitizer for the manufacture of DSSCs from an economic perspective. In this work, DSSCs were created using pandan (Pandanus amaryllifolius L.) leaf extract natural dyes as a photo-sensitizer. In