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TITLE:
EXTRACTION OF NATURAL DYE FROM BUTTERFLY PEA FLOWER TO DEVELOP DYE-SENSITIZED SOLAR CELL TO DOPED ON MAGNESIUM OXIDE

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ABSTRACT

The combination of post covid recovery, depleted fossil fuel reverse and extreme weather condition led to surge in demand for energy. Solar energy is a sustainable industry that capture interest energy industry in the world. The material that most commonly used nowadays is from synthetic dye. Therefore, natural dye from plan is proposed. This is because the natural dye never pollute 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, to study the presence of functional group in natural day and to study the potential of natural dye to use as solar film material. The natural dye was extracted from Butterfly Pea or the scientific name is Clitoria Ternatea (flower) using convectional extraction method and doped into metal oxide which is Magnesium Oxide (MgO) for 1 - 5 days. The result obtained had showed the concentration of dye decreasing as the time dope is increase. The natural dye is also tested with conductivity and the result showed a decreasing trend. Also, by FTIR, the longer the magnesium oxide is doped into the sample, the higher the transmittance showing the presence of O-H bonding determine the ability for the adsorption of solar energy. To conclude, natural dye from butterfly pea flower has the potential to be used for the Dye-Synthesized Solar Cells (DSSC).

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CHAPTER ONE
BACKGROUND

1.1 Introduction

The demand for electrical energy in the world is rising. The need for electrical energy is still mostly met by fossil fuels in the meanwhile. The demand for power is anticipated to double or triple by the year 2050. When DSSC first started off, they still used a ruthenium-based dye. However, due to its limited availability and challenging production, many researchers are starting to use natural dye. The plant's fruit, flowers, and leaves can all be used to make DSSC dye. The usage of natural dye is less expensive and simpler to extract, despite its low efficiency outcomes. Three different forms of dye, including chlorophyll, anthocyanin, and beta-carotene, are frequently employed as DSSC sensory materials. The first ingredient is chlorophyll, which is present in all plant leaves. Red, blue, and violet light wavelengths can all be absorbed by natural dyes. (Cari et al., 2018).

Different kinds of solar cells have been created over time to convert sunlight into electricity. Solar cells made of crystalline, polycrystalline, and amorphous silicon have all found extensive use in a variety of home and industrial settings. The world-record efficiency of 46% was demonstrated by multifunction semiconductor solar cells. Their uses, however, are primarily restricted to the space sector. Dye sensitized solar cells (DSSCs) and organic solar cells are two additional less effective and affordable cell types. The most reliable and efficient dyes used for DSSCs are metal-organic complexes of ruthenium and osmium. Growing activities for employing natural dyes have been observed due to the fact that synthetic dye dyes are harmful, expensive, and challenging to produce. (Ammar et al., 2019).

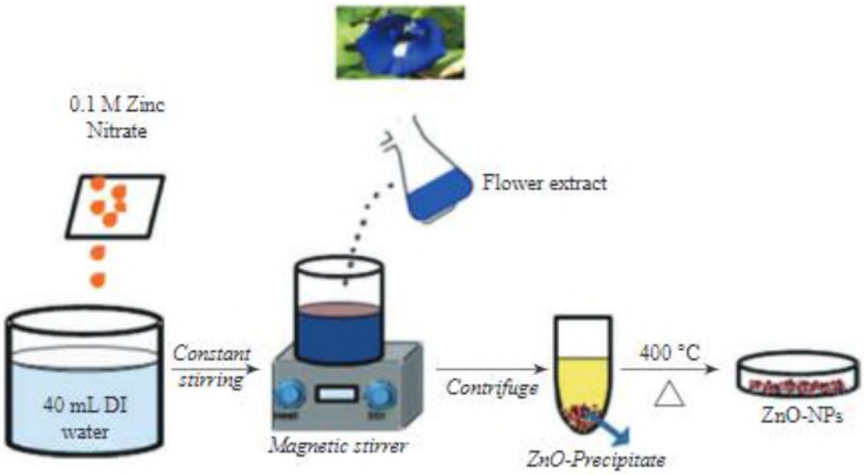

Figure1.1 The extraction of butterfly pea flower dye

1.2 Literature Review

1.2.1 Natural Dye Based DSSC

DSSCs were made utilising natural dyes taken from rosella (Hibiscus sabdariffa L.) and blue pea (Clitoria Ternatea) flowers as sensitizers, as these flowers are plentiful in tropical regions and are rich in anthocyanins. The effectiveness of solar cells in relation to dye structures is examined. This knowledge would be important for selecting anthocyanins and would also facilitate the production of dyes for DSSCs. The structure of ternatin in blue pea extract has longer R groups than dephinidin or cyanidin complexes in rosella extract, resulting in a higher steric hindrance for anthocyanin to form a bond with the oxide surface and preventing anthocyanin molecules from successfully arraying on the TiO2 layer. (Wongcharee et al., 2007).

From this study, the project will be proceeded by using butterfly flower pea tea as the source of natural dye since it is rich of anthocyanins and showed the most pigmented dye among others flower used in the previous study.