# TITLE: COMPARISON OF NATURAL FLOWER DYE EXTRACTION FROM FRESH AND DRIED BLUE PEA FLOWER USING METHANOL IN DYE SENSITIZED SOLAR CELL APPLICATION


**SUPERVISOR:**

**DR. NORAINI BINTI RAZALI**

**SCHOOL OF CHEMICAL ENGINEERING**
**COLLEGE OF ENGINEERING**


**2024**

# ABSTRACT

In this report, the dye of blue pea flower, dried and fresh form, are extracted using methanol as the solvent. The dye is then undergoing doping methods using CaO. The purpose of this research is to fine the best conductivity delivers from the dye whether it is fresh or dried form and then determine whether it can be absorbed by the dopant specifically CaO in doping. The highest conductivity of the dye is the 3 days of the dried blue pea flowers extraction in which the conductivity value is 2000(μS/cm)..

# TABLE OF CONTENTS

BACKGROUND

## 1.1 Introduction

In this modern world, the increasing demand for energy has led to numerous inventions and innovations to create sustainable energy resources. One of the sustainable energy sources available today is the solar cell system. Solar cells generate electricity directly from sunlight. Semiconductor materials of solar cells are exposed to sunlight, where photons excite electrons in the semiconductor material, producing electricity (Green, 1982). This method generates a substantial amount of renewable energy for today's uses, such as water heaters.

Dye-Sensitized Solar Cells (DSSC) provide an alternative way to produce electricity from sunlight photons. DSSC component consist of TCO glass, semiconductor material, dye and electrolyte as shown in figure 1. DSSC uses synthetic dyes to absorb the sunlight and excites the electron to a higher state. The excited electron will now be injected into the conduction band of $TiO_2$ and leaving the dye in oxidize state. The $TiO_2$ will help the electron to flow through the external circuit. The used electrons will now go to the electrolyte from the external circuit to recover back its electron from the counter electrode, completing the circuit cycle. (Jamalullail, N., Mohamad, I. S., Norizan, M. N., & Mahmed, N. 2018)

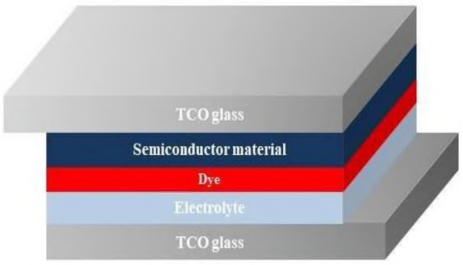


Figure 1: Components of DSSC (Jamalullail, N., Mohamad, I. S., Norizan, M. N., & Mahmed, N. 2018)

DSSC seems a good approach as an alternative to conventional solar cells. However, the use of synthetic dye in DSSC may pose harm to the environment. Synthetic dyes are expensive, non-renewable and toxic towards the environment. Moreover, disposal of this synthetic dye may pose to pollution and danger to human health. (Mariotti, N., Bonomo, M., Fagiolari, L., Barbero, N., Gerbaldi, C., Bella, F., & Barolo, C. 2020)

With that being said, new solutions of the synthetic dyes need to be found as it will raise sustainability concern if synthetic dyes still being used in the future. To replace synthetic dyes, natural dyes can be a good substituted to the synthetic dye as natural dyes also have properties to act as a sensitizer in DSSC. Chemical properties such as anthocyanins has the potential to absorb light like the synthetic dyes.