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Application of Solar Cells for Daytime Weather Study

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Abstract

The electric current is generated by the solar cell when the solar radiation is incident onto the solar cell. The intensity of the incident solar radiation can control the amount of generated electric current. In daytime, the variation of intensity of the incident solar radiation mainly comes from the cloud over the solar cell. It causes the variation of generated electric current. This phenomenon serves the new way to use the solar cell for meteorological purpose. In the period of experiment days, the results showed that the variation of generated electric current might be plausible to the daily weather condition. On the sunny day, the generated current was small fluctuation and had high level. Otherwise, a small fluctuation with low level one was appear on the cloudy day. On the rainning period, the generated current could drop down more than 3000 mA when compared with the sunny period.

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Keywords: Solar cell; Weather; Cloud; Rainy day

1. Introduction

In recent year, many instruments, methods and techniques were applied to the used of solar energy. Solar cell is one of them that can use to convert the solar energy into another energy form. Generally, the solar radiation, which is incident onto the solar cell, generates the electric current [1]. The total of electricity that solar cell can produce is mainly dependent on the intensity of the incident solar radiation [2 - 5]. It is well known that there are several features affecting the performance of the solar cell such as effect of cloud and rain [6]. The generated current from solar cell is small when cloudy and rainy days.

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For the solar cell engineering, it is set to be “the noise” of the solar cell used. In the other hand, the reducing current one is become “the meteorological signal” for meteorological study. In this paper, we demonstrated the simply way to use of the solar cell for meteorological study. The experiment was set to study the relationship between clouds over the solar cells and the generated electric current.

2. Observations and Results

The solar cell was installed on the top of the faculty of Science and Technology building, Rajamangala University of Technology Thanyaburi where is no any shadow effect to the solar cells, as shown in Figure 1. The solar panel consists of eight solar modules, which provide the power of around 1 kW. The specification of each solar module is shown in Table 1.

Sunny Data control is a computer program. It was installed to monitor the solar cell. All of informations from the solar cell were recorded and stored automatically on a monitoring server with sampling rate of 24 data per hour. In this experiment, we designed to use the data of direct current generated by solar cell (Ipv) in the unit of mA. The Ipv was generated when the sunlight is incident onto the solar cell. [7] and [8] suggest that the amount of direct current producing from the solar panels is directly dependent on the level of light they receive. In full and bright sunlight, solar panels receive maximum levels of light. During those peak sunlight hours, the solar panel will produce the maximum current, consecutively.

Fig. 1. The solar cell installed on the top of the faculty of Science and Technology building, Rajamangala University of Technology Thanyaburi, Thailand.