

PERFORMANCE OF THE AMORPHOUS SOLAR CELL
IN THE MALAYSIAN CLIMATE

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PERFORMANCE OF THE AMORPHOUS SOLAR CELL IN THE MALAYSIAN
CLIMATE

By

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PENGAKUAN DAN PENGESAHAN LAPORAN
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Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:

PERFORMANCE OF THE AMORPHOUS SOLAR CELL IN THE MALAYSIAN
CLIMATE

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telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini
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LIST OF ABBREVIATIONS / SYMBOLS

Abbreviation / Symbol

a-Si	Amorphous silicon
ASSC	Amorphous silicon solar cell
CSP	Concentrating solar power
FASM	Faculty of Agrotechnology and Food Science
I	Current
KUSTEM	University College of Science and Technology Malaysia
LED	Light emitting diod
PSSC	Polycrystalline silicon solar cell
PV	Photovoltaic
R_{sq} / R^2	Correlation coefficient
R & D	Research & development
S	Surface area of the solar cell
V	Volt
η	Efficiency of the solar panel

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ABSTRACT

This study focuses on the performance of the amorphous solar cell in the Malaysian climate. The purpose of this study is to determine the efficiency of the amorphous solar cell of the chosen angles of 10° and 20° , and to study the relations of these efficiencies with the weather parameters that have been chosen which are the intensity, wind speed, relative humidity and temperature. In this study, the solar cell is located in an open area near the old FASM building in KUSTEM. The relations will be crucial results in proving which parameters contribute most to the changes of the efficiency for the amorphous solar cell. All the data for current and volt that will be used to calculate the efficiency are collected using the multimeter. Meanwhile the data for the weather parameters are recorded using the weather station. The obtained efficiencies of the chosen angles proved to be in the expected range as they were recorded as 0.01% to 8.09% for the tilt angle of 10° and 0.02% to 8.04% for the tilt angle of 20° . As for the relations between the efficiencies recorded with the weather parameters chosen, it is concluded that weather do play a vital role in effecting the efficiency of the amorphous solar cell in Malaysian climate and the parameters that contribute most to the efficiency are the intensity and temperature. Finally the comparison of the efficiency between these two angles is made and as a whole, the tilt angle of 20° has a better performance in the location of study.

ABSTRAK

Kajian yang dijalankan adalah bertumpukan kepada kemampuan sel solar amorfus dalam iklim Malaysia. Tujuan kajian ini dijalankan adalah untuk menentukan kecekapan sel solar amorfus pada sudut yang telah ditetapkan iaitu 10° dan 20° . Di samping itu kajian tentang hubungan antara kecekapan dengan parameter-parameter cuaca yang telah dipilih iaitu intensiti, halaju angin, kelembapan relatif dan suhu juga akan dijalankan. Dalam kajian ini juga, sel solar yang digunakan telah ditempatkan di sebuah kawasan lapang berhampiran dengan bangunan lama FASM di KUSTEM. Hubungan-hubungan yang didapati akan menjadi keputusan yang penting dan membuktikan bahawa parameter-parameter manakah yang memainkan peranan yang paling penting dalam menyumbang kepada perubahan kecekapan sel solar amorfus. Semua data arus dan voltan yang akan digunakan dalam pengiraan kecekapan diambil menggunakan multimeter. Sementara itu data-data untuk parameter-parameter cuaca direkodkan melalui stesen cuaca. Kecekapan yang diperolehi bagi sudut-sudut yang telah dipilih menunjukkan bacaan dalam julat yang telah dianggarkan iaitu 0.01% - 8.09% untuk sudut 10° dan 0.02% - 8.04% untuk sudut 20° . Bagi hubungan antara kecekapan dan parameter cuaca pula, boleh disimpulkan yang cuaca memainkan peranan yang sangat penting dalam perubahan kecekapan sel solar amorfus dalam iklim Malaysia dan parameter-parameter yang paling menyumbang kepada perkara ini adalah intensiti dan suhu. Akhir sekali, perbandingan kecekapan antara kedua-dua sudut yang dipilih secara keseluruhannya menunjukkan bahawa pencapaian pada sudut 20° adalah lebih baik di lokasi kajian.