CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J1006

Project Title
Determining the Best Angle for Absorbing Photons

Abstract

Objectives/Goals
The objective of this lab was to determine at what angle solar cells produce the most electricity. I believe that if a solar cell is perpendicular to a light source then the solar cell will produce the most electricity, because the solar cell will absorb the most photons when the light source is directly above it.

Methods/Materials
The leads from a digital multimeter were attached to a solar cell module. Then the solar cell module and a skewer were attached parallel to the surface of a tilt mirror, and a protractor was attached perpendicular to the side of a tilt mirror. A lamp with a 150w incandescent light bulb was placed 4.5" above the solar cell module. The skewer was placed at 10° intervals on the protractor (90-180) and the amount of electricity produced at each interval was recorded. The experiment was repeated two more times.

Results
The average electrical output for the 3 trials ranged from 1082mV at 90° to 792mV at 180°. In each trial as the angle was increased by increments of 10°, the electrical output decreased.

Conclusions/Discussion
The lab showed that when the solar cell was perpendicular to the incandescent light source it generated the most electricity, because the solar cell absorbed the most photons when the light source was directly above it. Solar cells have many environmental benefits, so it is important to find out the best ways to make them efficient at producing electricity. Since solar cells are most efficient when perpendicular to the sun instead of having to move the solar cells so they follow the path of the sun, a way to improve the solar cell module may be to make it in a sphere shape so that photons are captured no matter what the angle of the sun.

Summary Statement
My project was about measuring the amount of electricity created when photons are absorbed by a solar cell module when it is placed at different angles to a light source.

Help Received
My science teacher and aunt inspired the idea for the project and reviewed my procedures. My mother provided help in getting my research and materials, and reviewed the layout of my board. My sister helped photograph the procedure.