CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J1017

Project Title
The Effect of Dust on the Performance of Photovoltaic Solar Cells

Abstract

Objectives/Goals
My objective is to find the effect of dust on the performance of Photovoltaic Solar Cells. My goal is to demonstrate that increasing dust particles will decrease the ability of photovoltaic cells to convert light (sun, lamp) into electricity.

Methods/Materials
Materials:
1.Photovoltaic Solar Panel; 2.Multi-meter; 3.Six identical large Glass Jars filled with clean water; 4.Talcum Powder; 5.250W Halogen Lamp; 6.Digital scale and a 1L Graduated Cylinder.
Methods:
1.Measure the output of the photovoltaic solar panel by recording the milliAmp (mA) in sunlight by placing a clear Glass Jar filled with clean water between the PV Solar Panel and the Sunlight. 2.Add a half teaspoon of talcum powder to a 2nd clear Glass Jar filled with water, shake vigorously to disperse the talc, and measure the PV Solar panel's mA output with the Multi-meter. Take readings three times for each experiment and record the average mA in the data table. 3.Using a separate Glass Jar for each experiment, continue to increase the amount of talcum powder suspended in water by half a teaspoon each time until it reaches two and a half teaspoons, and record the PV Solar panel mA output similarly as described in step-2. 4.Calculate the parts per million (ppm) of talcum powder in each jar. 5.Repeat steps one through four using a Halogen Lamp as the light source instead of Sunlight.

Results
1.As seen from graphs, increasing the amount of dust from zero to 2067 ppm resulted in a steady decline of the mA output of the PV Solar Panel. I also found that the light was almost completely blocked out at the dust concentration of 2067 ppm.
2.The mA output of the PV Solar Panel in uninterrupted sunlight and uninterrupted halogen light is higher than the mA output of the clean water-filled glass jar experiments. This shows that even clear water does not let 100% of the light from going through the jar, and therefore suggests that a high moisture concentration in the atmosphere would also reduce the mA output of a PV Solar Panel.

Conclusions/Discussion
1.Increasing concentrations of dust in the atmosphere can reduce the amount of electricity being generated by a Photovoltaic Solar Cell.
2.A dust concentration of about 2067 ppm in the atmosphere will block the sunlight and be almost the same as having a PV Solar Cell in the shade.

Summary Statement
My Project is about finding the effect of dust pollution in the atmosphere on the energy capture efficiency of a Photovoltaic Solar Panel.

Help Received
Father helped with shopping for materials and putting the posterboard together.