CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
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Project Number
J0704

Project Title
Potential Solar Cells for the Developing World

Abstract

Objectives/Goals
I hope to develop a solar cell consisting of inexpensive, easily found and commonly available materials useful in powering radios, cell phones, lights, small motors, and other basic devices.

Methods/Materials
Materials to be tested: aluminum, brass, copper, copper oxide, cuprous oxide, galvanized steel, lead, screen, stainless steel, silicon, steel, titanium and zinc. Electrolytes used: aluminum potassium sulfate, cuprous oxide, salt water, silicon (as a benchmark), water and zinc oxide.
Equipment Required: Computer; current and volt meter, pan, plastic containers, stove, blowtorch and radio, motor, LED to serve as loads to run with generated power. Some materials I wanted to test were not available to me due to safety or security reasons.

1. I created some of the needed components by heating, sanding, coating or mixing raw materials. 2. I built trial solar cells using combinations of the materials to be tested. Each solar cell required two electrodes and usually an electrolyte. Wires were attached to the electrodes. 3. The components were put in a container and the voltage and current produced were measured with a digital meter while minimal light fell on the assembly. 4. The measurements were taken again as a 100 watt bulb was shone on the cell. 5. I repeated the tests on 116 combinations of materials, each without and with light. 6. I assembled the best performing combination of materials into a cell array and tested it on practical load devices like a motor, light, etc. 7. I recorded the data in graphs and tables and included the information in my Log Book. 8. I drew conclusions and supported them with data.

Results
The best current results were from thick cuprous oxide and galvanized steel in salt water, producing an extra .13 volts and 1.15 milliamps from the light. The best combination for current was Aluminum and thick cuprous oxide in Zinc oxide and water, which gained 7 milliamps, but only .007 volts in light.
For my final solar cell, I used thick cuprous oxide and galvanized steel, because it produced a reasonable combination of current and voltage.

Conclusions/Discussion
I found combinations that produced additional electricity when exposed to light, but the output was minimal. I have not created a true solar cell, but a hybrid; part battery, part solar cell. Solar power alone, from the materials I tested, is not enough to power common devices.

Summary Statement
Is it possible to develop a solar cell consisting of inexpensive, easily found and commonly available materials useful in powering radios, cell phones, lights, small motors, and other basic devices?

Help Received
Parents drove me to stores, ordered some materials online, supervised use of blowtorch and took photos of me doing experiments.