CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
J1518

Project Title
Light Power: Energy from Color

Abstract

Objectives/Goals
The objective of my project was to test different wavelengths of light to find out which color can produce the most power when shined on a solar cell. My hypothesis was that blue would produce the most power because it has the highest frequency, so more waves per second hit the cell.

Methods/Materials
The general idea was to shine different colors of light onto a photocell that was connected to a voltmeter. At first, I built a tall cardboard box, lined with reflecting material, with a light bulb hanging over a filter. Then, I switched to a slide projector with color filters in slide mounts, and a tube on the end to contain the light. Both of these setups had a photo cell at the end of the test apparatus. Neither design worked very well.

In my final design, I mounted two small cardboard boxes, about 35 CM apart, on a board. On one side of the first box, I mounted colored LEDs, which provided pure sources of different wavelengths of light. On the other side this box, I cut a hole and taped a magnifying lens to focus the light beams. In the front side of the box at the other end of the board, I cut a small hole for the light to enter. On the back wall of this box, I mounted a calculator photocell, which was more sensitive than the photo cell I used in my first experiments. I put a lid on this box to keep outside light from hitting the cell. On the board, just in front of the second box, I placed two more lenses to focus the light beam even more. Finally, I cut a hole in the side of the second box, for inserting an optometer probe to measure the power output of each LED. I used this apparatus to test eight different wavelengths of light, including infrared and white.

Results
The Yellow LED caused the photocell to output the highest power, followed by green, orange, turquoise, blue, red, and finally, infrared. The photocell output almost no power from the infrared LED, and the output from the white LED was a little less than the output from the red LED..

Conclusions/Discussion
My hypothesis was incorrect. Yellow produced the highest output of all of the wavelengths. This may be because the photo cell from the calculator was meant for use under indoor lighting (usually in the green-yellow range) instead of outdoor light (which peaks at blue).

Summary Statement
My project is about which wavelength of light can produce the most power when shined on a photocell.

Help Received
My dad drove me around to various places and helped me assemble parts of the project. He provided certain materials and gave me some suggestions on how to analyze my data. Dr. Gross gave me suggestions about how the project could be improved and provided