



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Travis S. Adams	Project Number J0801
Project Title Maximizing the Power Output of a Crystalline Silicon Photovoltaic Module through the Use of Solar Concentrators	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Can you enhance the performance of solar cells by utilizing mirrors as a way of collecting or directing more light energy (photons) upon the surface of the solar cell? When the sun is blocked by clouds, the power output of the photovoltaic cells drop dramatically. My objective was to increase the power output of the solar cell on a cloudy day, with solar concentrators, so it is equal to the power output produced on a sunny day, without the solar concentrators.</p> <p>Methods/Materials 1. The solar concentrators or mirrors were set up on the stands at the correct angles under the lights. 2. The circuit was set. 3. The mirrors were covered and then the lux was measured with the light meter. 4. Then the Light Meter was taken off and the voltage and amps were recorded. 5. This was done ten times with the covers and without the covers at the different lux readings. These lux readings were varied through the use of a dimmer. 6. Lastly, the volts and milliamp readings were recorded and then multiplied together to get watts. 7. This whole process was repeated outdoors in cloudy and sunny conditions. Materials: 1. Solar Cell, 2. Solar Concentrators, 3. Light Meter, 4. Five High Powered Lights, 5. Multimeters.</p> <p>Results Through my experimenting, I found that at a very low level of lux, 5,290, the mirrors enhanced the power output of the solar cell by 65%. But, when the lux was very high, 118,000, the mirrors only raised the power output of cell by about 23%. So, on a typical cloudy day, the solar cell, with the enhanced performance of the solar concentrators, will produce about 45% more energy than without the solar concentrators. The closer the cell was to producing its maximum power on a sunny day, the mirrors, or solar concentrators became less and less effective. However I did prove my hypothesis correct, for on a typical cloudy day, I produced, with solar concentrators, the same amount of power as on a sunny day without the solar concentrators.</p> <p>Conclusions/Discussion Yes, I can enhance the performance of solar cells by utilizing mirrors as a way of collecting or directing more light energy (photons) on the surface of the solar cells. By increasing the area of the solar cell, more photons or light energy is collected and directed onto the surface of the photovoltaic cell. This is a very economic way to increase the power output of the cell.</p>	
Summary Statement My project is about maximizing the power output of a silicon photovoltaic cell using solar concentrators (mirrors).	
Help Received My mother partly helped assemble the board, my father helped with the building of the concentrator	