



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Twisha Kurlagunda	Project Number J0210
Project Title Analysis of Factors Affecting Solar Cell Performance	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Solar power is the leading way to address the problem of global warming and pollution from the use of fossil fuels. This project studies the impact energy production of the solar cell due to following factors: (a) Color filters (b) Use of Mirrors (c) Soiling and (d) Time of day (e) Temperature (f) Tilt (g) Orientation.</p> <p>Methods/Materials In my experimental setup I used the following materials:(a) 3 mini solar panels (b) Alligator clips (c) Multi-meter (d) Thermocouple (e) Tilt-able easel (f)Hair dryer (g) Color filters (h) Mirrors (i) Dust. I took measurements connecting the panel to the multimeter and repeated the measurements 6 times during the day for each of the three panels. Every time, I took the measurement, I measured the baseline data using standard conditions (direct sunlight) and compared it against the data using a changed condition (for example with mirrors).</p> <p>Results My analysis indicated that many factors had a large impact on solar power: Time of Day: The solar panels energy production varied during the day and peaked during noon. Just two hours later the power decreased by 30%. Mirror: Use of the mirror substantially increased the power output by 3 times the baseline. One cheap way could be to place a mirror under the solar panel to improve its performance. Color: Color of light has a strong impact on the output of the solar cell. Green color contributed least to the production of energy while yellow contributed the most in my study. Soiling: Soiling impacted the energy production but was not substantial. Orientation: The data shows that south-west was the best direction to orient the panel in the afternoon. Temperature: As the temperature increases power output decreases by about -0.2% per F. Tilt: My experiment found that if solar panel is tilted 25 degrees it will have the maximum power output.</p> <p>Conclusions/Discussion As hypothesized my study showed that many factors had a significant impact on the solar performance. I believe a thorough understanding of these factors is important for me to find ways to innovate on improving solar cell performance. I would like to extend this research to come up with an idea to increase performance of the solar cell cheaply. Mirrors seem like one good way to do that. I would like to explore this and other ideas in my future experiments.</p>	
Summary Statement This project is a study of various factors affecting the performance of a solar cell.	
Help Received My father helped me tilt the mirror while I took measurements using a multi-meter. He also helped me take temperature measurements using a thermocouple while I took measurement on the multi-meter.	