



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Emily E. Gray	Project Number 31141
Project Title Here Comes the Sun: How to Maximize Electricity Generation from Photovoltaic Solar Cells	
Abstract Objectives/Goals The objective of this experiment is to make solar cells more efficient by finding which wavelength produces the most electricity and how the electricity is most efficiently produced. Methods/Materials Red, yellow, and blue colored filters as well as 25% and 50% neutral density filters were put over 1.0v 100 mA and 1.5v 50 mA solar cells and the milliamps were recorded. Then, the solar cells were placed at various angles (45°, 90°, 135°, 180°, and 270°) facing north vs. south, and the milliamps were recorded. Finally, the milliamps were recorded from each solar cell at various times throughout the day (7:00 am, 9:30 am, 12:00 pm, 1:45 pm, 4:00 pm, and 9:00 pm). Results The tests resulted in surprising results. First, red, yellow, and blue colored filters caused the solar cells to produce similar results. The neutral density filters produced more than the hypothesized milliamps. Also, in the angle experiment, there was a pattern that in each trial, there was a peak at 180°, though it was not always the angle that caused the maximum results, and the solar cells at 360° produced the least amount of milliamps in every trial. Finally, maximum electricity generation took place at noon, and minimum electricity generation took place at 6:00 pm and 9:00 pm (at both times, the solar cells produced 0 milliamps in each trial). Conclusions/Discussion The 1.5v 50 mA and 1.0v 100 A solar cells that were used are not very sensitive to filters in the visible spectrum of light and they are only designed to block out a certain percent of light in specific regions. Also, the angle of solar cells that produces maximum electricity directly relates to the position of the sun in the sky. Finally, maximum electricity generation by photovoltaic solar cells occurs at 12:00 pm. For the most part, the entire hypothesis was proven incorrect.	
Summary Statement This project studied the efficiency of photovoltaic solar cells.	
Help Received Dr. Kevin Gray helped a lot as a mentor. Dr. Noufi also helped a lot by allowing to be interviewed. Finally, Mrs. Erin Schumacher provided a lot of useful information and help throughout this entire project.	