



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Sara K. Davis	Project Number 31039
Project Title Nanocrystalline Dye-Sensitized Solar Energy III	
Objectives/Goals The main objectives are to compare the photovoltaic energy generation capabilities of three different types of solar cells in brief (2-minute) tests; to compare the energy generation sustainability over a short period (3 days) of two different composite conductive polymer film/stainless steel solar cells and a polymer film cell; and to compare the long-term energy generating capability of an #unsealed# composite cell with that of a #sealed# composite cell. Abstract The main objectives are to compare the photovoltaic energy generation capabilities of three different types of solar cells in brief (2-minute) tests; to compare the energy generation sustainability over a short period (3 days) of two different composite conductive polymer film/stainless steel solar cells and a polymer film cell; and to compare the long-term energy generating capability of an #unsealed# composite cell with that of a #sealed# composite cell. Methods/Materials My 2009 and 2010 projects involved two different types of Graetzel solar cells: one made of conductive glass, another made of conductive polymer film. This year#s project introduces sealed and unsealed variations of a composite cell made of an upper conductive polymer film slide and a lower stainless steel slide. All of these solar cells used filtered juice from dark red flower petals as the primary reactive agent. A series of experiments was conducted to satisfy the objectives above. Results In a series of 2-minute tests the unsealed composite cell out-performed both the polymer cell and the glass cell. In a 3-day test the sealed composite cell generated slightly more energy than the unsealed composite cell. However, the energy generated by the unsealed composite cell dropped significantly after the first day; meanwhile the energy generated by the sealed composite cell increased dramatically on day 2, then decreased significantly on day 3. Surprisingly, both of the composite cells were slightly less effective than the polymer cell in generating energy over a 3-day period. In a multi-day test the sealed composite cell slightly out-produced the unsealed composite cell, but neither of the composite cells was a reliable energy generator beyond the first several days of testing. Conclusions/Discussion Since the objective of this series of annual science projects is to develop a simple photovoltaic cell that can be easily and cheaply made---and that can generate electricity reliably---the results of this year#s project indicate that consideration should be given to conducting further experiments to see if a composite solar cell made of conductive glass and polymer film can out-perform the composite cells used in this project. Hopefully, such a solar cell can be developed to help solve some of the world#s energy supply and ecological problems, especially in poorer countries.	
Summary Statement Generation of electricity from simple solar cells, using plant juice	
Help Received Mother supervised experiments and helped construct backboard; father proofread and edited logbook	