CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
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Project Number
J0208

Project Title
Super Solar Cells

Abstract

Objectives/Goals
The Plan was to find the best photosensitizer (light-sensitive dye) to apply to the Gratzel Solar Cell so that it creates the most energy. If given the Beta Carotene, Passion Tea, Ruthenium, Pomegranate extract, and a dyeless cell, The Ruthenium was expected to work the best because it#s been proven to work well with professional cells, and its skeletal structure suggests it will bond with the TiO2.

Methods/Materials
The Dyes were purified with a Rotor Evaporator and a Silica tube. The ITO was smeared with a mix of TiO2 and Vinegar until a full coat covered the conductive side, and baked in the furnace. These covered slides had the dye dropped onto them until the TiO2 was clearly dyed to the sensitizer. The cell was finished by coloring another piece of ITO with Graphite, placing it on top of the TiO2 coated one, and dropping the electrolyte inside. The voltages were measured individually.

Results
The average results between the different types of light show that Pomegranate did the best, but only beat the passion tea by .0007. The least effective cell was the Ruthenium, which lost just behind the control (no dye) by .014 volts.

Conclusions/Discussion
In conclusion, our hypothesis was wrong, as the pomegranate did the best, not the ruthenium dye. Out of the dyes that we chose, the dye that produced the most energy was the pomegranate, and this shows that natural dyes like those found in a pomegranate would probably be the most energy efficient.

Summary Statement
The goal of our project was to find the most efficient dye to apply to the Gratzel solar cell.

Help Received
Used lab equipment at Cal tech under the supervision of Dr. Heath