



2009

MASSACHUSETTS CLEAN TECHNOLOGY AWARDS

A Program from The Foresight Project Inc; www.theforesightproject.org



Region IV, Northeastern MA
CleanTech Award:

Shawn Onessimo, Lowell Catholic
High School, Lowell

*"The Arc of the Sun: Measuring the
Efficiency of Plastic, Organic
Photovoltaic Cells"*

ABOUT ME:

My name is Shawn Onessimo; I am currently a sophomore at Lowell Catholic High school. I am passionate about science and engineering and ever since grade school I have been trying to peruse a dream of some day attending MIT. Last year I participated in the Massachusetts State Science and Engineering Fair located at the MIT Campus in Cambridge. As a freshman my partner and I won the prestigious Fish & Richardson patent award. I am the first student in my schools twenty year history to win any such award. This year I am very excited about winning the Massachusetts Clean Technology Award along with the Air Force Certificate of Achievement Award at the Regional IV Science Fair. I am now looking forward to participation in the State Science Fair again this year. I have also been very focused on my academics, as I am currently taking all honors courses while maintaining a 3.3 G.P.A. After school I hold a lead position on the Mock Trial team and participate in Drama and Chorus clubs at my school. During the summer I like to swim and umpire baseball. I also love to watch sports and playing my Guitar Hero.

MY PROJECT:

In my project I focused on measuring the output of organic photocell arrays to understand the power output characteristics with respect to the sunlight. Konarka Technologies of Lowell manufactures a plastic organic solar cell array which I used. These solar cells are carbon-based, flexible, and light in mass and weight.

I created a Sun simulation device using a Xeon lamp and then plotted the travel on an Arc for each hour of the day. Using a special source meter and a laptop I recorded more the 250 data points of power outputs from the cells for each and every hour. I then experimented with the mounting position of the arrays, including bending the array into a semi-circle. Using the data I could conclude what the best position in respect to the horizon for installing the arrays to produce the most overall output and the

single greatest output for a standard day. My data showed that the maximum output was when the array was positioned flat and perpendicular to the horizon, but that the maximum total output for a day was when the array was positioned flat and horizontal to the horizon. Circular mounting provided a single point of high output but overall was much less.

Finally I built a model to demonstrate a practical application of these new cell arrays. I took one of the cell arrays and sewed it into the back of a jacket. I then wired the output to a USB jack in the sleeve. By applying sunlight to the array you can charge standard USB devices such as an iPod, cell phone, etc.