Shawn Tuteja
The Altamont School 12th grade
Birmingham, AL

My project, Developing More Efficient Models of Titanium Dioxide Dye-Sensitized Solar Cells, sought to increase the voltage and amperage in solar cells. To perform this experiment, I first had to build the titanium dioxide dye-sensitized solar cells. I applied titanium dioxide paste to the electrode of the cell, carbon to the counter electrode, and then I dipped the cells in various anthocyanin dyes. The three dyes used in the experiment were raspberry, blueberry, and chlorophyll. My experiment examined whether applying these dyes in different combinations (blending them together and then applying them to the cell) would have a positive effect on the voltage and amperage in the solar cells. In addition, I wanted to see how the titanium dioxide paste would affect the reading of the solar cells. To test this second question, I tested solar cells that had a single layer of titanium dioxide paste and others that had a double layer of the paste. The results showed that the cells that were applied with the blended dyes had a higher efficiency and amperage than the ones that were applied with only one anthocyanin dye at a time. Additionally, the second modification, which was the addition of another layer of titanium dioxide paste, increased the efficiency and amperage even more, especially when this modification was tested with the previous modification of the blended dyes. Dye-sensitized solar cells are already more environmentally friendly than their silicon-based predecessors, and my project has found a way to increase their efficiency to an even greater degree.