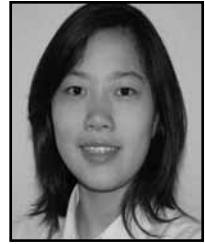


TEXAS

I-Chun Lin, 14

Plano, Texas



A Study of Dye-Sensitized Solar Cell Efficiency and Lifespan

Project Background: As an active member of her school's Recycling Club, I-Chun wanted to find an inexpensive, eco-friendly way to harness solar power. Through her research, she learned that dye-sensitized solar cells, which use dyes to harness sunlight, are cheaper to manufacture than solar panels, but aren't nearly as efficient. She decided to investigate how to increase the efficiency of dye-sensitized solar cells by using natural dyes obtained from berries. She hypothesized that a mixture of dyes would be most efficient, because dyes at different ends of the color spectrum would absorb photons at their respective wavelengths. This, in turn, would permit the cell to absorb more photons overall, increasing its voltage output.

Tactics and Results: I-Chun built three solar cells by sandwiching a layer of titanium dioxide paste between two glass plates coated with tin dioxide. She stained the titanium dioxide layer in each cell with one of three dyes: raspberry, blackberry, and mixed blackberry/raspberry, then added an electrolyte solution to the inside of the assembled cell. Next, she exposed the cells to a full-spectrum white light bulb, and measured the voltage output using a multimeter. She found the greatest voltage output from the cell stained with a mixture of blackberry and raspberry dye, which had 8% higher voltage output compared to the single-berry dyes. In a second experiment, she increased the cell's lifespan by sealing the cell with epoxy and minimizing the loss of the electrolyte solution.

Other Interests: I-Chun loves to play basketball. She started playing when she was in kindergarten and says she prizes the bonds she forms with her teammates. She also enjoys academics, participates in Student Council, and was the vice president of her school's chapter of the National Junior Honor Society.

Career of Interest: Neurologist. "Being a neurologist is a challenging and exciting career. The brain is one of the least comprehended parts of the human body; there are several opportunities to make a critical discovery."