Testing Different Anthocyanin Sources and Analyzing the Adsorptions on TiO2 (Titanium oxide) Nanoparticles with an Electron Microscope in DSSC

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Initially, solar cells were made from silicon, but it was very expensive to get. Later on, scientists created dye-sensitized solar cells using ruthenium dye which was a pollutant and it was facing environment-friendly issues due to the toxic chemicals and costly purification in processing ruthenium dye, but now the best alternative to it is the introduction of fruit dyes and photocatalysts instead of ruthenium dyes. That's why I decided to work on fruit-based dye-sensitized solar cells (DSSC) - to create a cheaper and more effective solar panel. I created my DSSC by using three different pairs of FTO glasses of different sizes, fruits extracts, titanium oxide as a photocatalyst, and triiodide solutions as an electrolyte. After creating the solar panels in a sandwiched structure, I tested them under three different sources of light- sunlight, room light, and a heat lamp. Then to understand the structure, I went to IUPUI Lab and took some pictures of the FTO glasses with and without the Titanium oxide with a scanning electron microscope SEM, to compare the results and I found out that because of the addition of TiO2 on the FTO glass, the glass has a larger surface area and pores than the glass with no TiO2. Therefore the glass with the TiO2 has more dye molecules adsorbed. And after conducting my experiment, I came up with a conclusion that the fruit that produced the highest electric power is blackberry because of its darker color and the amount of anthocyanin pigment available in the fruit. The large size panels were the most efficient type of FTO glass to be used, and from all the light sources, sunlight is the most efficient source of light to conduct this experiment with.

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