A Bright Future: The Use of Organic Waste in Dye-Sensitized Cells in the Creation of Efficient Solar Energy Systems

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Solar energy is a rising new alternative to fossil fuel. The most common source of solar energy, silicon-based solar cells, are often overpriced and environmentally harmful. In light of this, dye-sensitized cells are another option to utilize solar energy that promises potential replacement. These cells, which rely on the excitation of dye electrons to produce electricity, are favorable due to their cheap price and effectiveness. The purpose of this project was to find the most effective and sustainable dye that can be found in everyday organic waste that can work as effectively as expensive ruthenium based dyes and platinum electrodes. In this project, two experimentations were performed to identify the most effective and sustainable dye in both controlled and practical environments. In the first experimentation, four different fruit peels were used as dyes: Apple, Mangosteen, Orange, and Lemon. The dyes were tested two times a day for a month. From experimentation, Apple and Mangosteen were proven to have the highest voltage production, with averages of 509.114 mV and 499.972 mV respectively. In the second experimentation, the same four dyes were used, but they were tested outside in the sunlight for 12 hours. No significant degradation was observed throughout this time period, although voltage production did fluctuate with exposure to the sun and the sun's light intensity. Through these experiments, it can be concluded that fruit dye based dye-sensitized cell systems have potential to create efficient, cheap, and environmentally friendly solar energy systems.

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