

Dye Sensitized Solar Cell (DSSC) greenhouse shading: new insights for solar radiation manipulation

ABSTRACT

Energy crisis is the worldwide main concern since fossil fuels are facing rapid depletion and its consumption contributes to the rise in the average global temperature. Among the challenges to be embedded lately with agricultural activities is to explore clean and renewable energy resources. Electrical energy generation via solar technology, or known also as photovoltaic (PV) technology, has been the most economical viable green resource, especially in tropical-based countries. The most notable problem revealed by conventional PV in greenhouses, however, is due to the antagonistic factor lying in both photovoltaic roofs and plants. As such, the divergence subsequently decreases the growth and productivity of the cultivated crops. The Dye Sensitized Solar Cell (DSSC) is thus of great importance to human as it possesses several attractive features. For instance, the fabrication of DSSC is cheap. It is also flexible, transparent, and sensitive to low light levels. Besides its easiness to be used in larger applications, makes DSSC an ideal candidate that could function greatly as energy buildings. This review article aims to explore the DSSC technology's potential and its effectiveness as a shading greenhouse. Further, in-depth understanding on the uniqueness and advantages of this technology is thoroughly assessed. In comparison to conventional PV, the DSSC technology especially on solar radiation manipulation through the optimum choice of photosensitizer is well described. This paper also consolidates all the materials employed for DSSC fabrication for greenhouse shading. Detailing photosensitizer and light harvesting within PAR wavelength for sustenance growth have been provided. This technology has the potential to improve farming productivity while contribute to a significant reduction of CO₂ emission.

Keyword: PV greenhouse; Greenhouse shading; DSSC; Light manipulation; Solar energy