DYE-SENSITIZED SOLID-STATE SOLAR CELLS BASED ON NATURAL PIGMENTS EXTRACTED FROM GRAPE FRUIT SKIN AND ANTHURIUM PETALS

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The solar energy is an abundant, continuous and clean source of energy that can be used to produce electricity using many different photovoltaic designs. Dye-sensitized Solar Cells (DSCs) based on TiO_2 have drawn attention worldwide due to their low cost and easy preparation techniques compared to conventional silicon based photovoltaic devices. The objective of this work is to develop Dye-sensitized Solid-state Solar Cells (DSSCs), in which the liquid electrolyte, commonly applied in photoelectrochemical cells, is replaced by p-type hole conductors (CuSCN, CuI) and compared the performance of the solar cells with anthocyanin based natural dyes extracted from Grape fruit skin and Anthurium petals.

Highly porous, TiO_2 films have been prepared, on fluorine doped tin oxide (FTO) glass substrate, using 25 nm TiO_2 particles in TiO_2 colloidal suspension. These films were used to fabricate DSSC in the form of FTO/TiO_2/natural dye/p-type semi-conductor/Pt/FTO. The raw pigments, delphinidin and cyanin were simply extracted in acidic conditions from Grapes fruit skin and Anthurium petals. The DSSCs sensitized with delphinidin and cyanin gave power conversion efficiency of 0.43% and 0.34% respectively. Although the efficiencies obtained with these natural dyes are still below the current requirements for large scale practical application, the results are encouraging and may boost additional studies oriented to the search of new natural sensitizers and to the optimization of solar cell components compatible with such dyes.