DYE SENISIZED SOLAR CELL

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ABSTRACT

The dye-sensitized solar cells (DSC) provide an alternative idea for today's p – n junction photovoltaic systems that is technically and economically feasible. Unlike standard systems where both light absorption and charge carrier transport tasks are assumed by the semiconductor, the two functions are segregated here. A sensitizer, attached to the surface of a broad band semiconductor, absorbs light. Photo-induced electron injection from the dye into the solid's conductive band takes place at the interface. Carriers are transferred to the charge collector in the semiconductor's conductive band. Using sensitizers with a wide absorption band in combination with nanocrystalline morphology oxide movies allows a big percentage of sunlight to be harvested.

Key words: Dye-sensitized solar cells, P-N Junction, semiconductor, nanocrystalline.

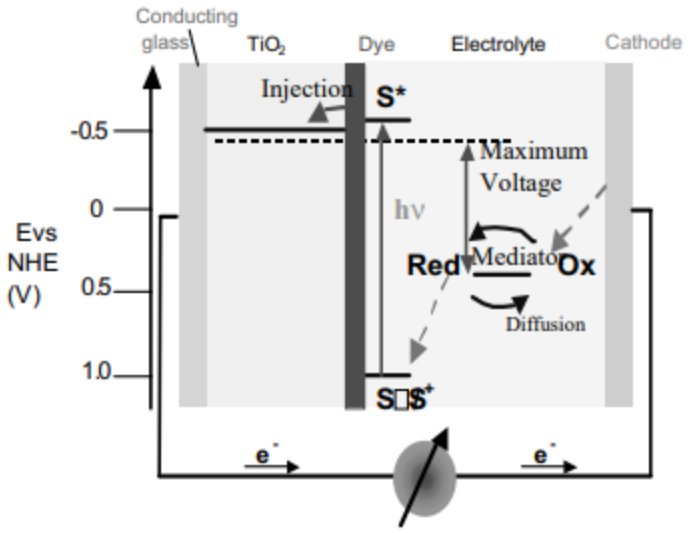
INTRODUCTION

Photovoltaic[1] equipment is based on the notion of load separation at an interface between two distinct conduction techniques. To date, this field has been dominated by solid-state junction devices, generally made of silicon, taking advantage of the semiconductor industry's experience and material accessibility. The dominance of the photovoltaic sector by inorganic solid-state junction systems is now questioned by the creation, for instance, of a third generation of cells based on polymer films and nanocrystalline films. These give very low-cost manufacturing prospects and current appealing characteristics that enable market entry. It is now feasible to totally depart from the classic solid-state junction device by replacing the contact stage with an electrolyte, fluid, gel or solid to the semiconductor, thus forming a photo-electrochemical cell.

METHODOLOGY

Referring to figure 1., At the center of the system, a mesoporous oxide layer consisting of particles of nanometer size is sintered together to enable electronic conduction to take place. Although alternative broad band gap oxides such as ZnO[2] and NbO5[3] were also researched, the material

of choice was TiO2 (anatase). The latter's photo excitation results in an electron being injected into the oxide's conductive band. Subsequently, the original dye state is restored by electrolyte donation of electrons, usually an organic solvent containing redox system, such as the iodide / triiodide couple. The sensitizer's regeneration by iodide intercepts the oxidized dye's recapture of the conduction band electron. In turn, the iodide is regenerated by reducing the triiodide[4] at the counter electrode that the circuit is completed through the external load via electron migration. The generated voltage under illumination is the difference between the electron's Fermi level[5] in the solid and the electrolyte's redox potential. The unit produces electrical power from light overall without any continuous chemical transformation.



CONCLUSION

The dye sensitized electro-chemical photovoltaic system has become a validated and reliable competitor for the transformation of solar energy into electricity to solid-state junction systems. Recent advances in sensitizers for these instruments have resulted in coloring that absorbs throughout the visible spectrum leading to greater efficiencies. The latest development of an all-solid-state heterojunction dye solar cell has extra potential to further reduce costs and simplify the production of dye solar cells.

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