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Solar cell: Photochemical cells based on dye sensitization of titanium dioxide and with indium tin oxide as a conductor

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The dye sensitized solar cell (DSSC) is a new type of solar cell which converts the visible light into electricity, by using indium tin oxide (ITO) and photo electrochemical system. A photo electrochemical solar cell that is based on the dye sensitization of thin microcrystalline films of titanium dioxide (TiO_2) nanoparticles in touch with a liquid electrolyte solution is tested. The main task of the project is to build a photochemical dye sensitized solar cell based on materials that are inexpensive and highly efficient in solar energy conversion by using ITO and TiO_2. The building process of the cell was started with the two conductive glass plate coated with ITO. However, a thin layer of Titanium dioxide TiO_2 is applied on the conductive side of one glass plate and the other side of the conductive glass plate is coated with graphite. A number of dyes such as natural strawberry and blue berries has been tested and then applied on the thin layer of TiO_2 and then the two conductive glass plates are stacked together to be a complete cell. A few drops of electrolyte solution such as pure iodine crystal, potassium iodide as well as ethylene glycol been added between the two conductive glass plates, a thin layer of titanium dioxide and a layer of graphite. The operational principle of the cell has been recorded through the measurement of the cell by emitting all wavelengths in the visible spectrum propagating from sunlight and exhibited steady voltage and current at much higher level for approximately 230 mv for the cell dimension 2.5 cm x 2.5 cm. During the testing cell we have got a problem with the nature of the electrolyte solution can undergo evaporation, leaking, charge separation at the titanium dioxide. For this kind of cells we recommend to use filters to decrease the amount of heat reaching the cell. However, recommendations for the future to improve the cell are made with using quantum dots. Quantum dots have the advantages of providing tunable band gaps and the ability to absorb specific wavelength from the solar spectrum.

Biography

Ari A Mohammed received his BSc degree in Physics from the University of Duhok, Iraq, in 2008, and started teaching physics for multiple academic levels including high school. In 2012, he earned his MSC degree in Physics from the University of Zakho as a Lecturer to teach physics for the undergraduate students and has joined a team of researcher in the field of Material Science. His researches focus in the field of material science and nuclear physics; he has a special interest in the field of Astronomy and Astrophysics also.

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