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| **Title:** | Design, Implementation, and Testing of a Dye-Sensitized Solar Cell | | |
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| **Abstract:** |  |
| Abstract— Designing adaptable energy systems is a big challenge for any sustainable design. Such a system should be able to provide uninterrupted services in varying climatic conditions. This research works aims to design and implement a very simple solar cell by reducing the design and manufacturing cost in case of environmental changes. This is a biological design using various types of dyes from biological materials. Dye-sensitized solar cell (DSSC) is one of the most important and latest generation thin film solar cells. It has recently been implemented for harnessing electrical energy from sunlight. It can convert up to 15% of solar energy into electrical energy through optoelectronic processes. This process is very much cheaper in terms of manufacturing cost than that of the traditional photovoltaic systems. Besides, DSSCs offer greater mechanical durability and design flexibility. The objective of this work is to design, implement and test a low-cost DSSC. Different dyes have been collected from various biological materials like fruits, vegetables, etc. Then the other chemicals are used to fabricate the DSSCs. The overall performance of a DSSC depends on the light absorption capability of the dye sensitizer and the diffusion of the ejected electrons through the mesoporous TiO2 film. The photovoltaic performances in terms of open circuit voltage and short circuit current were measured with an air-mass ratio of 1.5 global (AM1.5G) having an irradiance of 100 mW/cm2. The optical properties of the designed solar cell with the dyes extracted from the pomegranate were investigated. Test results were found very satisfactory. | |