

## **Fabrication of ZnO based Dye-sensitized Solar Cells using Screen Printing Technique**

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The dye-sensitized solar cell (DSSC) has been proven to have a good chance to become a notable competitor for the conventional solar cells. The operation principle of DSSC solar cells in comparison with the conventional semiconductor solar cells where light absorption and charge carrier transport are done by the semiconductor is different. In DSSC these two tasks are separated. Charge separation is done by photo-induced injection to the conduction band and such created carriers are transported to charge collector. Using dyes which have broad absorption band, the solar cell is capable of harvesting large fraction of sunlight. In this research, preparation of DSC using the Screen printing technique and mode of operation of solar cells based on parameters of the ZnO electrode is described.

Screen-printing is the best established, most mature solar cell fabrication technology, and screen-printed solar cells currently dominate the market for terrestrial photovoltaic modules. The key advantages of screen-printing are the relative simplicity of the process and the coating facility with fine controlling of the position and thickness. There are a variety of processes for manufacturing screen-printed dye-sensitized solar cells. The preparation technique followed here is one of the simplest techniques and it has been improved in our research laboratory.

A preparation technique of ZnO screen-printing pastes from commercially-available powders has been investigated in order to fabricate nanocrystalline films without cracking and peeling-off. In order to get a thickness around 12 $\mu$ m, four layers of ZnO were applied using the Screen Printing technique and the maximum conversion efficiency of 4.01% was obtained.