

ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF COMPOSITE NANOMATERIALS FOR SOLID-STATE DYE SENSITIZED SOLAR CELL

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Dye-sensitized solar cells (DSCs) based on metal oxide have become popular due to their low cost, eco-friendliness and simplicity of the process. To enhance the power conversion efficiency of DSCs, many attempts have been made like fabrication of bilayer electrode, preparation of composite semiconductor etc. Compared to individual nanoparticles, composite nanoparticles have significant affect on the surface morphologies, surface area, electronic and photo-electrochemical properties. In the present work $\text{TiO}_2\text{:ZnO}$ nanocomposites were prepared by sol-gel method and the structural properties were examined using various characterisation techniques. DSCs based on liquid electrolyte generally suffer from leakage, sealing, degradation and scaling problem. These limitations can be overcome by a solid electrolyte. From the literature it was found that a solid electrolyte with higher hole conductivity and good redox reaction properties may be used as conjugated polymeric nanomaterials. Polyaniline (PANI) is one of such conjugated polymers which can be easily synthesized and has very high hole conductivity, chemical stability and good redox reversibility. A detailed study on the application of PANI as electrolyte is being presented in this thesis

Keywords: Solid-state dye sensitized solar cells, Solid electrolyte, $\text{TiO}_2\text{:ZnO}$ nano-composite, PANI nanoparticles.