

Name of Scholars : Rahul
Name of Supervisor : Prof. Zishan Husain Khan
Name of Co-Supervisor : Prof. Bhaskar Bhattacharya
Department : Department of Applied Science & Humanities
Title of Ph. D. Thesis : Investigations on Dye Sensitized Solar Cells
Keywords : Dye, perovskite, solar cell, efficiency, polymer.

Abstract

The research work done in this thesis will have an impact on the scientific society working in the field of photovoltaic devices. The objective of this thesis work is fabrication and characterization of Dye, natural dye and perovskite light sensitizer based Dye sensitized solar cell. Development of such dye and perovskite sensitizers shall not only be cheaper and simpler but also eco-friendly. This thesis will contribute to the development of novel fabrication system and improve the performance of current materials in the photovoltaic application. In depth understanding of photovoltaic properties, charge transport and optical properties of these dye and perovskite sensitizers.

Organic-inorganic halide perovskite solar cells have recently emerged as a forerunner amongst the 3rd generation photovoltaic technologies. Within a short development cycle of 5 years, record efficiencies over 20% (or 20.1% certified) have been demonstrated in these devices. These astonishing performances have attracted a lot of attention. Furthermore, advances in perovskite photovoltaics have also culminated in spin-off discoveries of optical gain and applications of perovskite for water splitting. With more colleagues coming on-board this fast maturing field, there is a rapid increase in the number of publications on this exciting topic.

The favourable results from this thesis will lead to the following mentioned outcome. Chapter 1 deals with the detailed classification of dye sensitized solar cell and perovskite also; it also consultations about the possible photovoltaic modifications in DSSC and PSSC. Chapter 2 explain the available literature review and Chapter 3 describes the experimental setup and methodologies

adopted in the thesis. A detailed description of the characterization tools and fabrication techniques is also discussed here. Chapter 4 consists of the dye and perovskite sensitized solar cell working and fabrication system whose in-depth study of structural, fabrication process and photovoltaic parameters are presented for possible applications. Chapter 5 shows the comparison between the results obtained from photovoltaic studies of dye and perovskite sensitizers systems and some suggestions for future work also been discussed in this chapter. Use of solid polymer electrolyte in DSSC and PSSC will open new ways for the photovoltaic devices and lead to a cleaner and greener planet.