

Chapter-7

Conjugated Polymer for Photovoltaic (PV) Application

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Abstract: Nowadays photovoltaic cells (PSC) have attracted great interest due to their exclusive properties such as low cost, lightweight, easy processability, and the possibility to use in flexible devices. Due to low coverage in the solar spectral region, in most cases the efficiency is low. The development of conjugated polymers, having a low bandgap, and a wide absorption region has attracted much attention due to their smart application in photovoltaic. So, the challenge is to prepare low cost, highly efficient polymer-based photovoltaic materials by employing strategies such as constructing π -conjugated D- π -A semiconducting polymers (lowering E_g) to cover the longer wavelength of sunlight to increase the photocurrent and by using all-polymer materials favouring more efficient charge separation and increasing efficiency of photovoltaic performance.

Keywords: Semiconducting Polymers, π -Conjugated, Bulk Heterojunction (BHJ), Photovoltaic Cell, Renewable Energy.

7.1. Introduction

The conducting behaviour conjugated polymer was first discovered by Shirakawa, MacDiarmid, Heeger, and co-workers, when they studied the characteristic of polyacetylene by doping with a variety of electron acceptors or donors in 1977.¹ For this, they awarded Nobel Prize in Chemistry in 2000. This discovery annoyed the scientific community for the investigation of novel conjugated polymers. Today, research on conjugated polymers is a very interesting field due to their technological promising photophysical properties.²

The insulating properties of conjugated polymers make them a very promising candidate for electronic device applications. Organic semiconductors have several advantages due to their unique optoelectronic properties. For this, the science of