

ABSTRACT

Organic electronic materials, such as conjugated polymers and small organic molecules, with their unique semiconducting properties are of particular interest as new materials for electronic applications. Therefore, organic electronic materials are a promising field of research. During the practice for the diploma thesis, one of the objectives was the understanding of the processing parameters of these materials in order to obtain efficient photovoltaic devices. In order to achieve efficient production of photovoltaic devices based on organic semiconductors though, is very important to understand both the material properties and the functioning of the processing equipment.

This thesis refers to the "Processing of Organic Photovoltaic Devices with Printing Methods" and the goal was the use of inkjet printing technique for the control of rapid deposition of electronic materials from solution in specific parts of the surface. The manufacture of organic solar cells from solution can provide the most significant cost savings but for the realization of the concept, printed photovoltaic devices with optimized performance must be obtained. During this thesis, a full understanding of inkjet printing processing technique for the development of photovoltaic devices has been performed. In addition, processing trials for the deposition of PEDOT:PSS using the spin coating technique have been utilized and thereafter extensive experiments for the optimum deposition of a materials solution for the fabrication of organic photovoltaic devices have been carried out. For the active region of the solar cells the combination of regioregular poly(3hexylthiophene) and a soluble fullerene derivative namely PCBM has been chosen and dissolved in ortho-dichlorobenzene. The parameters of the inkjet printing technique and the properties of molecular electronic materials used had to be studied in depth in order to provide high quality thin films.