

Parameters affecting degradation performance of organic photovoltaics

The field of organic solar cells attracts high scientific interest due to the fact that provides several advantages, lightweight, flexibility and low cost of production. During the last years, major development in the performance of the organic dispositions was recorded. Moreover, the field of organic photovoltaics needs improvement in the device lifetime area and in the production processes in order to achieve commercialization and compete with inorganic solar cells. More detailed understanding of the organic solar cells degradation mechanism will lead to the improvement of the stability and the enhancement of the device lifetime.

The aim of this dissertation is to analyze the principle of Bulk Heterojunction organic solar cells function, as well as other methods that can be used to produce solar cells in laboratory environment. In addition, other parameters that influence the lifetime of the organic solar cells will be analyzed as well as their degradation mechanisms. The organic materials that comprise the active layer are very sensitive to atmospheric conditions. OSCs degrade because of their limited resistance to oxygen, moisture, elevated temperature and light. In the experimental part, blend of conjugated polymer P3HT-PCBM was deposit in order to indicate the consequence of the temperature and radiation in the organic materials. In order to suppress the action of the ultraviolet radiations and at the same time to reduce the ageing of the active layer, a family of compounds that had as basis the benzotriazole was used. Initially, the absorption was increased in the presence of the said compounds but during time the absorption was decreased further, in relation to the reference layers without benzotriazole. That decrease is possible to be produced due to the high action of those compounds. In order to minimize the rate of oxidation of the aluminous devices, benzotriazole was inserted. The treatment with benzotriazole is the one of the best promising compounds for the inhibition aluminum oxidation during the exposure in radiation.