Αγγλική Περίληψη

Nowadays we face the imminent need for the usage of renewable energy, in order to reduce the wasteful exploitation of the existent energy sources. Furthermore, the necessity to cut down the manufacturing cost of the advanced technological devices has led the researchers to the creation of innovative organic patterns, such as the organic photovoltaic (OPV) and the organic light-emitting diodes (OLED). So far these patterns have mostly been in a research level and have been built in laboratory scale. The most important reasons these technologies have not received a wide commercial growth are the following: a) Their poor performance (especially for the photovoltaic devices), b) the way that the devices are produced in industrial scale, c) the shortage of the materials used for the construction of those devices. The efficient function of the organic devices is crucial for their commercial use and depends not only on the structure of the device, but also on the use of the appropriate organic materials. Also, the need for even bigger devices at low building cost and the ability of arranging the materials on flexible underlying layers intensified the research on deposition and printing techniques. Even more, in recent years the industry has shown huge interest in roll-to-roll techniques, which do not require high temperatures, resulting in the lowering of the building cost. Such techniques also enable the production of large in their dimensions, yet thin devices in a short period of time. In this dissertation, there will be presented the factors which the efficiency of the organic devices is dependent on and there will be an exposition of the ways how we can improve the aforementioned efficiency, as well. There will also be references to the manufacturing techniques of the organic electronic devices, not only in laboratory scale, but also in industrial ones, emphasizing the roll-to-roll technique. Finally, using the appropriate software (origine8 pro), a prediction of the future efficiency of OLED and OPVs of different structures will be made. The purpose of this dissertation is to study and to infer the best possible efficiency that these devices can have, the time limit that this efficiency can be achieved in and the long-term viability of these technologies.