**ΤΙΤΛΟΣ:ΜΕΛΕΤΗ ΥΠΟΒΑΘΜΙΣΗΣ ΟΡΓΑΝΙΚΩΝ ΦΩΤΟΒΟΛΤΑΙΚΩΝ ΛΟΓΟ ΥΓΡΑΣΙΑΣ**

**ΟΝΟΜΑΤΕΠΩΝΥΝΟ:ΑΛΕΞΑΝΔΡΑ ΧΡΥΣΟΥ**

## ABSTRACT

Undoubtedly photovoltaics in recent years are showing a rapid growth. The reason for this fact it's due to the development and use of new materials, which became known as organic electronic materials. With the discovery and use of these specific materials, the scientific community focused on the field of organic photovoltaic (OPVs), which deserves wide study to date. The main reasons that motivate scientists to the further study of the course are for sure the advantages of these specific photovoltaics. More specifically the advantages are their light weight, flexibility, and the possibility of providing low cost mass production and thus cheaper end-user products.

In this thesis, we start by briefly describing the basic operation principleas of organic photovoltaic. Specifically are shown the two structures of organic photovoltaic, known as normal and reversed geometry. Additionally are presented the main steps of converting solar radiation into electricity using such devices, as well as indicating the different factors and degradation mechanisms of organic photovoltaic. Finally we present some of the ways to protect these devices, from the environmental conditions that directly affect device PCE over time.

The main objective of this research study was to investigate the degradation of inverted organic photovoltaics under harsh humidity conditions. More specifically, the influence on the stability of the inverted OPVs of the hole transporting layer processing additives is analyzed. PEDOT: PSS is treated with three different ways, with materials such as Zonyl, Dynol and their mixture. Despite that, these materials have to be used because they have the ability to improve the wetting properties of the PEDOT: PSS, we found that they strongly affect the device initial performance and lifetime under humidity conditions. Zonyl treated inverted OPVs degrade faster compared to the other two, under 85% RH-30$^{o}$C. Finally, Dynol treated devices seems to operate superior than all the inverted OPVs under study while their mixture T80 seems to be reached between Zonyl and Dynol T80.