Abstract

The conducting polymer blend poly(3,4-ethylenedioxythiophene): poly(styrene-sulfonate) (PEDOT:PSS) is the most widely used material as a hole transport layer in organic electronics. It is also one of the most promising candidate material to replace indium tin oxide (ITO) and act as an anode itself. This is very important for flexible organic electronic devices, because the devices fabricated on flexible plastic substrates with ITO break too easily as a result of failure of the ITO as they are bent. The main drawback in the deposition of the PEDOT:PSS on flexible polymeric substrates, such as poly(ethylene terephthalate) (PET), is the inert and hydrophobic surface of the polymer.

In the first part of this work PEDOT:PSS thin films (BAYTRON P VP AI 4083 by H.C. Starck) were spin coated on UV treated PET substrates. UV irradiation was used as a surface treatment technique for the increase of its hydrophilicity. The effects of the irradiation on the PET surface were evaluated by Atomic Force Microscopy (AFM) and Contact Angle measurements. The effects on the growth of the PEDOT:PSS onto the treated substrates were also investigated.

Another drawback in the replacement of ITO by PEDOT:PSS is that spin-coated PEDOT:PSS thin films are rich in PSS, which is an insulating polymer and therefore have a relatively low, comparing to ITO, electrical conductivity. In order to increase the conductivity of PEDOT:PSS, in the second part of this study we have investigated the effects of annealing at 90 ˚C for 3 and 24 hours and the addition of solvents on electrical and morphological properties of PEDOT:PSS thin films (CLEVIOS F E by H.C. Starck) that were deposited on PET films, which where UV-radiation pretreated. Conductivity measurements were performed using the four probe method and the effects on the morphology were investigated by AFM. Spectroscopic Ellipsometry has been utilized for the calculation of the thickness of the spin coated films.