

Real time optical monitoring of inorganic layer growth onto flexible polymeric substrates

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A major factor for the achievement of the desirable performance, efficiency and lifetime of flexible organic electronics is the optimization of the encapsulation layers that protect the device active layers by atmospheric molecule permeation. The active layers consisted of small molecule and/or polymer organic semiconductors as well as the organic conductors need to be encapsulated into a transparent medium that will provide the necessary protection and maintain their charge generation and transport characteristics. The encapsulation layers are generally consisted by inorganic thin films deposited onto the flexible polymeric substrates, such as PolyEthylene Terephthalate (PET).

In this work, in-situ and real-time Spectroscopic Ellipsometry in a wide spectral region has been implemented in order to investigate the growth of inorganic nano-layers onto flexible polymeric substrates, such as PET and PEN. The capability of optical measurement and analysis in very short time scales (in the order of 80ms) can provide information about the thickness and deposition rate of the deposited nano-layers during the process. Also, the real-time modeling option of the measured spectra provides insights on the deposition mechanisms of the inorganic nano-layers and the influence of the polymeric substrate.