# Abstract

The current trend in optoelectronics devices is oriented to the replacement of traditional substrates from flexible polymeric materials which will occur in flexible electronics devices (FED). The most important drawback of the polymeric materials is the high permeation rate in oxygen and water vapors. In order to construct FED high barrier thin film should be deposited onto polymeric substrates.

In this word was studied the optical and surface properties of inorganic, hybrid and hybrid/inorganic barrier films. It was also investigated the deposition mechanism of silicon oxide thin films ($SiO_x$). More specifically $SiO_x$ thin films were deposited onto PET, PEN and ORMOCER® substrates and the whole process was monitored by in-situ and real time spectroscopic ellipsometer (SE). The analysis of the real-time SE measurements revealed significant information about the growth mechanism and showed different deposition rates of $SiO_x$ onto Poly-Ethylene Terephthalate, Poly-Ethylene Naphthalate and organic-inorganic substrates. Also, SE provided information about the time-dependence of the optical parameters (energy gap, absorption peaks) and of $SiO_x$ stoichiometry in combination to the effect of the substrate.

The optical properties of ORMOCER® films were investigated by an ex-situ spectroscopic ellipsometer in the energy region of 1.5-6.5eV and studied the influence of the substrate, the composition and the addition of nanoparticles on the optical response of the material and its barrier properties.

Finally the homogeneity of the films thickness and optical properties was been determined by mapping SE measurements. Nanotopography was investigated by Atomic Force Microscopy.