OPTICAL AND ELECTRICAL PERFORMANCE OF YB/INSE INTERFACE

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Abstract— In this study a 300 nm ytterbium transparent thin film is used as substrate to a 300 nm thick InSe thin film. The optical transmittance, reflectance and absorbance of the glass/InSe and Yb/InSe films are measured and analyzed. The optical data allowed determining the effects of the Yb layer on the energy band gap, on the dielectric and on optical conductivity spectra. The band gap of the InSe films shrunk from 2.38/1.39 to 1.90/1.12 eV upon Yb layer interfacing leading to a band offset of 0.48/0.27 eV. On the other hand, the modeling of the optical conductivity in accordance with the Lorentz theory revealed a free carrier scattering time, carrier density and mobility of 0.225 (*fs*),$3.0\times10^{19}(cm^{-3})$ and 2.53 cm^2/Vs for the Yb/InSe interface, respectively. As these values seem to be promising for employing the Yb/InSe interface in thin film transistor technology, the current–voltage characteristics of Yb/InSe/C Schottky diode were recorded and analyzed. The electrical analysis revealed the removal of the tunneling channels by using Yb in place of Al. In addition, the "on/off" current ratios, the Schottky barrier height and the switching voltage of the Yb/InSe/C device are found to be 18.8, 0.76/0.60 eV and 0.53 V, respectively.

Keywords— Optical materials; Coating; Optical desorption spectroscopy; Dielectric properties.