PL-24

SURFACE ENGINEERING OF TCOS: APPLICATION IN FUNCTIONAL MATERIALS AND DEVICES

Amare Benor

Department of Physics, Bahir Dar University, P.O. Box 72, Bahir Dar, Ethiopia

Abstract. Transparent conductive oxide (TCO) materials are critical components of optoelectronic devices. The use of TCOs in these devices, as electrode material, is attributed to its excellent optical and electrical properties. Its electrical property in relation to charge transport issue has gained considerable attention in the scientific and industrial community. Charge injection or extraction between the electrode (TCO) and overlaid layer is affected by the work function of the TCO. Besides, the morphology of the subsequently deposited layer depends on the surface energy of the TCO. Both the surface energy and work function of the TCO can be tuned using different methods. In this work, the methods include depositing of ozone treated thin conductive polymer layer (PEDOT:PSS) and self-assembled monolayers (SAMs) treatment. Both surface energy and work function in the ozone treatment depends on the exposure time. In the latter case, SAMs treatment of TCOs, surface energy and work function of the TCOs depends on the chain length, chain chemistry and end/functional group. Furthermore, the SAMs use has been extended to pattern TCOs (indium tin oxide, ITO). The detailed factors, dependence of surface energy and work function of the TCOs on SAMs type, will be discussed in detailed. Furthermore, factors affecting the patterning the TCO (ITO) will be discussed in detail.

References

1. **A. Benor** *et al*., *Appl. Phys. Lett*., **96**, 243310 (2010).
2. **A. Benor** *et al*., *ACS Appl. Nano Mater.* 5, 5, 6505 (2022)