Studies on Al: Zn_2SnO_4 TCO layers for PV application

Gedi Sreedevi, 김우경†, Vasudeva Reddy Monnam Reddy, 서영주, 정현민, 알하마디 살레
Yeungnam University
(wkim@ynu.ac.kr†)

Al doped zinc stannate (Al:Zn_2SnO_4) has attracted much attention as a next well generation TCO due to its abundance,non-toxicity,high stability,and cost effective nature as well as good opto-electrical properties[1].In this work,Al:Zn_2SnO_4 layers were co-sputtered on glass substrates using three inches SnO_2 (4N purity) and Al:ZnO (4N purity) targets by RF and DC magnetron sputtering.All the prepared AZTO layers showed good uniformity and adherence. The full scan XPS spectrum of the layers showed the peaks of Zn 2p,Sn 3d,O 1s and Al 2p,which confirmed the presence of Zn,Sn,O and Al elements in the films.In addition, there were no other elementary impurities in the layers.The high resolution XPS spectra of Zn 2p,Sn 3d, O 1s and Al 2p raveled that the binding energies of Zn 2p3/2 and Zn 2p1/2; Sn 3d5/2 and Sn 3d3/2; O 1S; and Al 2p are at 1022.1eV and 1045.1eV; 486.5eV and 495.3eV; 530.4eV and 73.8 eV, respectively. The layer had and everage transmittance of over 80%, energy band gap of > 3.5eV and the lower electrical resistivity of 1.29 $\times 10^{-1}\Omega$ cm. The exhibited properties of Al: Zn_2SnO_4 layers made them suitable for making good TCO for photovoltaic and optoelectronic applications