Recent commercialization has peaked interest in transparent conducting oxides being implemented in display technology. Indium Tin Oxide (ITO) is a popular transparent conducting oxide which has been utilized as high work function electrode in liquid crystal displays, solar cells, gas sensors and heat reflecting films. Indium Tin Oxide films exhibit excellent transmission characteristics in the visible and infrared spectrum while maintaining high electrical conductivity. High work function electrodes are used to inject holes into organic materials. In majority applications, the ITO work function has an impact on the device performance as it affects the energy barrier height at the hetero-junction interface. Hence, the work function of ITO is of critical importance.

In this thesis, the work function of ITO is extracted successfully from a Metal Oxide Semiconductor Field Effect Transistor (MOSFET) device for the first time. Two MOSFET devices are fabricated using a four level mask under exact same conditions. Aluminum metal is used as a drain and source contact for both MOSFETs. One of the MOSFET has aluminum gate contact and transparent conducting ITO is used as gate contact for the second MOSFET. From the threshold voltage equation of both the fabricated MOSFETs, work function of ITO is extracted. Further optical transmission studies of ITO performed in the visible spectra are also reported in this study.

Major: Electrical Engineering
Educational Career:
Bachelor's of Electrical Engineering, BS, 2013, Mumbai University
Committee in Charge:
Kalpathy Sundaram, Chair, Electrical & Computer Engineering
Vikram Kapoor, Electrical & Computer Engineering
Jiann Yuan, Electrical & Computer Engineering

Approved for distribution by Kalpathy Sundaram, Committee Chair, on June 8, 2016.

The public is welcome to attend.