

## Interface electronic structures of organic light-emitting diodes with WO<sub>3</sub> interlayer : a study by photoelectron spectroscopy

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Reduction of the charge injection barrier at each interface in organic light-emitting diodes(OLEDs) is a key technology for interface engineering. The influence of the insertion of a hole injection layer in an OLED structure has been studied using *in-situ* x-ray and ultraviolet photoelectron spectroscopy. The hole injection barrier measured by the positions of highest occupied molecular orbitals (HOMOs) for *N,N'*-bis(1-naphthyl) -*N,N'*-diphenyl-1,1'-biphenyl-4,4'-diamine (NPB) /indium tin oxide (ITO) was estimated 1.32 eV, while that with inserted WO<sub>3</sub> layer between the NPB and ITO was lower by 0.48 eV. This phenomenon is followed by a large work function changes which are likely due to the charge redistribution of interface dipole. In case of annealed WO<sub>3</sub> interlayer, the reduction of hole injection barrier was not observed. Such effect will be discussed in relation to chemical changes in the WO<sub>3</sub> such as oxygen vacancy formation.