

Changes in Al-Alq₃ interface by inserting thin LiF layer : medium energy ion scattering analysis

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The initial interface formation during the Al electrode deposition on Alq₃ layer was studied. We prepared two interfaces of Al/Alq₃ and Al/LiF/Alq₃ by thermal deposition. In-situ medium energy ion scattering spectroscopy measurements were carried out to study the change in the Al diffusion into the Alq₃ layer. This system has a technical importance since the organic light emitting devices have an identical structures to enhance the carrier injection. LiF has been known as the material to help carrier injection from electrode to organic layer. It is also considered to prevent the metal diffusion into organic layer. However, little is known about the metal/organic interfaces, particularly on the behavior of LiF inserted. We measured the elemental depth profile of each interface and found that a part of Al diffuses into Alq₃ layer and LiF interrupts the Al diffusion. Additionally, Li in LiF layer also diffuses into Alq₃ layer.

Interface electronic structures of OLED with ReO₃ hole injection layer

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Recently, an organic light emitting diode (OLED) with rhenium trioxide (ReO₃) doping for hole transporting layer has revealed a dramatically improved characteristics of low driving voltage and long-time stability. To study the role of ReO₃ interlayer at the interface between the hole injection layer and anode in an OLED structure, *in situ* ultraviolet and x-ray photoelectron spectroscopy (UPS and XPS) have been performed. The hole injection barrier measured by the position of the highest occupied molecular orbital (HOMO) for *N,N'*-bis(1-naphthyl)-*N,N'*-diphenyl-1,1'-biphenyl-4,4'-diamine (NPB)/indium tin oxide (ITO) was estimated 1.48 eV, while that for NPB/ReO₃/ITO was lowered to 0.38 eV. This remarkable reduction in the barrier height is consistent with a large work function of ReO₃ film which causes the formation of a new interface dipole to NPB. However, no chemical reaction seems to occur but only an interfacial charge transfer takes place. Those interface chemical changes will be discussed comparing the result for ReO₃-doped NPB film.