T3-005

Water vapor permeation properties of Al_2O_3/TiO_2 passivation layer on a poly (ether sulfon) substrate

권태석[1], 문연건[2], 김웅선[2], 문대용[1], 김경택[2], 한동석[1], 신새영[2], 박종완[2]

[1]한양대 나노반도체공학과 [2]한양대 신소재공학과

Organic electronic devices require a passivation layer to ensure sufficient lifetime. Specifically, flexible organic electronic devices need a barrier layer that transmits less than 10^{-6} g/m^2/day of water and 10^{-5} g/m^2/day of oxygen. To increase the lifetime of organic electronic device, therefore, it is indispensable to protect the organic materials from water and oxygen. Severe groups have reported on multi-layerd barriers consisting inorganic thin films deposited by plasma enhenced chemical deposition (PECVD) or sputtering. However, it is difficult to control the formation of granular-type morphology and microscopic pinholes in PECVD and sputtering. On the contrary, atomic layer deoposition (ALD) is free of pinhole, highly uniform, conformal films and show good step coverage. In this study, the passivation layer was deposited using single-process PEALD. The passivation layer, in our case, was a bilayer system consisting of Al_2O_3 films and a TiO_2 buffer layer on a poly (ether sulfon) (PES) substrate. Because the deposition temperature and plasma power have a significant effect on the properties of the passivation layer, the characteristics of the Al_2O_3 films were investigated in terms of density under different deposition temperatures and plasma powers. The effect of the TiO_2 buffer layer also was also addressed. In addition, the water vapor transmission rate (WVTR) and organic light-emitting diode (OLEDs) lifetime were measured after forming a bilayer composed of Al_2O_3/TiO_2 on a PES substrate.