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Abstract
In the modern display technologies, a portable and a light OLED display have great competition ability than other displays. However, how to prevent the moisture attack is the key issue for the devices with long lifetime. Nowadays, the encapsulation of OLED is covered with glass or metal and therefore limited the application of flexible OLED.
In this study, the silicon oxide films were deposited by the Electron-Gun evaporation, and then the as-deposited films were treated in a RIE chamber by injecting the CH4, O2 H2 and N2 gas. We found that the water vapor transmission rate (WVTR)[4][5] of silica-based barrier film decreased with increasing the time of surface modify. It was found that while the WVTR of pure silica film 100nm on PET was 98 g/day/cm2 when measure at 60℃ and 95% RH. In surface modify of CH4 plasma 5min, the WVTR was decreased to 15.8 g/day/cm2, then it was decreased to 10.5g/day/cm2 with O2 plasma 0.5min. In AFM, we can also see the roughness of surface was decreased with O2 plasma 0.5min.Furthermore, WVTR is decreased to 3.8 g/day/cm2 beforehand H2 plasma treatment 8min. In AES measurement, we can see the carbon adhesion strength can be enhanced by beforehand H2 plasma treatment. In WVTR test, the Cr material is a good buffer layer to realize multi-layers film. But there are several problems like stress and electric conductivity wait for us to solve. The leakage current come with H2 plasma can be decreased with N2 plasma treatment. In the test result of OLED device, we can fine the passivated OLED have more excellent property in luminance efficiency and lifetime. From these results, the SiCXO1-X barrier films deposited in this work should be very suitable for encapsulating OLED.
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