Supplemental Document

Figure 1 (a) shows the growth per cycle (GPC) and refractive index (RI) values at 550 nm for deposited Al_2O_3 films as a function of grown temperatures. The GPC increases with deposition temperatures, while the RI slightly decreases. The causes of these results are clearly observed by X-ray photoelectron spectroscopy (XPS) analysis. Figure 1 (b) reveals the XPS O 1s peaks with different substrate temperatures. The relative area of the OH/COO peak decreased with increasing deposition temperatures. As a result, decreasing RI with increasing GPC originates from residual C impurities in the Al_2O_3 bulk, which result from limited thermal energy for chemical reactions.

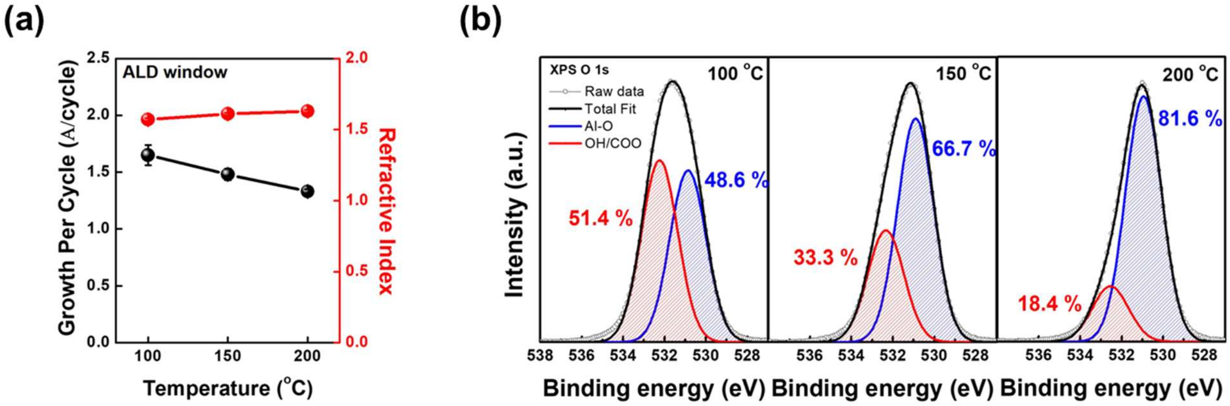

Figure 1. (a) The GPC and RI values and (b) XPS O 1s peaks of the AP S-ALD-derived Al_2O_3 films with different deposition temperatures.

Figure 2 (a) and (b) show the positive and negative gate bias stress (P/NBS) stability and mechanical bending results of the PEALD IGZO TFT using the optimal AP S-ALD-derived Al_2O_3 film as a buffer layer and gate insulator, respectively. The PEALD IGZO TFT present highly stable P/NBS reliability and bending test results. These results dependent on excellent AP S-ALD Al_2O_3 insulators in addition to the PEALD IGZO channel layer.

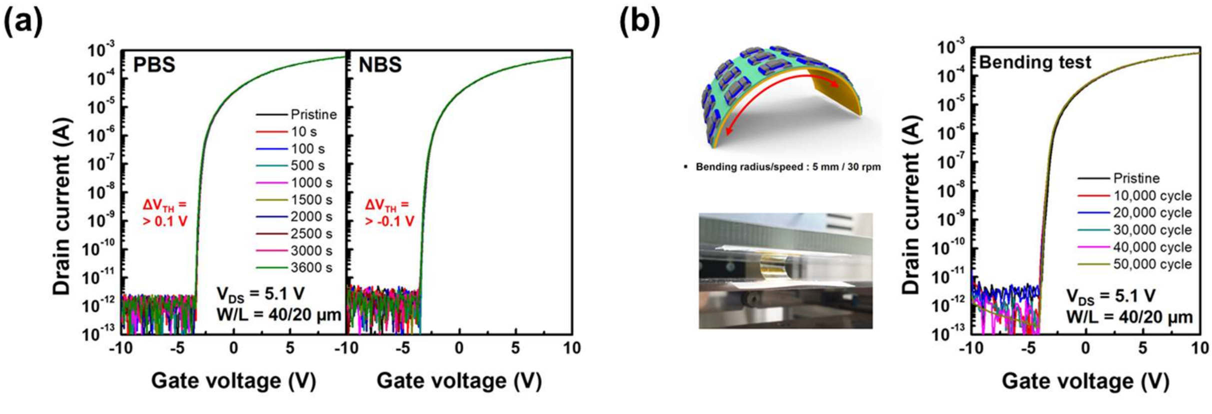

Figure 2. (a) Positive and negative gate bias stress results and (b) mechanical bending tests of the PEALD IGZO TFT. The optimal AP S-ALD-derived Al_2O_3 film was used for buffer layer and gate insulator of the PEALD IGZO TFT. The positive/negative gate bias stress and bending radius were set as ± 2 MV/cm and 5 mm, respectively.