**Supplemental Document**

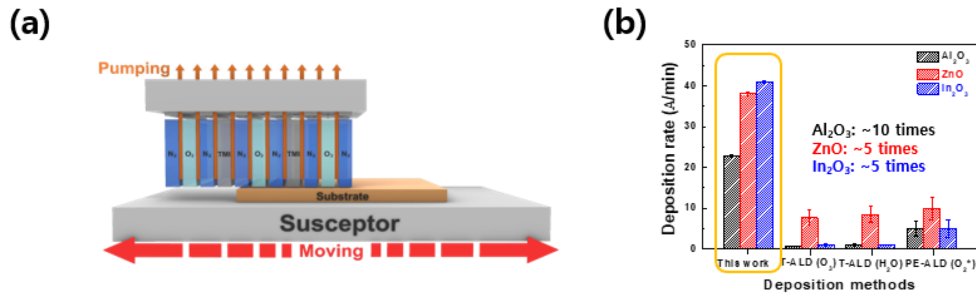


**Figure 1.** (a) APS-ALD system scheme, (b) is a productivity comparison with the conventional ALD method. The APS-ALD method, which does not require a purge time, can secure superior productivity compared to the existing method.

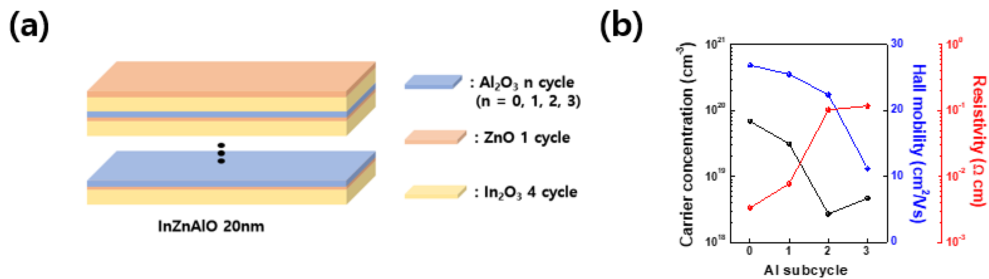


**Figure 2.** (a) Structure for Al-doping and (b) the Hall measurement result according to the Al cycle. The tendency of carrier concentration decrease according to the increase of the Al cycle was confirmed

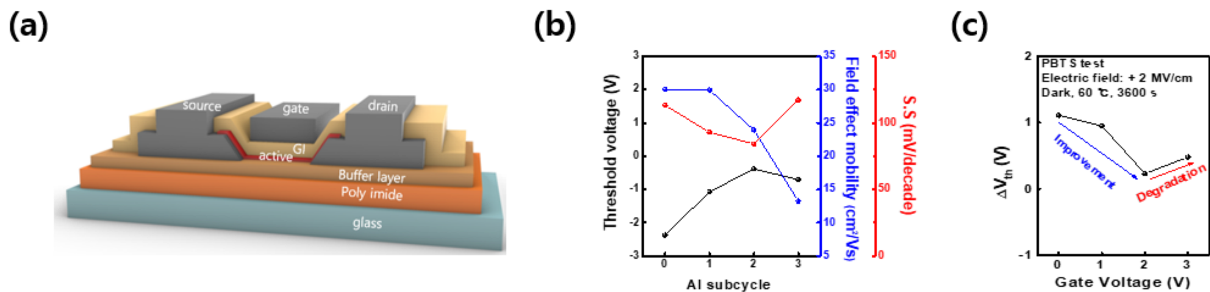


**Figure 3.** (a) Top gate bottom contact TFT structure (b) TFT characteristics and (c) PBTS reliability results. Excellent reliability was confirmed in 2 cycles.

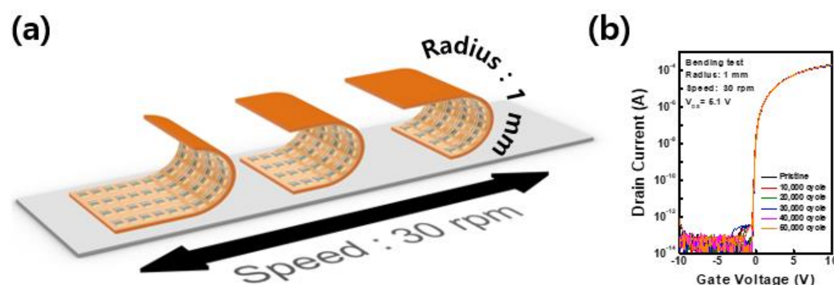


**Figure 4.** (a) Schematic during the mechanical bending test. (b) Transfer characteristics and electrical parameter variations as a function of bending cycle time. The AP S-ALD IAZO TFT reveal negligible electrical parameters changes after 50,000 bending cycles.