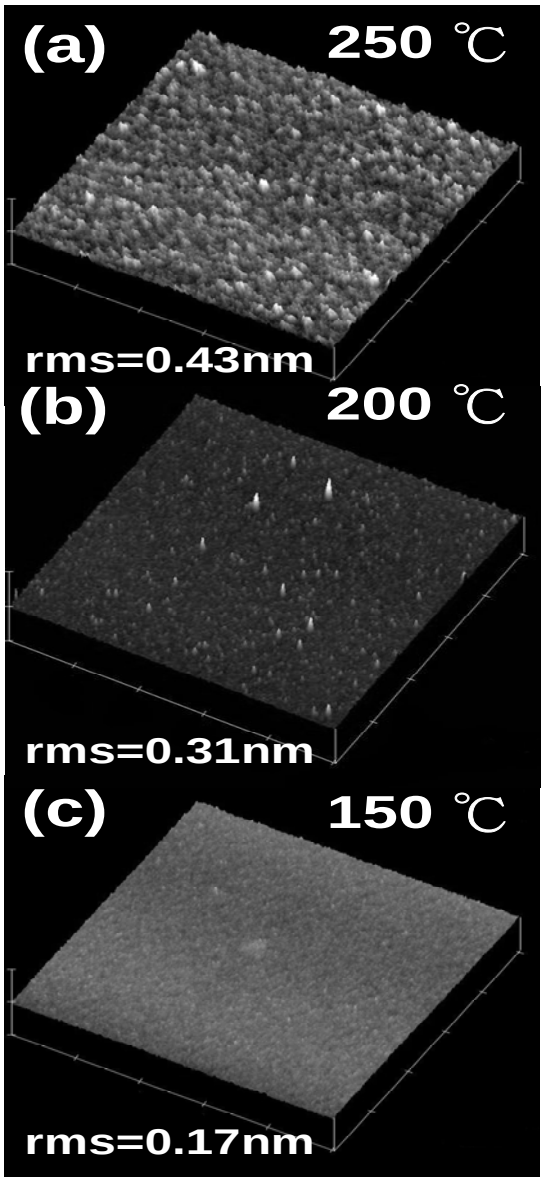

Fig. 4-1 The AFM images of AlN films deposited at 250°C, 200°C, and 150°C are shown in Fig. (a), Fig. (b), and Fig. (c), respectively. The scanning size is fixed to be 5×5 μm^2. The rms roughness values are 0.43, 0.31, 0.17 nm, respectively.

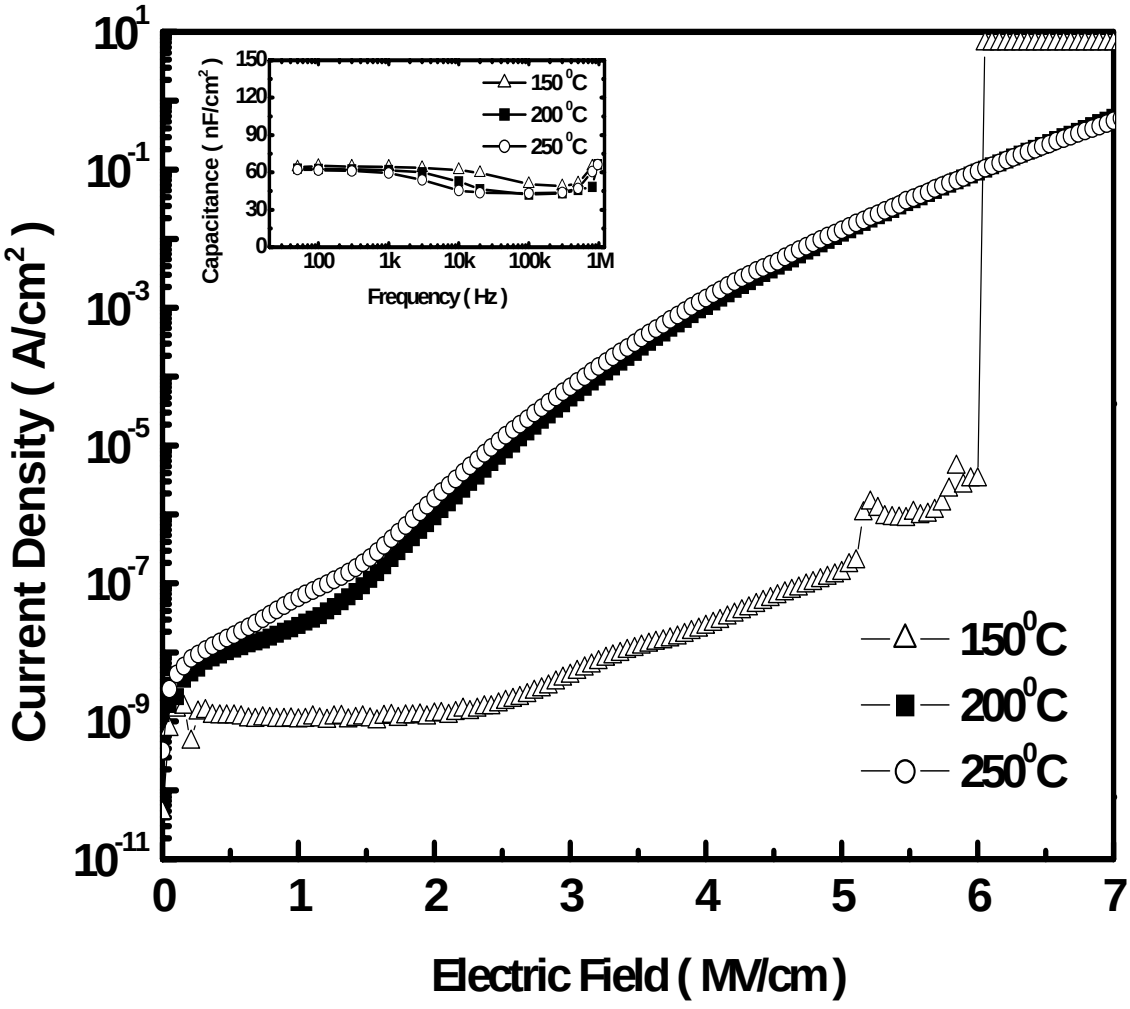

Fig. 4-2 The leakage current of the Au/AlN/Si MIS structure as a function of the electric field and gate voltage. The inset is the capacitance measured from the same structure under various frequencies.

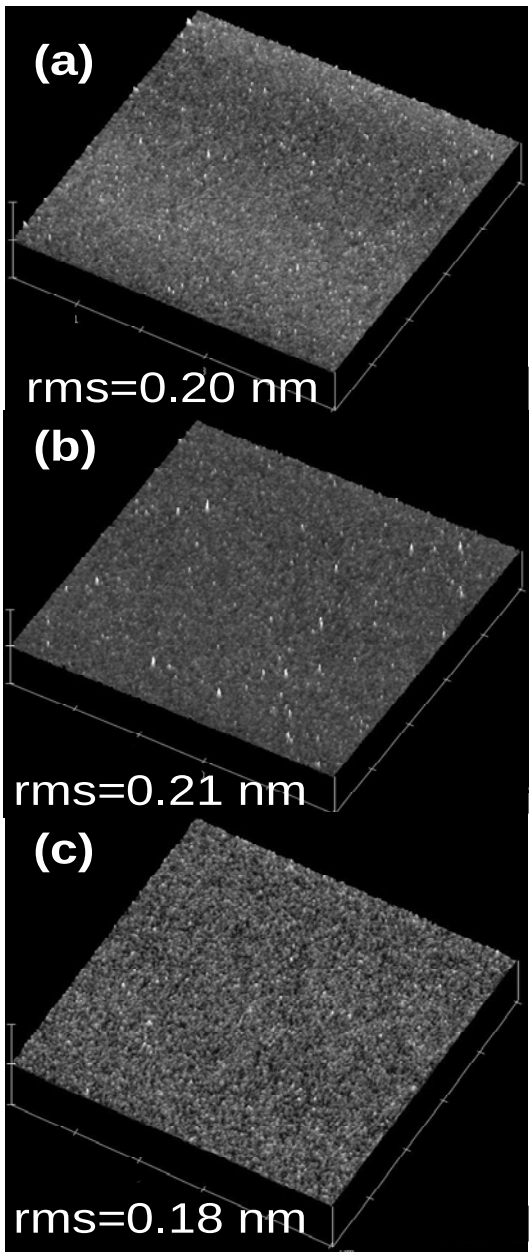

Fig. 4-3 The AFM images of AlN films deposited at Ar/N_2 ratio: 2/5, 2/7, 2/9 are shown in Fig. (a), Fig. (b), and Fig. (c), respectively. The scanning size is fixed to be $5\times5\ \mu m^2$. The rms roughness values are 0.20, 0.21, 0.18 nm, respectively.

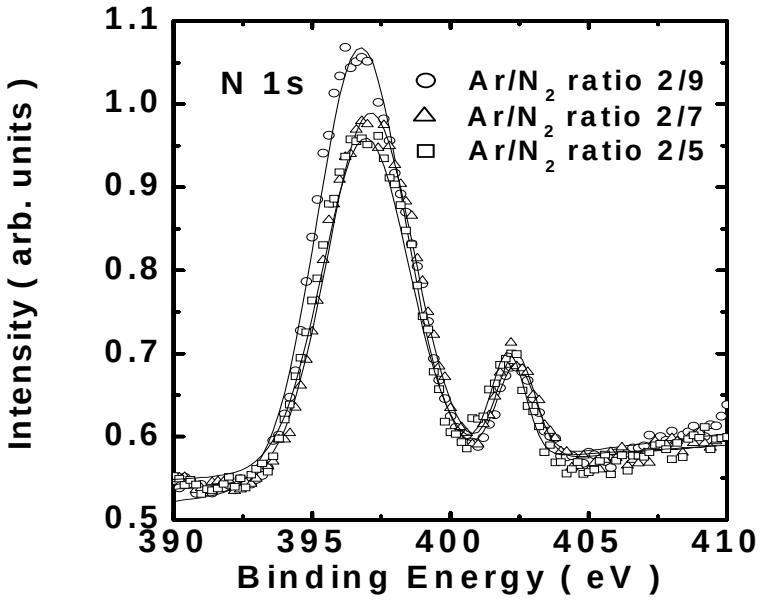

Fig. 4-4 The x-ray photoemission spectrum (XPS) signal form the AlN sample (different sputtering condition).

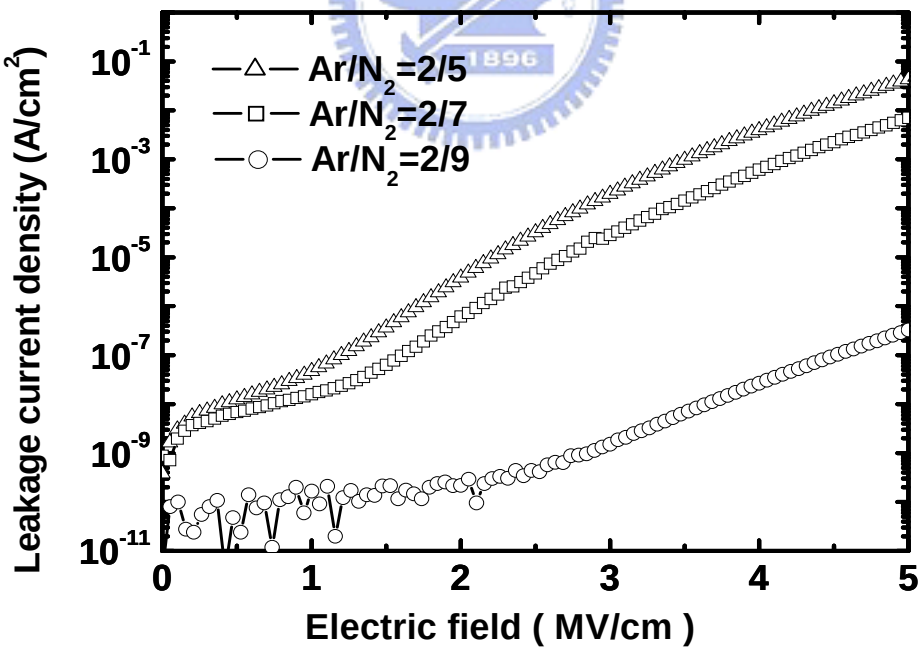

Fig. 4-5 The J-E plots of the Au/AlN/Si MIS structure from different Ar/N_2 flow rate in AlN sputtering process.

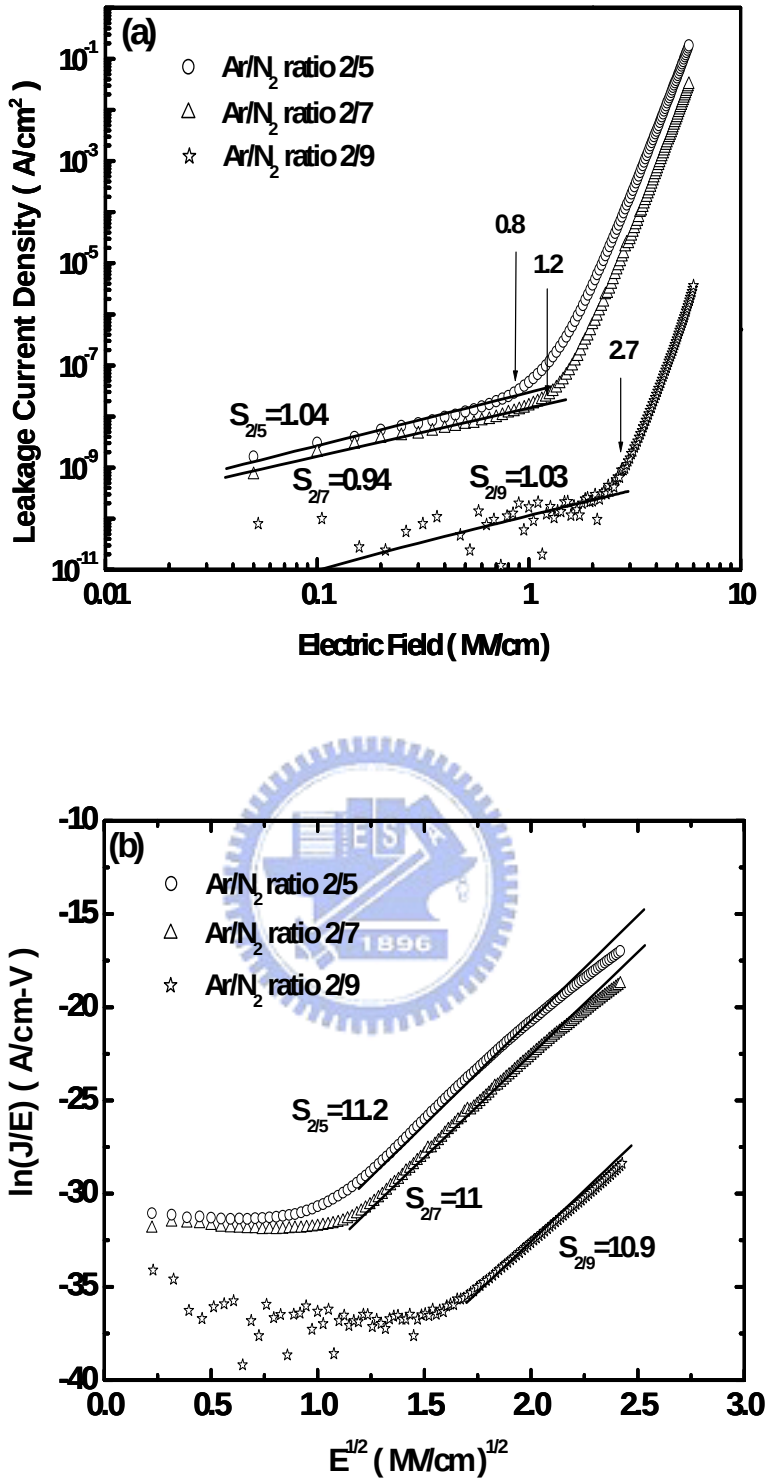

Fig. 4-6 (a) The leakage current from three MIS structures are plotted as a function of electric field in log(J) vs. log(E) plots and (b) in ln(J/E) vs. $(E)^{1/2}$ plot.

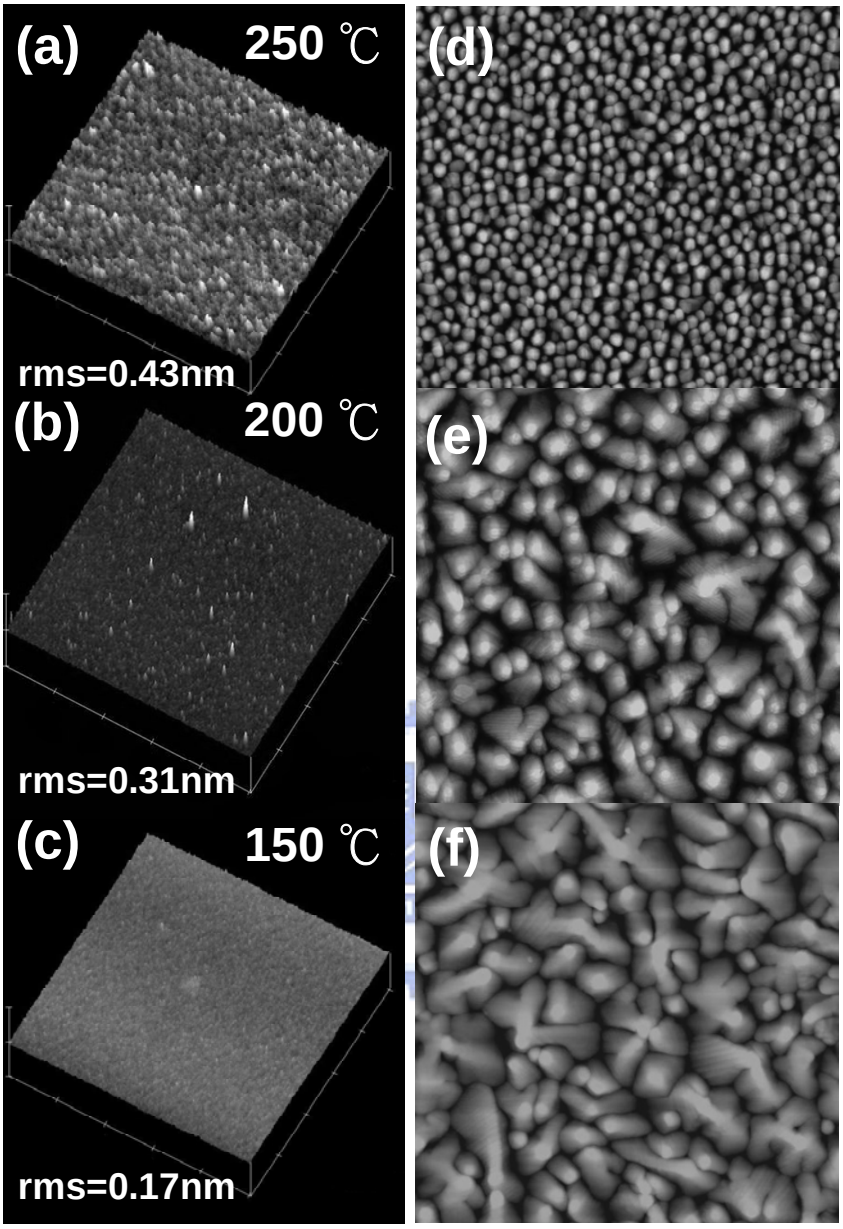

Fig. 4-7 The AFM images of AlN films deposited at 250°C, 200°C, and 150°C are shown in Fig. (a), Fig. (b), and Fig. (c), respectively. The corresponding AFM images of pentacene films grown on the 250°C, 200°C, and 150°C AlN dielectrics are shown in Fig. (d), Fig. (e), and Fig. (f). The scanning size is fixed to be 5×5 μm^2.

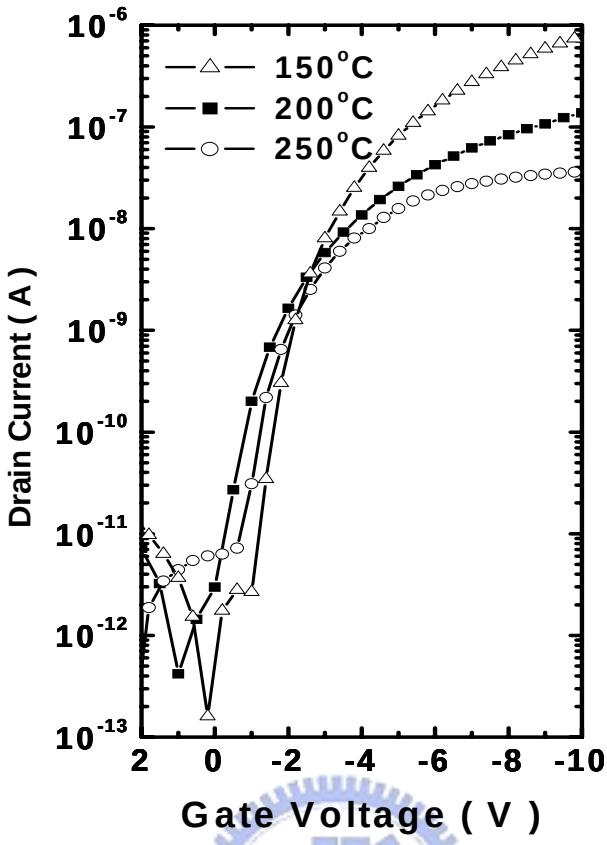

Fig. 4-8 The transfer characteristic of the OTFTs with 150°C, 200°C, and 250°C AlN gate dielectric. The drain bias is -3 V.

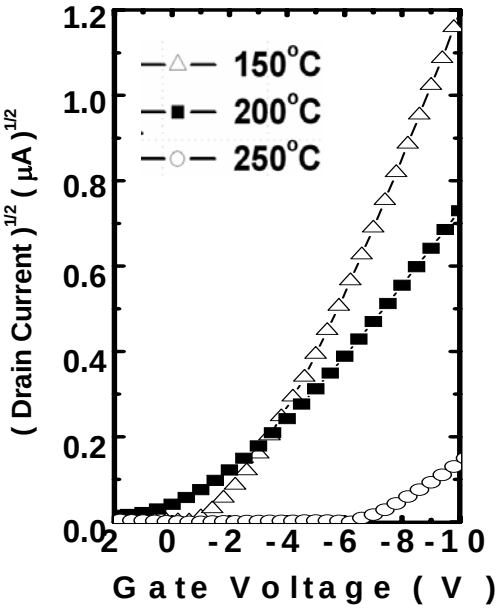

Fig. 4-9 The plot of square root of drain current versus the gate voltage when the drain bias is -7 V.

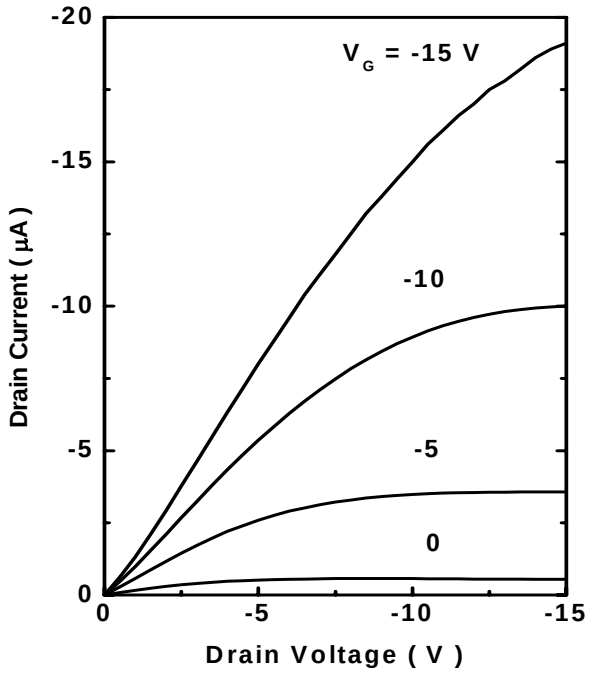

Fig. 4-10 The output characteristic of the OTFTs with 150°C AlN gate dielectric.

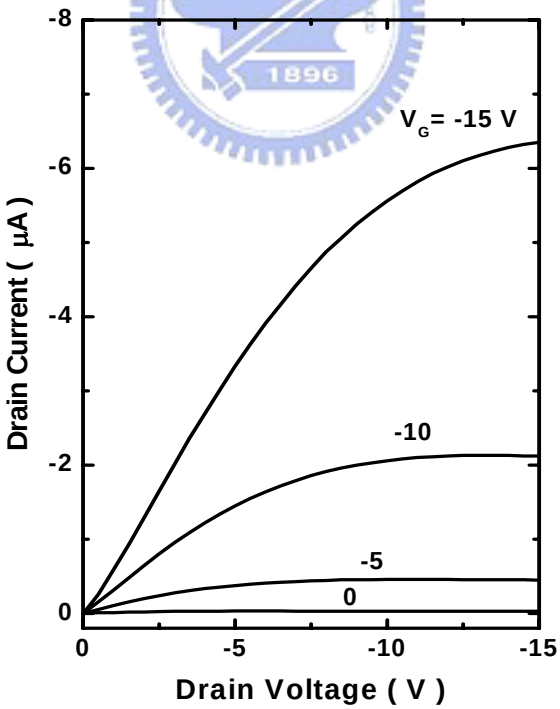

Fig. 4-11 The output characteristic of the OTFTs with 200°C AlN gate dielectric.

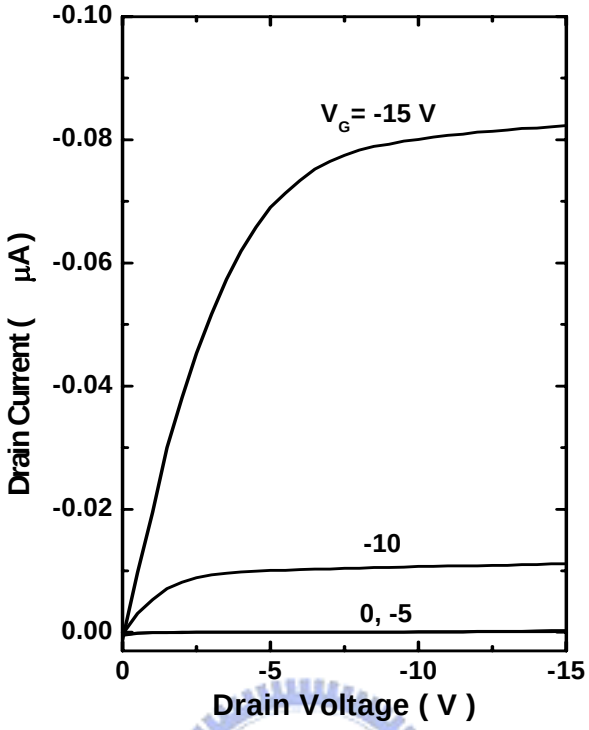

Fig. 4-12 The output characteristic of the OTFTs with 250°C AlN gate dielectric.

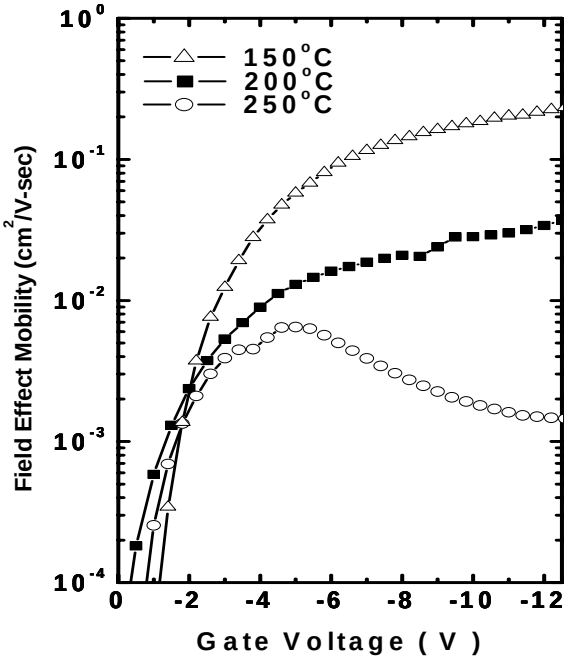

Fig. 4-13 The field effect mobility of OTFTs with 150°C, 200°C, and 250°C AlN gate dielectric. The drain bias is -3 V. The field effect mobility is extracted from the linear region transconductance.

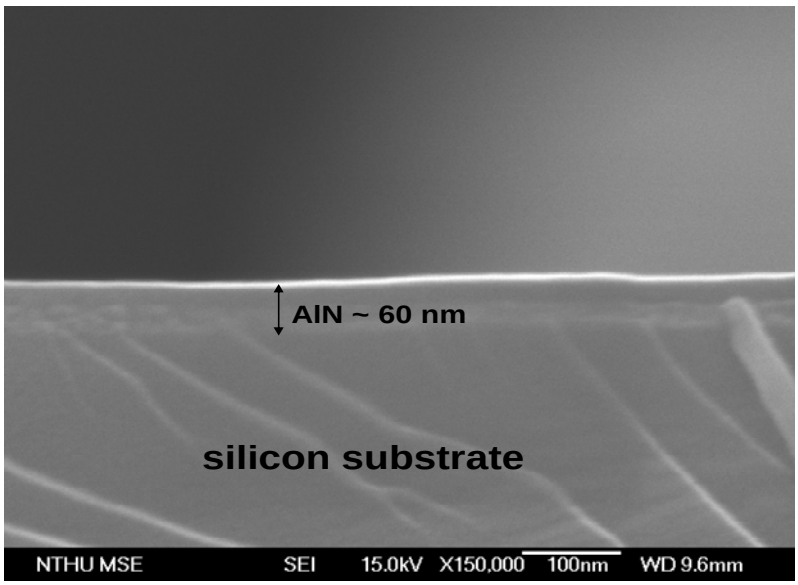

Fig. 4-14 The cross-sectional SEM image of AlN dielectric.

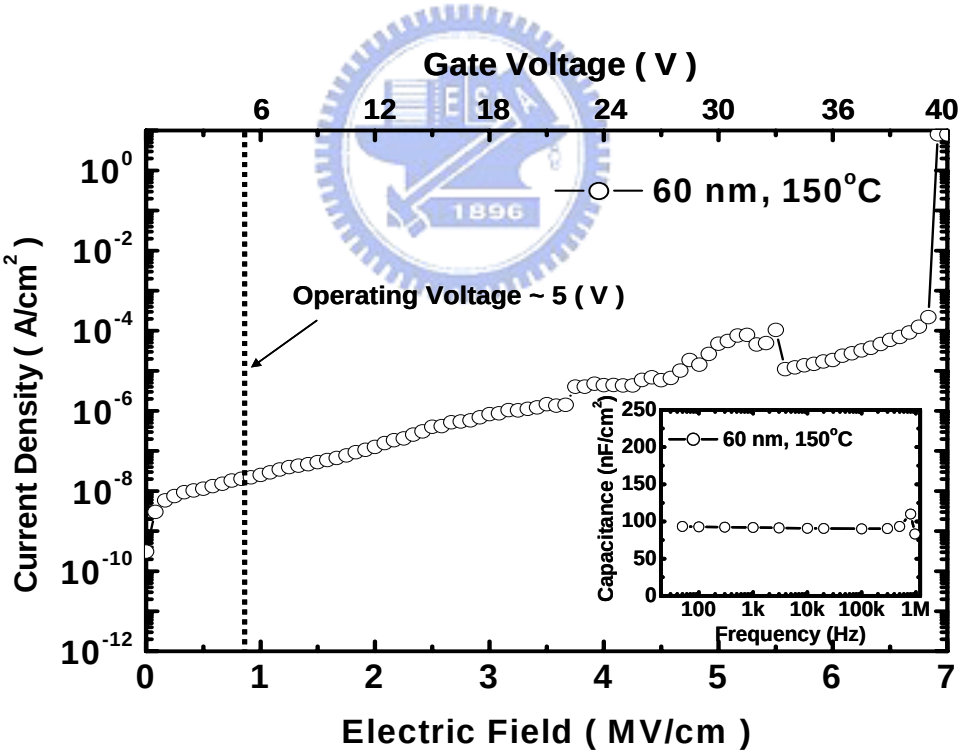

Fig. 4-15 The leakage current of MIS structure as a function of electric field and gate voltage. The inset is the capacitance measured from the same structure under various frequencies.

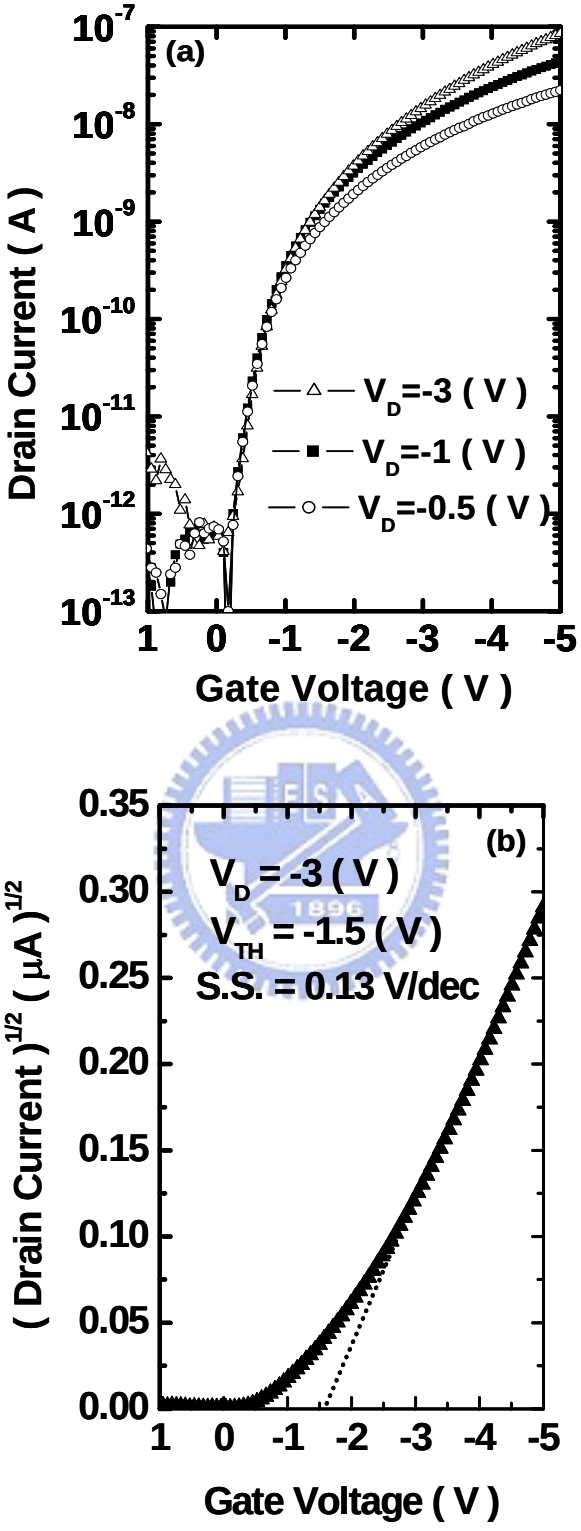

Fig. 4-16 (a) The transfer characteristics of AlN-OTFTs. The gate voltage was scanned from +1 V to -5 V. (b) The square root of drain current vs. the gate voltage.

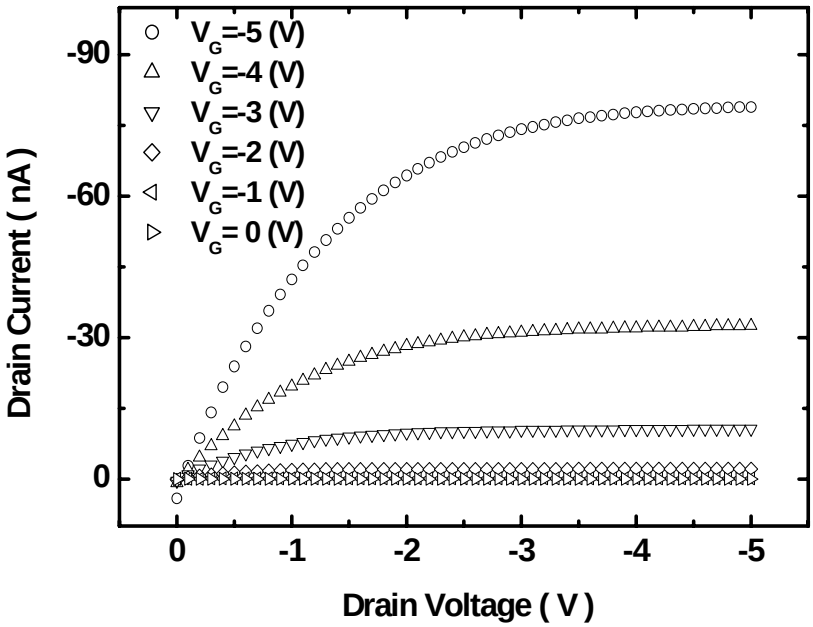

Fig. 4-17 The output characteristics of AlN-OTFTs.

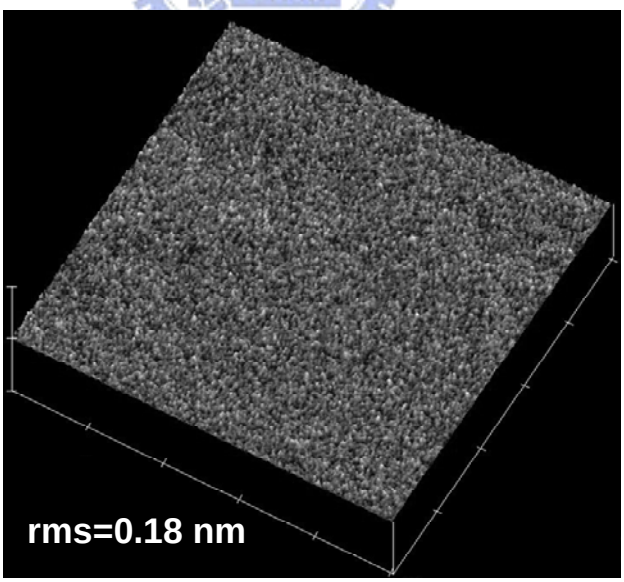

Fig. 4-18 The AFM image of higher Ar/N_2 ratio sputtered AlN film. The scanning sized is $5\times5\ \mu m^2$.

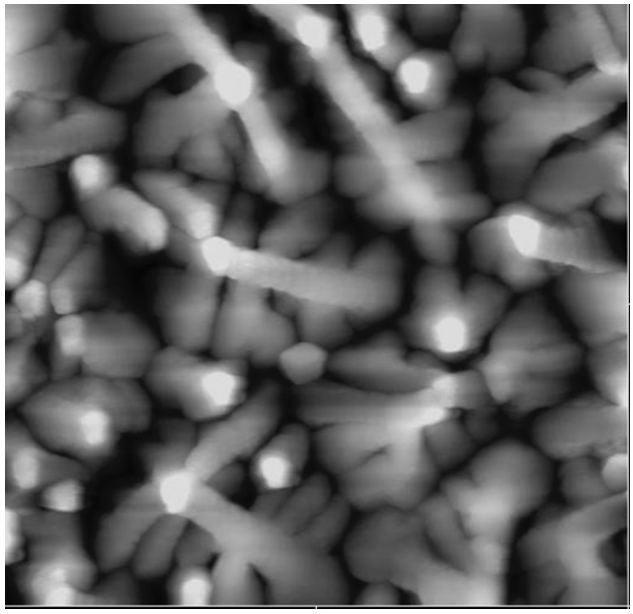

Fig. 4-19 The AFM images of pentacene films grown at higher Ar/N_2 ratio AlN dielectrics. The scanning sized is 5×5 μm^2.

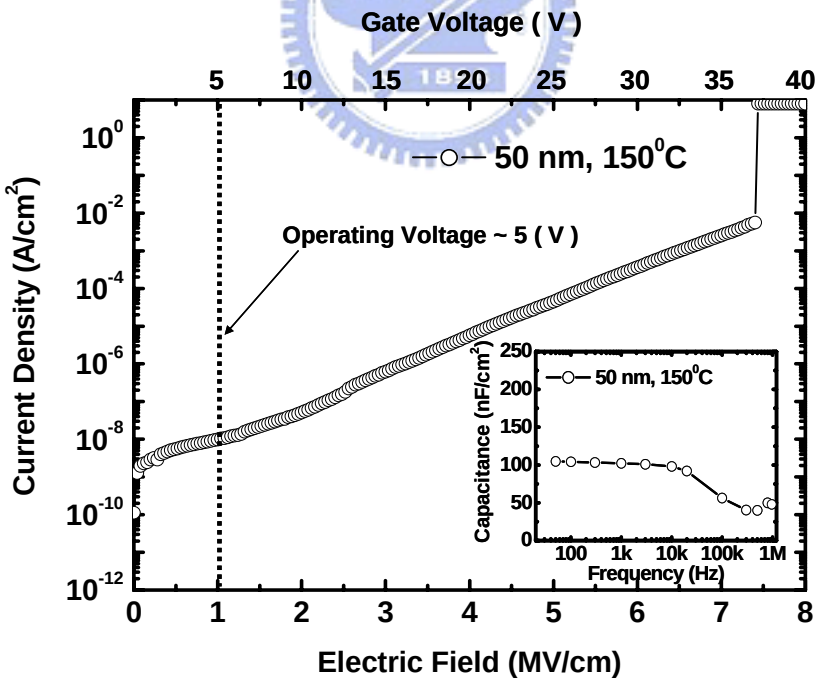

Fig. 4-20 The leakage current of MIS structure as a function of electric field and gate voltage. The inset is the capacitance measured from the same structure under various frequencies.

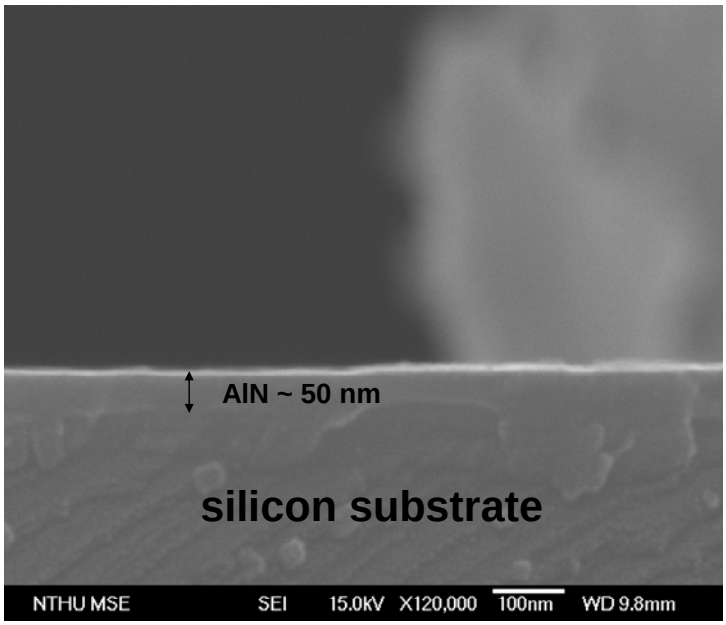

Fig. 4-21 The cross-sectional SEM image of AlN dielectric with higher Ar/N_2 ratio.

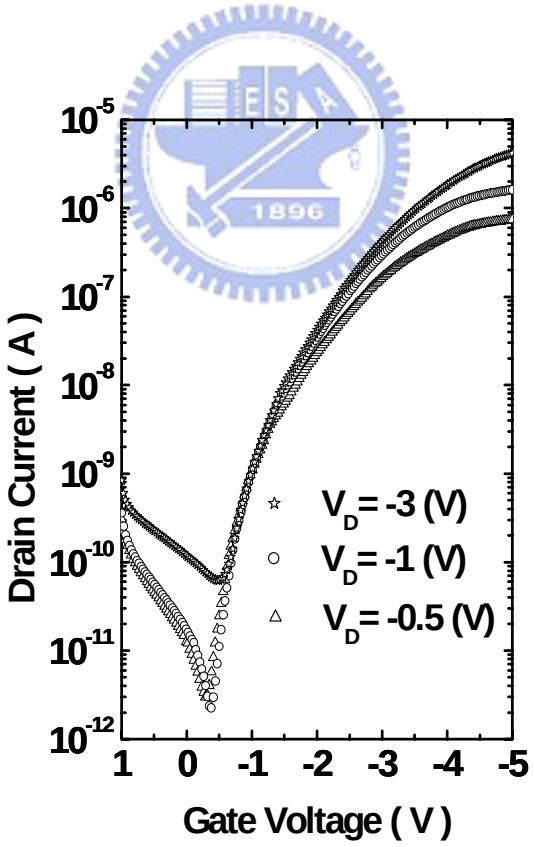

Fig. 4-22 The transfer characteristics of AlN-OTFTs. The gate voltage was scanned from +1 V to -5 V.

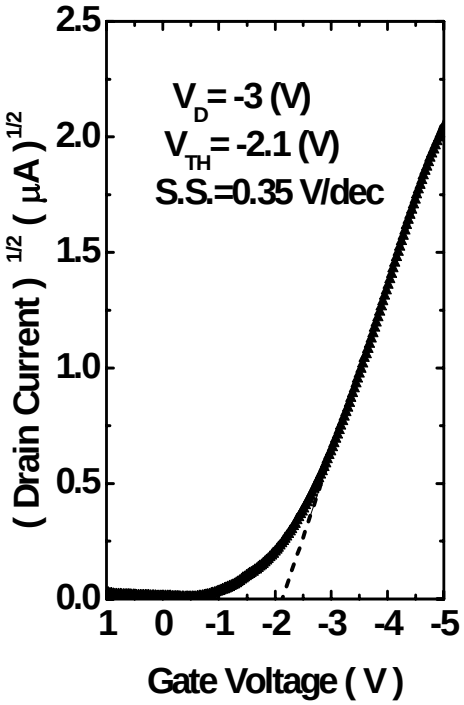

Fig. 4-23 The square root of drain current vs. the gate voltage. The gate voltage was scanned from +1 V to -5 V.

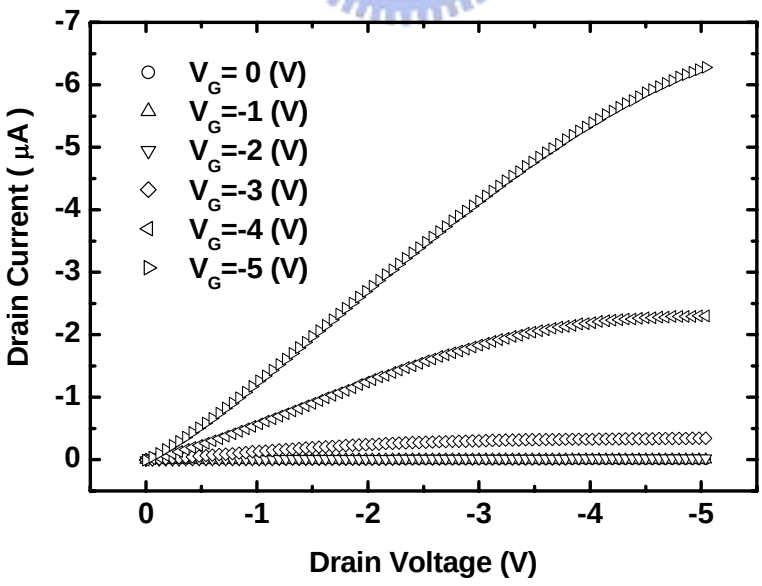

Fig. 4-24 The output characteristics of OTFTs with higher Ar/N_2 ratio AlN films.

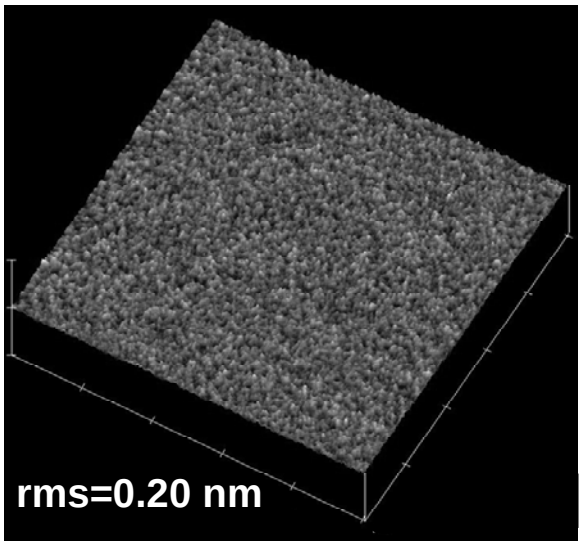

Fig. 4-25 The AFM image of room temperature sputtered AlN film. The scanning sized is 5×5 μm^2.

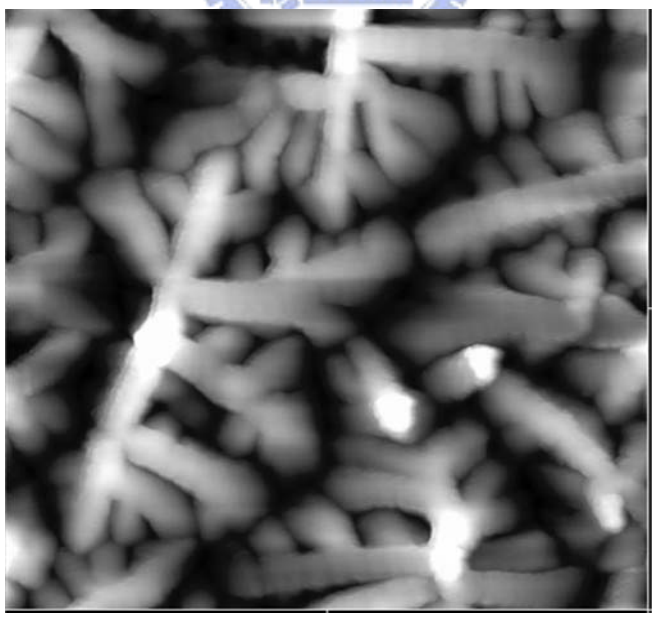

Fig. 4-26 The AFM images of pentacene films grown on the room temperature AlN dielectrics. The scanning sized is 5×5 μm^2.

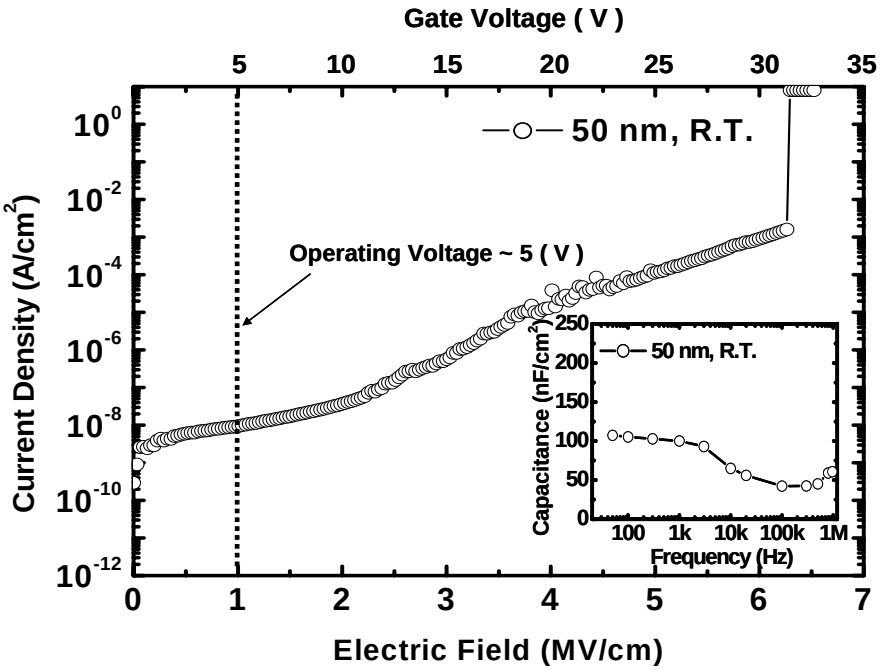

Fig. 4-27 The leakage current of MIS structure as a function of electric field and gate voltage. The inset is the capacitance measured from the same structure under various frequencies.

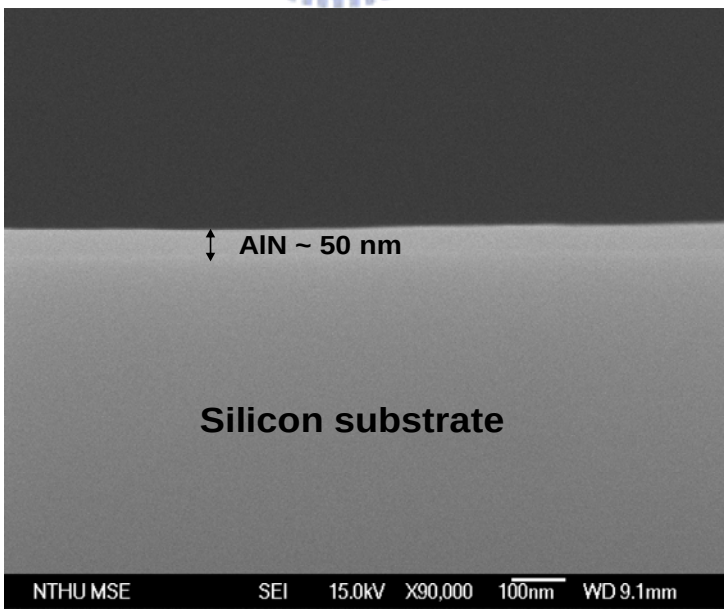

Fig. 4-28 The cross-sectional SEM image of room temperature AlN dielectric.

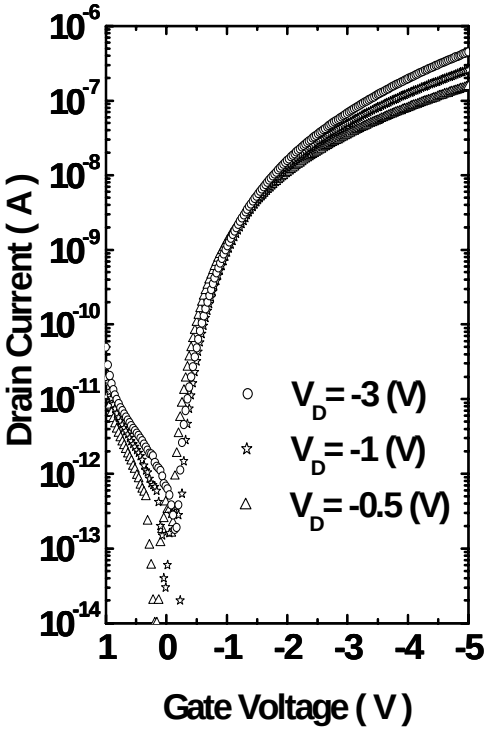

Fig. 4-29 The transfer characteristics of AlN-OTFTs. The gate voltage was scanned from +1 V to -5 V.

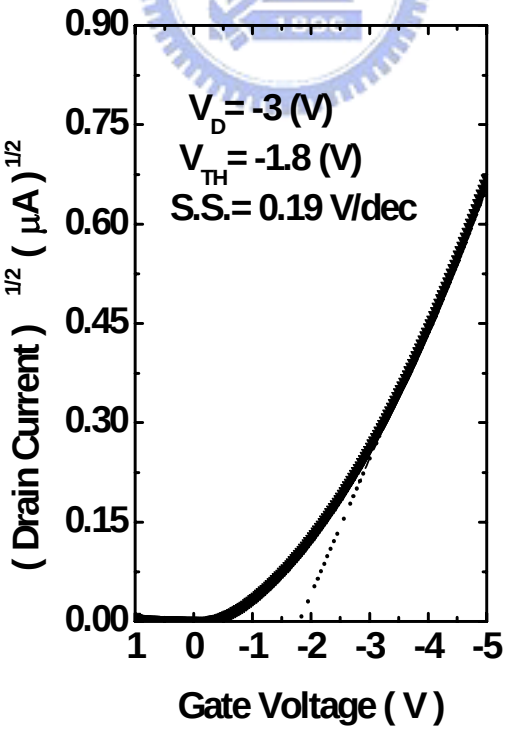

Fig. 4-30 The square root of drain current vs. the gate voltage. The gate voltage was scanned from +1 V to -5 V.

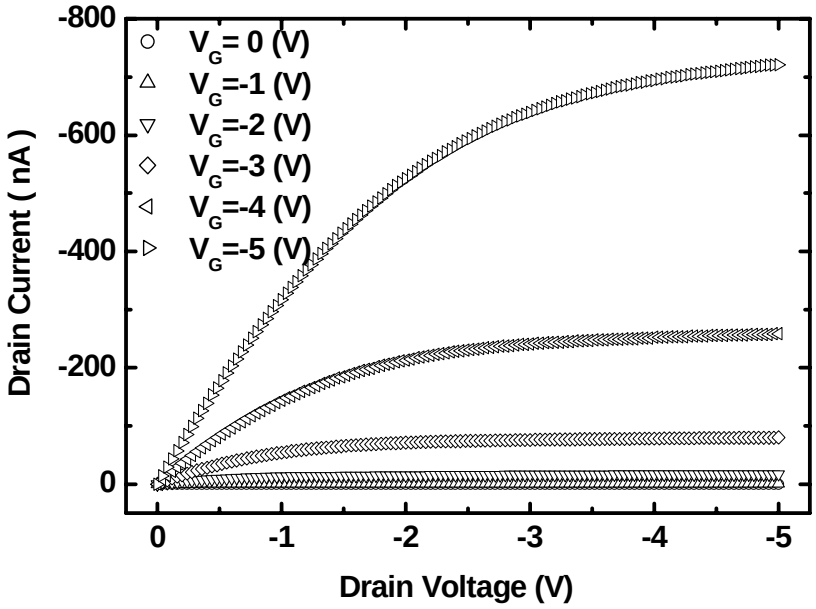

Fig. 4-31 The output characteristics of OTFTs with room temperature AlN films.