

# Contents

<b>Abstract (Chinese)</b>	I
<b>Abstract (English)</b>	III
<b>Acknowledgement</b>	V
<b>Contents</b>	VI
<b>Table Captions</b>	VIII
<b>Figure Captions</b>	IX

## **Chapter 1. Introduction**

1-1 Introduction of Organic Thin Film Transistors (OTFTs)	1
1-2 Deposition Methods of AlN	2
1-3 Motivation	3
1-4 Thesis Organization	4

## **Chapter 2. Theoretical Background of OTFTs**

2-1 Introduction	5
2-2 Transportation Mechanisms of Organic Semiconductor	5
2-3 Operation of OTFTs	7
2-4 Parameter Extraction	9
2-4-1 Mobility	9
2-4-2 Threshold voltage	9
2-4-3 On/Off current ratio	10
2-4-4 Subthreshold swing	10
2-4-5 Maximum interface trap density	10
2-4-6 Surface free energy	11
2-4-7 Poole-Frenkel (P-F) mechanism	11

## **Chapter 3. Experiments**

3-1 AlN Deposition	12
3-2 OTFTs Fabrication	12
3-3 Capacitance Structure Fabrication	14

## **Chapter 4. Result and Discussion**

4-1 Electrical Properties of AlN Dielectric	16
4-1-1 Dependence of dielectric leakage on substrate temperature	16
4-1-2 Dependence of dielectric leakage on nitrogen gas flow rate	18
4-2 Effects of AlN Dielectric Roughness	20
4-3 Surface Polarity of AlN Film	22
4-4 Low-Voltage OTFTs with AlN Dielectric	23
4-5 High-Performance AlN-OTFTs	25
4-5-1 AlN dielectric with higher Ar/N <sub>2</sub> ratio	25
4-5-2 Room temperature AlN dielectric	26
4-6 Summary	28
<b>Chapter 5. Conclusion and Future Work</b>	
5-1 Conclusion	29
5-2 Future Work	30
<b>References</b>	31
<b>Tables</b>	39
<b>Figures</b>	41
<b>Profile</b>	63

