Contents

Abstract (Chinese) i
Abstract (English) iii
Acknowledgement v
Contents vi
Figure Captions viii
Table Captions xiii

CHAPTER 1 INTRODUCTION 1
1.1 Overview of Low-Temperature Polycrystalline Silicon Thin Film Transistors (LTPS TFTs) 1
1.2 Motivation 3
1.3 Thesis Organization 5

CHAPTER 2 FABRICATION AND CHARACTERIZATION 6
2.1 Fabrication Methods of Low-Temperature Polycrystalline Silicon Thin Film Transistors 6
2.2 Set Up Instruments 9
2.2.1 Stress Setup
2.2.2 Current-Voltage (I-V) Measurement
2.2.3 Capacitance-Voltage (C-V) Measurement
2.3 Methods of Device Parameter Extraction 14
2.3.1 Determination of the On/Off Ratio
2.3.2 Determination of the Subthreshold Swing
2.3.3 Determination of the Field-Effect Mobility
2.3.4 Determination of the Threshold Voltage
2.3.5 Determination of the Trap Density

CHAPTER 3 EXPERIMENT ····· 20

3.1 Electrical Degradation of N-Channel Poly-Si TFT under Dynamic Stress by Capacitance-Voltage (C-V) Measurement ····· 20

3.2 Electrical Degradation of N-Channel Poly-Si TFT With and Without Grain Boundary in Channel under Dynamic Stress by Current-Voltage (I-V) Measurement ····· 27

CHAPTER 4 RESULTS AND DISCUSSION ····· 30

4.1 Lightly Doped Drain Effects of Low-Temperature Polycrystalline Silicon Thin Film Transistors ····· 30

4.2 Grain Boundaries Effects of Low-Temperature Polycrystalline Silicon Thin Film Transistors ····· 57

CHAPTER 5 CONCLUSION ····· 65

REFERENCE ····· 67

RESUME ····· 71