

Content

Abatract (Chinese).....	I
Abstract (English).....	IV
Acknowledge.....	VII
Content.....	IX
Figure Captions.....	X III
Chapter 1	
Introduction.....	
1.1 General Background.....	1
1.2 Organization of the Dissertation.....	4
Chapter 2	
The Effects of Dielectric Type and Thickness on the Characteristics of Dynamic Threshold Metal Oxide Semiconductor Transistors	
2.1 Backgrounds and Motivation.....	6
2.2 Device Fabrication.....	7
2.3 Experimental Results and Discussion.....	8
2.3.1 Characteristics of devices with different gate oxide thickness.....	8
2.3.2 Simulation of subthreshold swing under the DT mode.....	10
2.3.3 Characteristics of N ₂ O-oxynitride versus O ₂ -oxide.....	13

2.4 Summary.....16

Chapter 3

Hot Carrier Degradations of Dynamic Threshold SOI-pMOSFETs

3.1 Backgrounds and Motivation.....29

3.2 Device Fabrication.....30

3.3 Experimental Results and Discussion.....31

3.4 Summary.....37

Chapter 4

High Voltage and High Temperature Applications of DTMOS with Reverse Schottky Barrier on Substrate Contacts

4.1 Backgrounds and Motivation.....51

4.2 Device Fabrication for nMOSFET with reverse Schottky substrate contacts.....52

4.3 Experimental Results and Discussion for nMOSFET with with reverse Schottky substrate contacts.....53

4.4 Device Fabrication for pMOSFET with with reverse Schottky substrate contacts.....56

4.5 Experimental Results and Discussion for nMOSFET with with reverse Schottky substrate contacts.....57

4.5.1 Electrical characteristics of DT-pMOSFETs with Reverse Schottky Substrate

Contacts.....57

4.5.2 NBTI effects of DTMOS.....59

4.6 Summary.....61

Chapter 5

Conclusion and Future Work

5.1 Conclusion.....74

5.2 Suggestions for future work.....76

Reference.....78

Appendix A

Effects of Nitrogen Dose on the Negative Bias Temperature Instability of pMOSFETs with Thin Gate Oxide



A.1 Backgrounds and Motivation.....83

A.2 Device Fabrication.....84

A.3 Experimental Results and Discussion.....85

A.4 Summary.....91

Appendix B

Crystal Orientation and Nitrogen Effects on the Carrier Mobility of pMOSFETs with Ultra-thin Gate Dielectrics

B.1 Background and Motivation.....101

B.2 Device Fabrication.....102

B.3 Experimental Results and Discussion.....103

 B.3.1 Substrate orientation and nitrogen dosage effects.....103

 B.3.2 Impact of nitrogen and aspect ratio on carrier mobility.....105

B.4 Summary.....107

Appendix Reference.....119

