

# Table of Contents

Abstract (Chinese)

Abstract (English)

Acknowledgments

Table of Contents

Figure Caption

<i>Chapter 1 Introduction</i> .....	1
<b>1.1 Portable Multimedia</b> .....	1
<b>1.2 Liquid Crystal Display</b> .....	1
<b>1.3 Transflective LCDs</b> .....	3
1.3.1 Trnasflective LCDs with Transflector Device.....	4
1.3.2 Single-cell Gap Structure.....	5
1.3.3 Double-cell Gap Structure.....	6
<b>1.4 Motivation and Objective of This Thesis</b> .....	7
<b>1.5 Arrangement of This Thesis</b> .....	7
<i>Chapter 2 Principle</i> .....	9
<b>2.1 Introduction</b> .....	9
<b>2.2 Related Methods</b> .....	9
2.2.1 Tunable Mirror.....	9
2.2.2 Dielectric Multilayer.....	10
<b>2.3 Micro-Optics Components on Transflective LCD</b> .....	10
2.3.1 Diffractive Component (Fresnel Lens).....	11
2.3.2 Diffractive Component (Grating).....	12

2.3.3	Reflective Component (Micro-lens).....	13
<b>2.4</b>	<b>Design of Micro-lens.....</b>	<b>13</b>
<b>2.5</b>	<b>Summary.....</b>	<b>15</b>
<i>Chapter 3</i>	<i>Fabrication and Measurement Instruments.....</i>	<i>16</i>
<b>3.1</b>	<b>Introduction.....</b>	<b>16</b>
<b>3.2</b>	<b>Semiconductor Fabrication Process.....</b>	<b>16</b>
<b>3.3</b>	<b>Measurement System.....</b>	<b>20</b>
3.3.1	Surface Profile Measuring System.....	20
3.3.2	Scanning Electron Microscope (SEM).....	21
3.3.3	Measurement System for Light Efficiency.....	22
3.3.3.1	ELDIM EZContrast 160R.....	23
<i>Chapter 4</i>	<i>Simulation Results and Discussions.....</i>	<i>25</i>
<b>4.1</b>	<b>Introduction.....</b>	<b>25</b>
<b>4.2</b>	<b>Simulation Software.....</b>	<b>25</b>
<b>4.3</b>	<b>Analysis of Light Efficiency Enhancement in Transmissive Mode.....</b>	<b>25</b>
<b>4.4</b>	<b>Simulation of Light Efficiency Enhancement in Reflective Mode.....</b>	<b>27</b>
4.4.1	Directional Backlight Module.....	30
4.4.1.1	Principle of Directional Backlight.....	30
4.4.1.2	Optimization of Directional Backlight.....	31
4.4.2	Optimization of Lenticular-lens Structure.....	35
<b>4.5</b>	<b>Mask Design.....</b>	<b>36</b>



<b>4.6 Summary.....</b>	<b>36</b>
<b>Chapter 5 Experimental Results and Discussions.....</b>	<b>39</b>
<b>5.1 Introduction.....</b>	<b>39</b>
<b>5.2 Reflective regions.....</b>	<b>39</b>
<b>5.3 Lenticular-lens Array.....</b>	<b>43</b>
5.3.1 Diffraction Effect.....	43
5.3.2 Shape of Exposed Photoresist.....	44
<b>5.4 UV light with Divergent Angle.....</b>	<b>48</b>
5.4.1 Excimer Laser.....	48
5.4.2 UV Light with Smaller Divergent Angle.....	49
5.4.2.1 Characteristics of Lenticular-lens Structure.....	50
5.4.2.2 Light Efficiency and Efficiency Enhancement.....	55
5.4.2.2.1 Directional Backlight.....	56
5.4.2.2.2 ORMON Backlight.....	57
<b>5.5 Summary.....</b>	<b>60</b>
<b>Chapter 6 Conclusions.....</b>	<b>61</b>
<b>6.1 Conclusion.....</b>	<b>61</b>
<b>6.2 Future Works.....</b>	<b>62</b>
6.2.1 Solution of Fill Factor.....	63
6.2.2 Solution of Loss in Reflection.....	63



