

Table of Contents

Preface

Table of Contents

List of Abbreviations

1. History of the OLED	1
2. Introduction to OLEDs	
2.1 Classification of OLEDs. 2.2 OLED Using Small Organic Molecules	7
2.3 PLED Using Emissive Polymers	9
2.4 Hybrid OLED	11
2.5 Kinds of Devices According to Function and Structure	13
3. The Physics behind OLEDs	
3.1 Basic Mechanism	21
3.2 Charge Carrier Injection and Transport	22
3.3 Delayed EL Owing to Low Charge Carrier Mobility	40
3.4 Generation of Singlet and Triplet Excitons in OLEDs	41
3.5 Efficiency of OLEDs	44
3.6 Exciton Energy Transfer from Donor (Host) to Acceptor (Guest)	49
4. Organic Materials (Small Molecules) for OLEDs	
4.1 Hole-Injecting Materials	58
4.2 Hole-Transporting Materials	59
4.3 Light-Emitting Materials (Organic Light-Emitters)	60
4.4 Hole-Blocking Materials. 4.5 Electron-Transporting Materials	67
4.6 Electron-Injecting Materials. 4.7 Electrodes	68
5. Polymeric Materials for PLEDs	
5.1 Polymers for Buffer Layer	72
5.2 Light-Emitting Polymers	73
5.3 Hole-Blocking/Electron-Transporting/Electron-Injecting Polymers. 5.4 Electrode Materials	77
6. Materials for Hybrid OLEDs	
6.1 Materials for All-Organic HOLEDs	80
6.2 Materials for Organic-Inorganic HOLEDs	84
7. Reliability and Lifetime	
7.1 Moisture Effect	87
7.2 Oxygen Effect	88
7.3 Impurity Effect	89
7.4 Progressive Electrical Short	90
7.5 Solvent and Polymer Side-Chain Effects in PLEDs	94
7.6 Intrinsic Material Stability and Luminance Decay Mechanism	95
8. OLED Displays	

8.1 Passive Matrix-Organic Light-emitting Display (PM-OLED)	99
8.2 Active-Matrix – Organic Light-Emitting Display (AM-OLED)	112
8.3 Full-Color OLED Displays	115
9. Ongoing Challenges	
9.1 Flexible OLED	122
9.2 Organic Light-Emitting Transistors	128
9.3 OLED for Lighting Applications	130
10. OLED Market Trends and Outlook	
10.1 OLED Market Trends	134
10.2 Outlook	136