

# List of Schemes

頁次

Scheme 1 Synthesis of dendrimers G1-OH~G3-OH-----	25
Scheme 2 Synthesis of dendrimer containing monomers G1-DPM ~G3-DPM-----	26
Scheme 3 Synthesis of polymers P1~P6-----	35
Scheme 4 Synthesis of polymers P7~P12-----	36



# List of Tables

頁次

Table 1-1 The work function of electron injection electrodes--	6
Table 3-1 Molecular weights and molecular weight distributions of polymers P1~P12-----	40
Table 3-2 Thermal transition and thermal degradation temperature of polymers P1~P12-----	42
Table 3-3 UV-visible absorption spectrum and Photoluminescence spectrum of polymer P1~P12-----	44
Table 3-4 Quantum yield of polymer P1~P12-----	53
Table 3-5 Glass-cleaning process-----	63
Table 3-6 EL analysis of P1~P12-----	66

# List of Figures

頁次

Figure 1-1 Device of ITO/Diamine/Alq <sub>3</sub> /Mg:Ag-----	2
Figure 1-2 Schematic structure of single layer PLED-----	4
Figure 1-3 Band diagram of (a) PL and (b) EL processes----	5
Figure 1-4 Schematic energy-level diagram for an ITO/PPV/Al device-----	6
Figure 1-5 Structures of double-layer-type OEL devices-----	7
Figure 1-6 Structures of triple-layer-type OEL devices----	8
Figure 1-7 Structures of double-layer-type OEL device with a dielectric reflector-----	9
Figure 1-8 PPV derivatives and their emission color-----	10
Figure 1-9 Poly (alkylthiophene) derivatives and their emission color-----	10
Figure 1-10 Examples of blue-emitting materials-----	11
Figure 1-11 Examples of copolymer materials-----	11
Figure 1-12 Voglte' s "Cascade Molecules" -----	16
Figure 1-13 Tomalia' s poly amido amide (PAMAM) Dendrimers---	16
Figure 1-14 Fréchet' s Dendrimers-----	17
Figure 1-15 Synthetic Routes to Dendronized Linear Materials-	20
Figure 3-1 Gilch route polymerization-----	38
Figure 3-2 UV-visible absorption spectrum and Photo luminescence spectrum of P1 (G3-DP-PPV-40%) ----	45
Figure 3-3 UV-visible absorption spectrum and Photo luminescence spectrum of P2 (G3-DP-PPV-20%) ----	46

Figure 3-4 UV-visible absorption spectrum and Photo luminescence spectrum of P3 (G2-DP-PPV-40%)	----46
Figure 3-5 UV-visible absorption spectrum and Photo luminescence spectrum of P4 (G2-DP-PPV-20%)	----47
Figure 3-6 UV-visible absorption spectrum and Photo luminescence spectrum of P5 (G1-DP-PPV-40%)	----47
Figure 3-7 UV-visible absorption spectrum and Photo luminescence spectrum of P6 (G1-DP-PPV-20%)	----48
Figure 3-8 UV-visible absorption spectrum and Photoluminescence spectrum of P7[G3-DP-PPV(75)-co-MDMO-PPV(25)]	-48
Figure 3-9 UV-visible absorption spectrum and Photoluminescence spectrum of P8[G3-DP-PPV(50)-co-MDMO-PPV(50)]	-49
Figure 3-10 UV-visible absorption spectrum and Photoluminescence spectrum of P9[G3-DP-PPV(75)-co-DMe-PPV(25)]	-49
Figure 3-11 UV-visible absorption spectrum and Photoluminescence spectrum of P10[G3-DP-PPV(50)-co-DMe-PPV (50)]	50
Figure 3-12 UV-visible absorption spectrum and Photoluminescence spectrum of P11[G3-DP-PPV(75)-co-MEH-PPV (25)]	50
Figure 3-13 UV-visible absorption spectrum and Photoluminescence spectrum of P12[G3-DP-PPV(50)-co-MEH-PPV (50)]	51
Figure 3-14 Energy-level diagram for Polymer P1~P12	-----56
Figure 3-15 Cyclic voltammogram of P1 in film state	-----57
Figure 3-16 Cyclic voltammogram of P2 in film state	-----57
Figure 3-17 Cyclic voltammogram of P3 in film state	-----58
Figure 3-18 Cyclic voltammogram of P4 in film state	-----58
Figure 3-19 Cyclic voltammogram of P5 in film state	-----59
Figure 3-20 Cyclic voltammogram of P6 in film state	-----59

Figure 3-21 Cyclic voltammogram of P7 in film state-----	60
Figure 3-22 Cyclic voltammogram of P8 in film state-----	60
Figure 3-23 Cyclic voltammogram of P9 in film state-----	61
Figure 3-24 Cyclic voltammogram of P10 in film state-----	61
Figure 3-25 Cyclic voltammogram of P11 in film state-----	62
Figure 3-26 Cyclic voltammogram of P12 in film state-----	62
Figure 3-27 Luminescence -Voltage curve for the device with configuration: ITO/PEDOT/ P1 and P2/Ca(A1) -----	69
Figure 3-28 EL efficiency for the device with configuration: ITO/PEDOT/P1 and P2/Ca(A1)-----	69
Figure 3-29 Luminescence -Voltage curve for the device with configuration: ITO/PEDOT/P3 and P4/Ca(A1)-----	70
Figure 3-30 EL efficiency for the device with configuration: ITO/PEDOT/P3 and P4/Ca(A1)-----	70
Figure 3-31 Luminescence -Voltage curve for the device with configuration: ITO/PEDOT/P5 and P6/Ca(A1) -----	71
Figure 3-32 EL efficiency for the device with configuration: ITO/PEDOT/P5 and P6/Ca(A1) -----	71
Figure 3-33 Luminescence -Voltage curve for the device with configuration: ITO/PEDOT/P7 and P8/Ca(A1) -----	72
Figure 3-34 EL efficiency for the device with configuration: ITO/PEDOT/P7 and P8/Ca(A1) -----	72
Figure 3-35 Luminescence -Voltage curve for the device with configuration: ITO/PEDOT/P9 and P10/Ca(A1)---	73
Figure 3-36 EL efficiency for the device with configuration: ITO/PEDOT/P9 and P10/Ca(A1) -----	73
Figure 3-37 Luminescence -Voltage curve for the device with	

configuration: ITO/PEDOT/P11 and P12/Ca(A1) ---	74
Figure 3-38 EL efficiency for the device with configuration : ITO/PEDOT/P11 and P12/Ca(A1)-----	74
Figure 3-39 CIE 1931 of P1 (0.431 , 0.555) -----	75
Figure 3-40 CIE 1931 of P2 (0.403 , 0.571) -----	75
Figure 3-41 CIE 1931 of P3 (0.392 , 0.582) -----	75
Figure 3-42 CIE 1931 of P4 (0.387 , 0.582) -----	75
Figure 3-43 CIE 1931 of P5 (0.394 , 0.578) -----	75
Figure 3-44 CIE 1931 of P6 (0.389 , 0.577) -----	75
Figure 3-45 CIE 1931 of P7 (0.434 , 0.550) -----	76
Figure 3-46 CIE 1931 of P8 (0.457 , 0.532) -----	76
Figure 3-47 CIE 1931 of P9 (0.433 , 0.553) -----	76
Figure 3-48 CIE 1931 of P10 (0.466 , 0.525) -----	76
Figure 3-49 CIE 1931 of P11 (0.428 , 0.556) -----	76
Figure 3-50 CIE 1931 of P12 (0.471 , 0.520) -----	76

## 附圖目錄

	頁次
附圖 1 $^1\text{H-NMR}$ of G1-DPM-----	84
附圖 2 $^1\text{H-NMR}$ of G2-DPM-----	85
附圖 3 $^1\text{H-NMR}$ of G3-DPM-----	86
附圖 4 $^{13}\text{C-NMR}$ of G1-DPM-----	87
附圖 5 $^{13}\text{C-NMR}$ of G2-DPM-----	88
附圖 6 $^{13}\text{C-NMR}$ of G3-DPM-----	89
附圖 7 MALDI-TOF of G1-DPM-----	90
附圖 8 MALDI-TOF of G2-DPM-----	91
附圖 9 MALDI-TOF of G3-DPM-----	92
附圖 10 $^1\text{H-NMR}$ of P1(G3-DP-PPV-40%)-----	93
附圖 11 $^1\text{H-NMR}$ of P2(G3-DP-PPV-20%)-----	94
附圖 12 $^1\text{H-NMR}$ of P3(G2-DP-PPV-40%)-----	95
附圖 13 $^1\text{H-NMR}$ of P4(G2-DP-PPV-20%)-----	96
附圖 14 $^1\text{H-NMR}$ of P5(G1-DP-PPV-40%)-----	97
附圖 15 $^1\text{H-NMR}$ of P6(G1-DP-PPV-20%)-----	98
附圖 16 $^1\text{H-NMR}$ of P7[G3-DP-PPV(75)-co-MDMO-PPV(25)]-----	99
附圖 17 $^1\text{H-NMR}$ of P8[G3-DP-PPV(50)-co-MDMO-PPV(50)]-----	100
附圖 18 $^1\text{H-NMR}$ of P9[G3-DP-PPV(75)-co-DMe-PPV(25)]-----	101
附圖 19 $^1\text{H-NMR}$ of P10 [G3-DP-PPV(50)-co-DMe-PPV(50)]-----	102
附圖 20 $^1\text{H-NMR}$ of P11[G3-DP-PPV(75)-co-MEH-PPV(25)]-----	103
附圖 21 $^1\text{H-NMR}$ of P12[G3-DP-PPV(50)-co-MEH-PPV(50)]-----	104
附圖 22 TGA of P1(G3-DP-PPV-40%)-----	105
附圖 23 DSC of P1(G3-DP-PPV-40%)-----	105
附圖 24 TGA of P2(G3-DP-PPV-20%)-----	106

附圖 25 DSC of P2(G3-DP-PPV-20%)-----	106
附圖 26 TGA of P3(G2-DP-PPV-40%)-----	107
附圖 27 DSC of P3(G2-DP-PPV-40%)-----	107
附圖 28 TGA of P4(G2-DP-PPV-20%)-----	108
附圖 29 DSC of P4(G2-DP-PPV-20%)-----	108
附圖 30 TGA of P5(G1-DP-PPV-40%)-----	109
附圖 31 DSC of P5(G1-DP-PPV-40%)-----	109
附圖 32 TGA of P6(G1-DP-PPV-20%)-----	110
附圖 33 DSC of P6(G1-DP-PPV-20%)-----	110
附圖 34 TGA of P7[G3-DP-PPV(75)-co-MDMO-PPV(25)]-----	111
附圖 35 DSC of P7[G3-DP-PPV(75)-co-MDMO-PPV(25)]-----	111
附圖 36 TGA of P8[G3-DP-PPV(50)-co-MDMO-PPV(50)]-----	112
附圖 37 DSC of P8[G3-DP-PPV(50)-co-MDMO-PPV(50)]-----	112
附圖 38 TGA of P9[G3-DP-PPV(75)-co-DMe-PPV(25)]-----	113
附圖 39 DSC of P9[G3-DP-PPV(75)-co-DMe-PPV(25)]-----	113
附圖 40 TGA of P10[G3-DP-PPV(50)-co-DMe-PPV(50)]-----	114
附圖 41 DSC of P10[G3-DP-PPV(50)-co-DMe-PPV(50)]-----	114
附圖 42 TGA of P11[G3-DP-PPV(75)-co-MEH-PPV(25)]-----	115
附圖 43 DSC of P11[G3-DP-PPV(75)-co-MEH-PPV(25)]-----	115
附圖 44 TGA of P12[G3-DP-PPV(50)-co-MEH-PPV(50)]-----	116
附圖 45 DSC of P12[G3-DP-PPV(50)-co-MEH-PPV(50)]-----	116