

目 錄

中文摘要.....	I
英文摘要.....	III
誌謝.....	V
目錄.....	VI
Scheme 目錄.....	IX
Table 目錄.....	IX
Figure 目錄.....	X
附圖目錄.....	XIII
第一章 緒論.....	1
1.1 有機電激發光簡介.....	1
1.2 電激發光原理.....	5
1.3 高分子發光二極體材料與合成.....	9
1.4 中孔洞氧化矽材料.....	13
1.5 溶膠-凝膠法.....	15
1.6 界面活性劑(Surfactant).....	18
1.7 薄膜塗佈的方式.....	19
1.8 中孔洞氧化矽材料的應用.....	20

1.9 含環氧乙烷側取代之聚(2,3-雙苯基-1,4 仲苯基乙烯)研究動機.....	22
1.10 偏極化之高分子發光二極體.....	23
1.11 含三苯基側取代之聚(2,3-雙苯基-1,4 仲苯基乙烯)研究動機.....	27
第二章 含環氧乙烷側取代之聚(2,3-雙苯基-1,4 仲苯基乙烯)之合成.....	28
2.1 試藥.....	28
2.2 儀器.....	28
2.3 單體及聚合物之合成.....	32
2.3.1 單體之合成.....	32
2.3.2 聚合物之合成.....	35
2.4 元件製作.....	37
2.5 溶膠-凝膠(Sol-Gel)製程.....	37
第三章 含環氧乙烷側取代之聚(2,3-雙苯基-1,4 仲苯基乙烯)之結果與討論.....	42
3.1 單體之合成與鑑定.....	42
3.2 聚合物合成與反應之探討.....	43
3.2.1 聚合物之鑑定.....	44
3.3 GPC 量測.....	46
3.4 熱性質分析.....	47



3.5 循環伏安計量(Cyclic Voltammetry)分析.....	49
3.6 有機電激發光二極體製作與光電性質量測.....	51
3.61 ITO 圖形化的製作.....	51
3.62 發光元件的結構.....	52
3.63 元件光電性質討論.....	54
3.7 穿透式電子顯微鏡(TEM)鑑定高分子複合材料之奈米結構.....	58
3.8 薄膜態之光學性質鑑定高分子複合材料之奈米結構.....	64
3.9 小角度 X-ray(SAXS)鑑定高分子複合材料之奈米結構.....	65
3.10 結論.....	67
第四章 含三苯基側取代之聚(2,3-雙苯基-1,4 仲苯基乙烯)之合成.....	69
4.1 試藥.....	69
4.2 儀器.....	69
4.3 合成部份.....	69
4.4 聚合物之合成.....	76
4.5 元件製作.....	78
第五章 含三苯基側取代之聚(2,3-雙苯基-1,4 仲苯基乙烯)之結果與討論...82	82
5.1 單體合成與鑑定.....	82
5.2 高分子 P4~P6 之合成.....	83
5.3 主鏈液晶高分子 P4~P6 之性質分析.....	84

5.31 高分子 P4~P6 之熱性質分析.....	84
5.32 高分子 P4~P6 之偏級化光學性質探討.....	86
5.4 結論.....	89
第六章 參考文獻.....	90

List of Schemes

Scheme 1 Synthesis of Amphiphilic Polymer P1~P3.....	41
--	----

Scheme 2 Synthesis of monomer M ₁	80
--	----

Scheme 3 Synthesis of Liquid Crystal Polymer P4~P6.....	81
---	----



Table 3-1 Polymer P1~P3 溶解度測試表.....	45
-------------------------------------	----

Table 3-2 Molecular weights and Molecular weight distributions.....	47
---	----

Table 3-3 DSC and TGA data.....	48
---------------------------------	----

Table 3-4 Device Performance.....	55
-----------------------------------	----

Table 5-1 Polymerization Results of Polymers.....	83
---	----

Table 5-2 The Thermo Properties of Polymers.....	84
--	----

List of Figures

Figure 1-1 Small molecular OEL device prepared by Tang <i>et al</i>	2
Figure 1-2 Structures of some common small molecules.....	3
Figure 1-3 Structures of some common polymer materials.....	4
Figure 1-4 Structure of a single layer OLED device.....	6
Figure 1-5 Electroluminescence mechanism.....	6
Figure 1-6 Energy diagram of exciton formation.....	7
Figure 1-7 Schematic energy level diagram for an ITO/PPV/Al device.....	8
Figure 1-8 Structure of a multilayer OLED device.....	8
Figure 1-9 Structure of MEH-PPV.....	10
Figure 1-10 Scheme of SPR method.....	10
Figure 1-11 Scheme of XPR method.....	11
Figure 1-12 Structures of some DP-PPVs.....	12
Figure 1-13 Scheme of ring-opening polymerization.....	12
Figure 1-14 中性界面活性劑(兩性分子)在水溶液中的相圖.....	15
Figure 1-15 中孔洞材料的三種對稱性.....	15
Figure 1-16 溶劑揮發誘導自組裝現象示意圖.....	17
Figure 1-17 不同的起始溶液配方，在相圖中將可能導致不同的薄膜形....	18

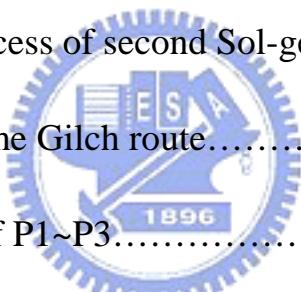
Figure 1-18 界面活性劑示意圖：(a) CTAB(S ⁺) , (b) BrijR56(S ⁰).....	19
Figure 1-19 pH 值對氧化矽與正離子界面活性劑之間作用的影響示意圖 ...	19
Figure 1-20 Polymer hybrid with silica form mesostructure.....	21
Figure 1-21 Molecular orientation of the polymer chains in the L-B film.....	22
Figure 1-22 Structures of PF2/6, PI and ST638.....	25
Figure 1-23 Structures of some LC-PPVs, LC-PPPs and LC-PTVs.....	26
Figure 1-24 Structures of DP-PPVs with liquid crystalline side groups.....	27
Figure 2-1 Experiment process of first Sol-gel method.....	38
Figure 2-2 Experiment process of second Sol-gel method.....	40
	
Figure 3-1 Mechanism of the Gilch route.....	43
Figure 3-2 FT-IR spectra of P1~P3.....	45
Figure 3-3 Energy Level of P1~P3.....	50
Figure 3-4 Cyclic Voltammogram of P1 in film state.....	51
Figure 3-5 Luminance-Voltage curve for the device with configuration: ITO / PEDOT / P1 /Ca(Al).....	55
Figure 3-6 Current density-Voltage curve for the device with Configuration : ITO / PEDOT / P1 / Ca(Al).....	56
Figure 3-7 Luminance-Voltage curve for the device with Configuration : ITO/ PEDOT / P2 / Ca(Al).....	56

Figure 3-8 Current density-Voltage curve for the device with Configuration : ITO / PEDOT / P2 / Ca(Al).....	57
Figure 3-9 Luminance-Voltage curve for the device with Configuration : ITO / PEDOT / P3 / Ca(Al).....	57
Figure 3-10 Current density-Voltage curve for the device with Configuration : ITO / PEDOT / P3 / Ca(Al).....	58
Figure 3-11 TEM of P3 nanocomposite.....	59
Figure 3-12 TEM of P3 nanocomposite.....	59
Figure 3-13 TEM of P3 與矽源反應後經由高溫鍛燒後之照片	61
Figure 3-14 TEM of P3 與矽源反應後經由高溫鍛燒後之照片	61
Figure 3-15 TEM of P3 與矽源反應後經由高溫鍛燒後之照片	62
Figure 3-16 TEM of P3 與矽源反應後經由高溫鍛燒後之照片	62
Figure 3-17 凝膠在 UV 燈照射之下	63
Figure 3-18 EDX of P3 nanocomposite.....	63
Figure 3-19 PL of P3 nanocomposite and P3 solution 、 film state.....	65
Figure 3-20 Small Angle X-ray of P3 nanocomposite.....	66
Figure 5-1 TGA Thermogram of copolymer P4~P6.....	85
Figure 5-2 DSC thermogram of polymer P6.....	85
Figure 5-3 Polarizing optical micrograph of polymer P6 at 250°C	86

Figure 5-4 Polarized PL emission spectra of P4.....	87
Figure 5-5 Polarized PL emission spectra of P5.....	88
Figure 5-6 Polarized PL emission spectra of P6.....	88

List of 附圖

附圖 1. ^1H -NMR spectrum of 5a-----	95
附圖 2. ^{13}C -NMR spectrum of 5a-----	96
附圖 3. MALDI spectrum of 5a-----	97
附圖 4. ^1H -NMR spectrum of 5b-----	98
附圖 5. ^{13}C -NMR spectrum of 5b-----	99
附圖 6. MALDI spectrum of 5b-----	100
附圖 7. ^1H -NMR spectrum of 5c-----	101
附圖 8. ^{13}C -NMR spectrum of 5c-----	102
附圖 9. MALDI spectrum of 5c-----	103
附圖 10. ^1H -NMR spectrum of P1-----	104
附圖 11. ^1H -NMR spectrum of P2-----	105
附圖 12. ^1H -NMR spectrum of P3-----	106
附圖 13. TGA of P1、TGA of PEO(Mw:120)-----	107
附圖 14. TGA of P2、TGA of PEO(Mw:350)-----	108

附圖 15. TGA of P3、TGA of PEO(Mw:750)-----	109
附圖 16. DSC of P1~P3-----	110
附圖 17. ^1H -NMR spectrum of M ₁ -----	111
附圖 18. ^{13}C -NMR spectrum of M ₁ -----	112
附圖 19. Mass spectrum of M ₁ -----	113
附圖 20. ^1H -NMR spectrum of P4-----	114
附圖 21 ^1H -NMR spectrum of P5-----	115
附圖 22. ^1H -NMR spectrum of P6-----	116

