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(12)

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(A)

(51) 。 Int. Cl. ⁷
C09K 11/06

(11)
(43)

2003-0034276
2003 05 09

(21) 10-2001-0058391
(22) 2001 09 20

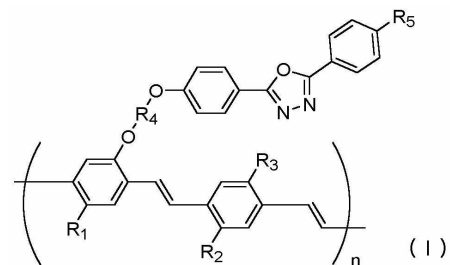
(71) 1

(72) 2 2525 102 201

2 1 1101

(74) :

(54)



, R₄, R₁, R₂, R₃, R₅ 가 ,

4

, (p-), 1,3,4-

1				
2		MPPOXA - PPV	PPOXA - PPV	UV - visible ;
3		MPPOXA - PPV	PPOXA - PPV	PL ;
4		MPPOXA - PPV	PPOXA - PPV	;
5		MPPOXA - PPV		- , -
6		PPOXA - PPV		- , -
7	MEH - PPV			;
8	MEH - PPV			- , -

(HOMO) (LUMO) (band gap)
(polymer light emitting diode: PLED)
(work function)

(indium tin oxide: ITO)

가

(tunn ing)

(ohmic current)가

(CN),

(N. C. Gree

nam et al., *Nature* 365:628(1993), Z. Peng et al., *Chem. Mater.*, 11:1138(1999)).

(Q. Pei et al., *Chem. Mater.* 7:1568(1995), M. Struk j et. al., *Science*, 267:1969(1995), M. Stru k j et. al., *J. Am. Chem. Soc.*, 117 : 11976(1995), K. Kim et. al., *Synth. Met.*, 114:49(2000)

(Y. Ohmori et. al., *Jpn. J. Ap pl. Phys.*, 35:4105(1996), C. Wu et. al., *IEEE Trans. ectron*, 44:1269(1997)), 가 (phase separation)

5,408,109

가

(p -

6,127,693

가 (p -)

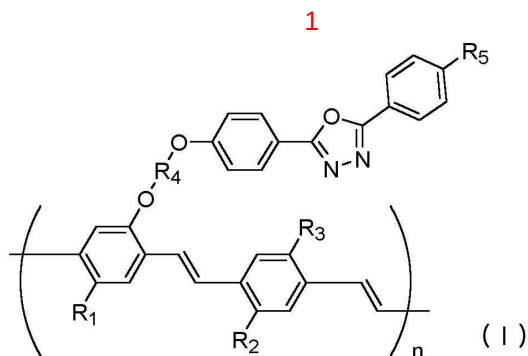
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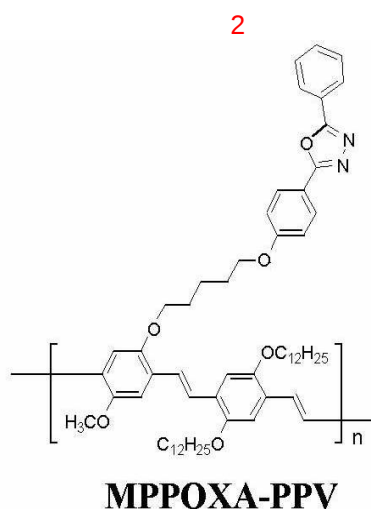
6,165,383

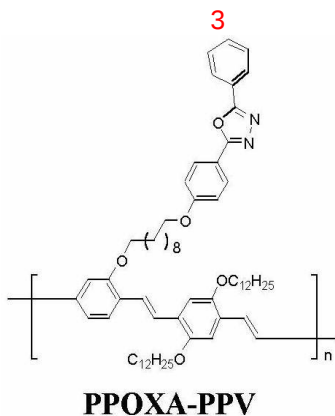
(p -)

1

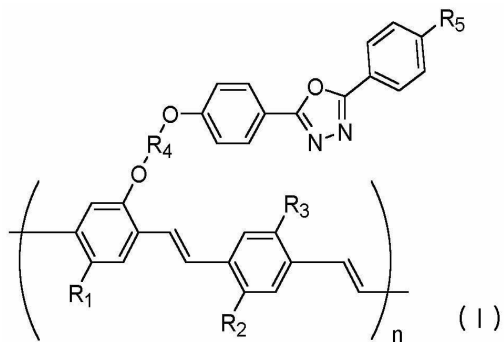
(p -



[illegible]



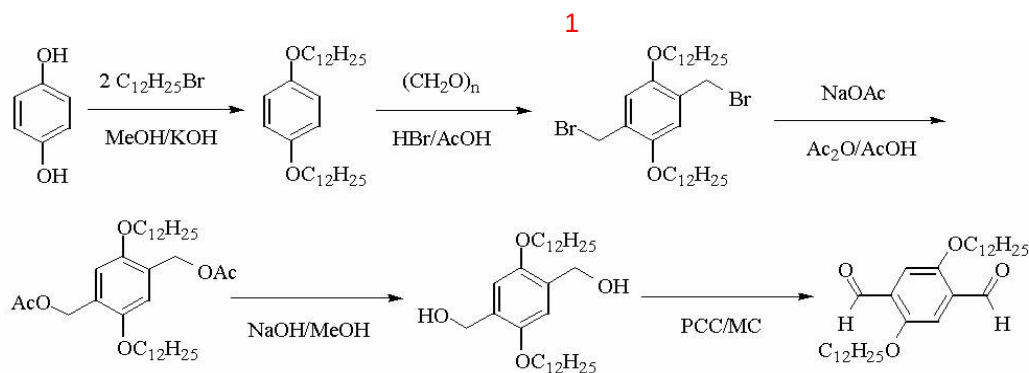
(*p* -)
 10,000 13,000 n 10 15 가 8,000 20,000 ,
 1,3,4- (*p* -)
 e charge) , (spac
 가 , 가 ,
 ; (b) , (a) 1 (*p* -)
 ; (c)



, R_4 , R_1 , R_2 , R_3 , R_5 , 가 ,
 1 (*p* -)
 Al, In, Al:Li , Mg/Ag, Mg:Ag , Ca/Ag Ca/Al
 ,
 (turn-on voltage),
 (*p* -)
 1 (*p* -)

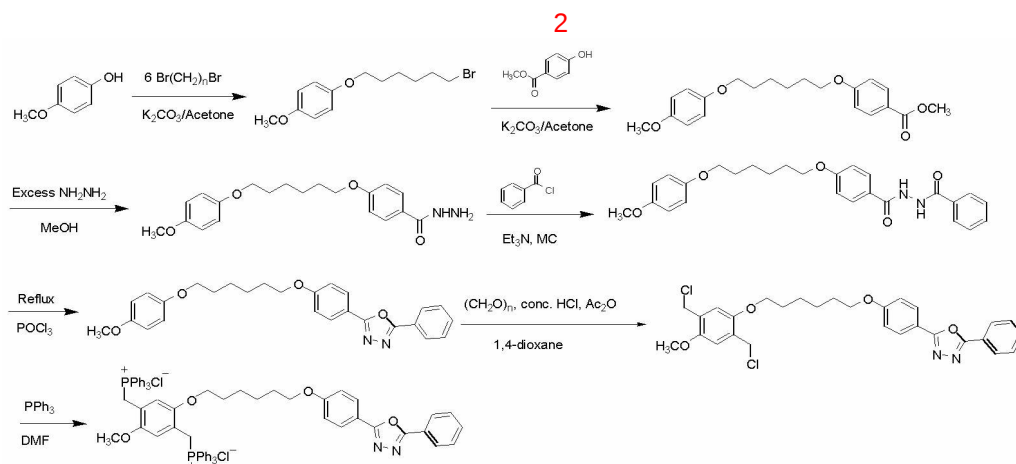
(Wittig)

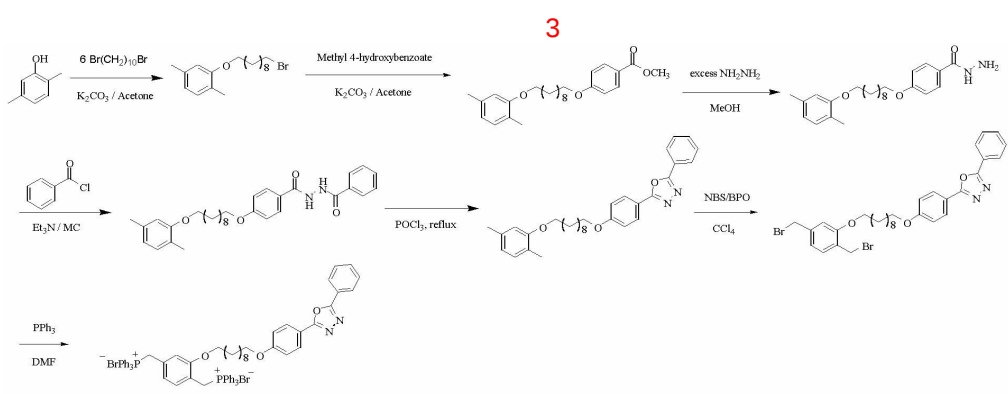
(2,5-Bis-dodecyloxy-benzene-1,4-dicarbaldehyde) (Chen, Z. et al., *Macromolecules*, 32 : 4351(1999)).



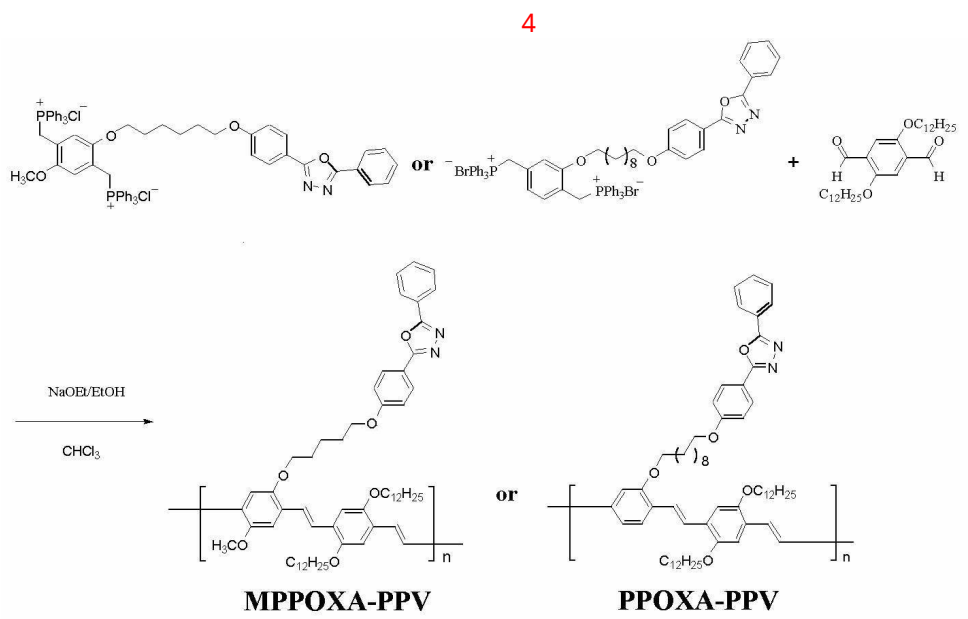
(hydroxy *p*-methoxy benzene)
1,3,4-
1,3,4-
1,3,4-

(hydroxy *p*-xylene)
2-
-5-{6'-[2''-4
(2-Met
hoxo-5-{6'-[2''-(4'''-oxyphenyl)-5''-phenyl-1'',3'',4''-oxadiazole]-hexyloxy}-*p*-xylene-bis-(triphenylp
hosphonium chloride) 2-{4-[10-(2,5-
-5-[1,3,4] (2-{4-[10-(2,5-xylene-Bis-(triphenylphosphonium bromide)-phenoxy)-decylox
y]-phenyl}-5-phenyl-[1,3,4]oxadiazole) 2 3





1,4-phenylenevinylene- *alt* -2,5-didodecyloxy-1,4-phenylenevinylene}, MPPOXA-PPV) {2-[10'-(2''-(4'''-oxyphenyl)-5''-phenyl-1'',3'',4''-oxadiazole)-decyloxy]-1,4-phenylenevinylene- *alt* -2,5-didodecyloxy-1,4-phenylenevinylene}, PPOXA-PPV)



1: ()

1-1: 1,4- (1,4-Bis-dodecyloxy-benzene)

200 M $\varnothing$ 16.82 g (0.30 mol) , 16.52 g (0.15 mol)
74.77 g (0.30 mol) 1- 가 , 24 가 ,
78.3% : : 72-73 ; MS[M +]: *m/z* 447; $^1\text{H-NMR}$ (CDCl₃, ppm): 6.83(s, 4H), 3.92-3.90(t, *J* = 6.6, 4H), 1.79-1.74(m, 4H), 1.48-1.42(m, 4H), 1.35-1.28(m, 32H)

, 0.91-0.89(t, $J = 6.6$, 6H); ^{13}C -NMR(CDCl₃, ppm): 153.18, 115.34, 68.62, 31.92, 29.66, 29.64, 29.60, 29.59, 29.42, 29.40, 29.35, 26.06, 22.69, 14.12; C₃₀H₅₄O₂: C, 80.65; H, 12.18. : C, 80.68; H, 12.15.

1-2: 1,4,- - -2,5,- - - (1,4,-Bis-bromomethyl-2,5-bis-dodecyloxy-benzene)

1-1 44.67 g (0.10 mol) 30.00 g (1.0 mol) HBr (30%)
가 , 90 12 , 100 Mℓ 250 Mℓ
가
MgSO₄ /
63.3% : : 95-96 ; MS[M⁺]: m/z 633; ^1H -NMR(CDCl₃, ppm): 6.86(s, 4H), 4.54(s, 4H), 4.00-3.98(t, $J = 6.5$, 4H), 1.85-1.79(m, 4H), 1.53-1.47(m, 4H), 1.37-1.28(m, 32H), 0.91-0.87(t, $J = 6.9$, 6H); ^{13}C -NMR(CDCl₃, ppm): 150.64, 127.49, 114.61, 68.98, 31.92, 29.67, 29.64, 29.59, 29.56, 29.35, 29.32, 28.75, 26.07, 22.69, 14.12; C₃₂H₅₆Br₂O₂: C, 60.76; H, 8.92. : C, 60.78; H, 8.91.

1-3: 4- -2,5- - - (Acetic acid 4-acetoxymethyl-2,5-bis-dodecyloxy-benzyl ester)

1-2 27.20 g (0.043 mol), 21.32 g (0.260 mol) 13.26 g (0.130 mol)
250 mL 24 가 , ,
200 Mℓ 가 , ,
MgSO₄ / 98.5%
: : 83-84 ; MS[M⁺]: m/z 591; ^1H -NMR(CDCl₃, ppm): 6.88(s, 2H), 5.14(s, 4H), 3.96-3.93(t, $J = 6.5$, 4H), 2.10(s, 6H), 1.79-1.74(m, 4H), 1.49-1.41(m, 4H), 1.31-1.27(m, 32H), 0.90-0.87(t, $J = 6.8$, 6H); ^{13}C -NMR(CDCl₃, ppm): 150.77, 125.07, 113.77, 69.01, 61.67, 31.89, 29.65, 29.61, 29.59, 29.37, 29.33, 26.04, 22.67, 21.06, 14.11; C₃₆H₆₂O₆: C, 73.18; H, 10.58. : C, 73.13; H, 10.66.

1-4: (2,5- - -4- - -) - ((2,5-Bis-dodecyloxy-4-hydroxymethyl-p-henyl)-methanol)

9.30 g (0.23 mol) 250 Mℓ 1-3 23.04 g (0.03 mol)
9 mol) 가 , 12 가 , ,
90.6% :
: 109-110 ; MS[M⁺]: m/z 507; ^1H -NMR(CDCl₃, ppm): 6.85(s, 2H), 4.68-4.67(d, $J = 6.5$, 4H), 4.00-3.97(t, $J = 6.5$, 4H), 2.37-2.35(t, $J = 6.5$, 2H), 1.81-1.76(m, 4H), 1.49-1.40(m, 4H), 1.35-1.27(m, 32H), 0.90-0.87(t, $J = 6.7$, 6H); ^{13}C -NMR(CDCl₃, ppm): 150.64, 129.04, 112.32, 68.74, 62.20, 31.92, 29.65, 29.62, 29.59, 29.57, 29.41, 29.37, 29.34, 26.15, 22.69, 14.11; C₃₂H₅₈O₄: C, 75.84; H, 11.54. : C, 75.88; H, 11.63.

1-5: 2,5- - -1,4- (2,5-Bis-dodecyloxy-benzene-1,4-dicarbaldehyde)

1-4 16.72 g (0.033 mol) (c ite) 28.00 g 250 Mℓ
가 , 0 (pyridinium chlorochromate; PCC) 28.07 g (0.13 mol) 가
, (: /n- = 3/7) .
, 200 Mℓ 가 , , (:
, /n- = 3/7) , 75.8% : : 90-91 ; MS
[M⁺]: m/z 503; ^1H -NMR(CDCl₃, ppm): 10.5(s, 2H), 7.43(s, 2H), 4.09-4.07(t, $J = 6.3$, 4H), 1.86-1.80(m, 4H), 1.50-1.44(m, 4H), 1.35-1.26(m, 32H), 0.89-0.86(t, $J = 6.8$, 6H); ^{13}C -NMR(CDCl₃, ppm): 189.49, 155.19, 129.21, 115.53, 69.18, 31.89, 29.62, 29.60, 29.55, 29.52, 29.32, 29.29, 29.02, 25.98, 22.66, 14.11; C₃₂H₅₄O₄: C, 76.45; H, 10.83. : C, 76.37; H, 11.01

2: {2- -5-{6'-[2''-4'''-)-5''- - 1'',3'',4''-]- }-1,
4- - -2,5- -1,4-

2-1: 1-(6- -)-4- - (1-(6-Bromo-hexyloxy)-4-methoxy-benzene)

4-ol 100 Mℓ 12.41 g (0.10 mol), 13.8 g (0.10 mol) 1,6- 146.38 g (0.60 m
 , 50 Mℓ 100 Mℓ 가 ,
 MgSO₄ , 1,6-
 91.9% : 161-163 / 2.5 mmHg; MS[M⁺]: 287; ¹H-NMR(CDCl₃, ppm): 6.85(s, 4H), 3.93-3.91(t, J = 6.4, 2H), 3.78(s, 3H), 3.45-3.42(t, J = 6.8, 2H), 1.92-1.88(m, 2H), 1.80-1.77(m, 2H), 1.52-1.51(m, 4H); ¹³C-NMR(CDCl₃, ppm): 153.64, 153.12, 115.32, 114.53, 68.26, 55.62, 33.72, 32.62, 29.12, 27.85, 25.22; C₁₃H₁₉BrO₂: C, 54.37; H, 6.67. : C, 63.33; H, 8.69.

2-2: 4-[6-(4- -)-]- (4-[6-(4-Methoxy-phenoxy)-hexyloxy]-benzoic acid methyl ester)

2-1 25.84 g (0.090 mol), 13.8 g (0.10 mol) 4-
 13.69 g (0.090 mol) 100 Mℓ 24 가 ,
 , 50 Mℓ 100 Mℓ
 100 mL ,
 MgSO₄ /
 92.5% : MS[M⁺]: 358; ¹H-NMR(CDCl₃, ppm): 8.00-7.99(d, J = 8.9, 2H), 6.92-6.90(d, J = 8.9, 2H), 6.84(s, 4H), 4.03-4.01(t, J = 6.5, 2H), 3.94-3.92(t, J = 6.4, 2H), 3.89(s, 3H), 3.77(s, 3H), 1.86-1.79(m, 4H), 1.56-1.55(m, 4H); ¹³C-NMR(CDCl₃, ppm): 166.79, 162.83, 153.66, 153.16, 131.49, 122.30, 115.34, 114.55, 113.98, 68.33, 67.93, 55.63, 51.72, 29.24, 29.14, 25.79, 25.75; C₂₁H₂₆O₅: C, 70.37; H, 7.31. : C, 75.60; H, 8.86.

2-3: 4-[6-(4- -)-]- (4-[6-(4-Methoxy-phenoxy)-hexyloxy]-benzoic acid hydrazide)

2-2 28.67 g (0.080 mol) 100 Mℓ ,
 24 가 , 50
 1 ℓ , 95.6% : MS
 [M⁺]: 358; ¹H-NMR(CDCl₃, ppm): 7.71-7.69(d, J = 8.9, 2H), 7.22(br, 1H), 6.93-6.92(d, J = 8.9, 2H), 6.83(s, 4H), 4.08(br, 2H), 4.03-4.00(t, J = 6.5, 2H), 3.94-3.92(t, J = 6.5, 2H), 3.78(s, 3H), 1.85-1.79(m, 4H), 1.56-1.53(m, 4H); ¹³C-NMR(CDCl₃, ppm): 168.37, 162.07, 153.74, 153.23, 128.58, 124.68, 115.44, 114.65, 114.45, 68.44, 68.04, 55.75, 29.30, 29.06, 25.85, 25.81; C₂₀H₂₆N₂O₄: C, 67.02; H, 7.31; N, 7.82. : C, 72.72; H, 8.85; N, 6.81.

2-4: N'-(4-[6-(4- -)-]-)- (Benzoic acid N'-(4-[6-(4-methoxy-phenoxy)-hexyloxy]-benzoyl)-hydrazide)

10.54 g (0.075 mol) 20 Mℓ (DMAc) 2-3
 26.90 g (0.075 mol) 가 40 Mℓ DMAc 가 , 4
 , 가
 89.7% : ¹H-NMR(CDCl₃, ppm): 9.30-9.29(d, J = 5.9, 1H), 9.20-9.18(d, J = 5.7, 1H), 7.88-7.87(d, J = 7.4, 2H), 7.84-7.82(d, J = 8.7, 2H), 7.58-7.55(t, J = 7.4, 1H), 7.49-7.46(t, J = 7.8, 2H), 6.95-6.93(d, J = 8.8, 2H), 6.84(s, 4H), 4.04-4.02(t, J = 6.4, 2H), 3.95-3.92(t, J = 6.4, 2H), 3.77(s, 3H), 1.86-1.80(m, 4H), 1.57-1.54(m, 4H); ¹³C-NMR(CDCl₃, ppm): 163.80, 162.57, 153.74, 153.23, 150.82, 132.41, 131.44, 129.08, 128.81, 127.54, 127.17, 123.55, 115.44, 114.65, 68.44, 68.11, 55.75, 29.31, 29.05, 25.85, 25.80; C₂₇H₃₀N₂O₅: C, 70.11; H, 6.54; N, 6.06. : C, 74.35; H, 7.83; N, 5.47.

2-5: 2- -5-{6'[2''-(4'''-)-5'''- -1'',3'',4'''-]- }- p - (2-Methoxy-5-{6'-(2''-(4'''-oxyphenyl)-5''-phenyl-1'',3'',4'''-oxadiazole]-hexyloxy}- p -xylene)

2-4 30.99 g (0.0670 mol) 150 Mℓ POCl₃ , 6 가
 , POCl₃ , 가 ,

, 1 l , 200 Ml 1 N
MgSO₄ 88.3% : MS[M⁺]: *m/z* 444; ¹H-NMR(CDCl₃, ppm): 8.14-8.12(m, 2H), 8.07-8.05(d, *J* = 8.7, 2H), 7.55-7.52(m, 3H), 7.03-7.01(d, *J* = 8.8, 2H), 6.84(s, 4H), 4.06-4.03(t, *J* = 6.5, 2H), 3.95-3.92(t, *J* = 6.4, 2H), 3.77(s, 3H), 1.87-1.80(m, 4H), 1.58-1.55(m, 4H); ¹³C-NMR(CDCl₃, ppm): 164.53, 164.04, 161.86, 153.69, 153.18, 131.43, 128.97, 128.62, 126.75, 124.09, 116.19, 115.38, 114.93, 114.59, 68.37, 68.05, 55.67, 29.26, 29.02, 25.83, 25.78; C₂₇H₂₈N₂O₄: C, 72.95; H, 6.35; N, 6.30. : C, 77.08; H, 7.71; N, 5.62.

2-6: 1,4- (2- (4'- (2''- (4'''-)-5''- -1'',3'',4''-)- (1,4-Bis-chloromethyl-(2-methoxy)-5-{6'-[2''-(4'''-oxyphenyl)-5''-phenyl-1'',3'',4''-oxadiazole]-hexyloxy}-benzene)

2-5 5.29 g (11.90 mmol) 1.903 g (47.58 mmol) 50
Ml 1,4- 37 % 100 Ml 가 , 0 200 Ml 가 , 10
65 , 100 Ml , MgSO₄ , 62.5% : [M-Cl]⁺: *m/z* 505.
MS; ¹H-NMR(CDCl₃, ppm): 8.14-8.12(m, 2H), 8.07-8.05(d, *J* = 8.9, 2H), 7.54-7.53(m, 3H), 7.03-7.01(d, *J* = 8.8, 2H), 6.93(s, 1H), 6.92(s, 1H), 4.64(s, 1H), 4.63(s, 1H), 4.07-4.05(t, *J* = 6.4, 2H), 4.03-4.01(t, *J* = 6.3, 2H), 3.85(s, 3H), 1.89-1.85(m, 4H), 1.60-1.59(m, 4H); ¹³C-NMR(CDCl₃, ppm): 164.54, 164.04, 161.86, 151.02, 150.58, 131.45, 128.98, 128.63, 127.03, 126.82, 126.76, 124.06, 116.16, 114.93, 114.36, 113.29, 66.80, 68.01, 56.20, 41.32, 41.24, 29.18, 29.01, 25.78, 25.69. C₂₉H₃₀Cl₂N₂O₄: C, 64.33; H, 5.58; N, 5.17. : C, 58.53; H, 5.56; N, 4.19.

2-7: 2- -5-{6'-[2''-4'''-)-5''- -1'',3'',4''-]- }- p - (2-Methoxy-5-{6'-[2''-(4'''-oxyphenyl)-5''-phenyl-1'',3'',4''-oxadiazole]-hexyloxy}- p -xylene-bis- (triphenylphosphonium chloride)

2-6 1.12 g (2.08 mmol) 1.20 g (4.58 mmol) 10 Ml
가 24 가 , 500 Ml
85.4% : ¹H-NMR(CDCl₃, ppm): 8.11-8.09(m, 2H), 8.06-8.04(d, *J* = 8.9, 2H), 7.71-7.61(m, 30H), 7.54-7.49(m, 3H), 7.04-7.02(d, *J* = 9.0, 2H), 6.90(s, 1H), 6.80(s, 1H), 5.35-5.30(m, 4H), 4.04-4.02(t, *J* = 6.3, 2H), 3.12-3.10(t, *J* = 5.5, 2H), 2.88(s, 3H), 1.78-1.75(m, 4H), 1.37-1.35(m, 4H); ¹³C-NMR(CDCl₃, ppm): 164.48, 164.07, 161.81, 150.83, 150.54, 134.75, 134.74, 134.66, 134.64, 134.31, 134.29, 134.24, 134.22, 131.47, 129.99, 129.93, 129.90, 129.84, 128.97, 128.68, 126.75, 124.00, 134.76, 134.74, 134.66, 134.64, 134.31, 134.29, 134.24, 134.22, 118.47, 118.41, 117.78, 117.72, 16.55, 116.47, 116.45, 116.26, 115.45, 114.93, 68.01, 67.89, 65.76, 55.09, 29.01, 28.60, 25.72, 25.55; C₆₅H₆₀Cl₂N₂O₄P₂: C, 73.23; H, 5.67; N, 2.63. : C, 69.21; H, 5.69; N, 2.31

2-8: {2- -5-{6'-[2''-4'''-)-5''- -1'',3'',4''-]- }-1,4- -2,5- -1,4- ([{2-Methoxy-5-{6'-[2''-(4'''-oxyphenyl)-5''-phenyl-1'',3'',4''-oxadiazole]-hexyloxy}]-1,4-phenylenevinylene- alt -2,5-didodecyloxy-1,4-phenylenevinylene}) (MP POXA-PPV)

0.12 g (5.0 mmol) 5 Ml 0 가 , 30
15 Ml 1 mmol 1-5 2-7
가 ,
(soxhlet extractor) 3 , 45%
: ¹H-NMR(CDCl₃, ppm): 8.19-8.02(m, 9H, 1,3,4-H), 7.68-7.32 (m, 2H, H), 7.08-6.82(m, 6H, H), 4.18-4.08 (m, 11H), 1.98-1.05 (m, 48H), 0.98-0.90 (m, 6H); C₆
¹H₈₂N₂O₆: C, 78.00; H, 8.80; N, 2.98; : C, 77.33; H, 8.71; N, 2.20.

3. {2-[10'-(2''-(4'''-)-5''- -1'',3'',4''-)-]-1,4-
- -2,5- -1,4-

3-1: 2-(10-)-1,4- (2-(10-Bromo-decyloxy)-1,4-dimethyl-benzene)

1,10- 120.03 g (0.40 mol), 13.82 g (0.10 mol) 2,5- 12.22 g (0.10 mol)
) 100 Mℓ , 24 가 , , 150 Mℓ
, 100 Mℓ , 200 Mℓ 1 N 300 Mℓ
, MgSO₄ , 75.4% : : 1
60-162 /0.5 mmHg); [M⁺]: *m/z* 342; ¹H-NMR(CDCl₃, ppm): 7.02-7.00(d, *J* = 7.4, 1H), 6.67-6.65(d, *J* = 7.5, 1H), 6.64(s, 1H), 3.95-3.93(t, *J* = 6.4, 2H), 3.43-3.40(t, *J* = 6.8, 2H), 2.32(s, 3H), 2.18(s, 3H), 1.89-1.83(m, 2H), 1.82-1.76(m, 2H), 1.51-1.42(m, 4H), 1.37-1.32(m, 12H); ¹³C-NMR(CDCl₃, ppm): 157.09, 136.40, 130.23, 123.60, 120.53, 111.98, 67.81, 34.01, 32.81, 29.44, 29.37, 29.34, 29.30, 28.73, 28.15, 26.11, 21.39, 15.77; C₁₈H₂₉BrO: C, 63.34; H, 8.56. : C, 63.33; H, 8.69.

3-2: 4-[10-(2,5-)-]- (4-[10-(2,5-Dimethyl-phenoxy)-decyloxy]-benzoic acid methyl ester)

3-1 12.63 g (0.037 mol), 4- 5.63 g (0.037 mol)
5.11g (0.037 mol) 150 Mℓ , 24 가 , ,
, 100 Mℓ , 200 Mℓ 1 N 300 Mℓ
, MgSO₄ ,
(: /n- = 2/8)
, 93.7% : : 47-48 ; [M⁺]: *m/z* 412; ¹H-NMR(CDCl₃, ppm): 7.99-7.97(d, *J* = 6.8, 2H), 7.01-7.00(d, *J* = 7.3, 1H), 6.91-6.89(d, *J* = 6.8, 2H), 6.66-6.65(d, *J* = 7.3, 1H), 6.63(s, 1H), 4.02-3.99(t, *J* = 6.3, 2H), 3.95-3.92(t, *J* = 6.3, 2H), 3.88(s, 3H), 2.31(s, 3H), 2.18(s, 3H), 1.81-1.77(m, 4H), 1.49-1.45(m, 4H), 1.38-1.34(m, 8H); ¹³C-NMR(CDCl₃, ppm): 166.90, 162.95, 157.11, 136.41, 131.54, 130.24, 123.61, 122.32, 120.54, 114.05, 111.99, 68.18, 67.82, 51.79, 29.49, 29.46, 29.39, 29.33, 29.10, 26.13, 25.96, 21.39, 15.77; C₂₆H₃₆O₄: C, 75.69; H, 8.80. : C, 75.60; H, 8.86.

3-3: 4-[10-(2,5-)-]- (4-[10-(2,5-Dimethyl-phenoxy)-decyloxy]-benzoic acid hydrazide).

3-2 11.14 g (0.027 mol) 100 Mℓ , , 50
24 가 , ,
1 ℓ , 94.2%
: : 92-93 . [M⁺]: *m/z* 413; ¹H-NMR(CDCl₃, ppm): 7.70-7.68(d, *J* = 6.8, 2H), 7.28(b, 1H), 7.01-6.99(d, *J* = 7.4, 1H), 6.93-6.91(d, *J* = 6.8, 2H), 6.66-6.65(d, *J* = 7.4, 1H), 6.63(s, 1H), 4.07(b, 2H), 4.00-3.98(t, *J* = 6.5, 2H), 3.95-3.92(t, *J* = 6.4, 2H), 2.31(s, 3H), 2.17(s, 3H), 1.81-1.76(m, 4H), 1.49-1.44(m, 4H), 1.38-1.34(m, 8H); ¹³C-NMR(CDCl₃, ppm): 168.38, 162.11, 157.10, 136.42, 130.24, 128.57, 124.58, 123.60, 120.54, 114.43, 111.99, 68.19, 67.82, 29.48, 29.45, 29.38, 29.32, 29.08, 26.12, 25.96, 21.39, 15.77; C₂₅H₃₆N₂O₃: C, 72.78; H, 8.80; N, 6.79. : C, 72.72; H, 8.85; N, 6.81.

3-4: N-{4-[10-(2,5-)-]- }- (Benzoic acid N-{4-[10-(2,5-dimethyl-phenoxy)-decyloxy]-benzoyl}-hydrazide)

1.83 g (0.013 mol) 20 Mℓ 3-3 5.36 g (0.013 mol)
1.32 g (0.013 mol) 50 Mℓ
가 , 4 ,
gSO₄ , 82.5% :
: 138-139 . [M+H]⁺: *m/z* 517; ¹H-NMR(CDCl₃, ppm): 9.24-9.22(d, *J* = 6.8, 1H), 9.13-9.12(d, *J* = 6.3, 1H), 7.88-7.86(d, *J* = 7.3, 2H), 7.83-7.82(d, *J* = 8.8, 2H), 7.58-7.55(t, *J* = 7.3, 1H), 7.50-7.47(t, *J* = 7.8, 2H), 7.01-6.99(d, *J* = 7.8, 1H), 6.96-6.94(d, *J* = 8.8, 1H), 6.66-6.64(d, *J* = 7.3, 1H), 6.64(s, 1H), 4.03-4.00(t, *J* = 6.3, 2H), 3.95-3.93(t, *J* = 6.3, 2H), 2.31(s, 3H), 2.18(s, 3H), 1.83-1.76(m, 4H), 1.48-1.44(m, 4H), 1.38

-1.35(m, 8H); ^{13}C -NMR(CDCl_3 , ppm): 163.91, 163.76, 162.61, 157.12, 136.43, 132.39, 131.45, 130.25, 129.10, 128.79, 127.19, 123.63, 123.20, 120.549, 114.53, 112.01, 68.27, 67.84, 29.5, 29.47, 29.39, 29.35, 29.34, 29.09, 26.14, 25.97, 21.40, 15.78; $\text{C}_{32}\text{H}_{40}\text{N}_2\text{O}_4$: C, 74.39; H, 7.80; N, 5.42. : C, 74.35; H, 7.83; N, 5.47.

3-5: 2-{4-[10-(2,5-di-methyl-phenoxy)-decyloxy]-phenyl}-5-phenyl-[1,3,4]oxadiazole}

3-4, POCl₃ 3.60 g (6.97 mmol), 50 mL POCl₃, 6 가, POCl₃ 500 Mℓ, 100 Mℓ, 1 N, MgSO₄, 94.0%
: 95-96. [M⁺]: m/z 498; ^1H -NMR(CDCl_3 , ppm): 8.14-8.13(m, 2H), 8.08-8.06(d, J = 8.8, 2H), 7.54-7.52(m, 3H), 7.03-7.00(m, 3H), 6.66-6.65(d, J = 7.8, 1H), 6.64(s, 1H), 4.05-4.03(t, J = 6.8, 2H), 3.95-3.93(t, J = 6.8, 2H), 2.31(s, 2H), 2.18(s, 3H), 1.85-1.78(m, 4H), 1.48-1.44(m, 4H), 1.38-1.35(m, 8H); ^{13}C -NMR(CDCl_3 , ppm): 164.60, 164.08, 161.97, 157.11, 136.41, 131.47, 130.24, 129.01, 128.66, 126.81, 124.15, 123.61, 120.55, 116.18, 114.98, 112.00, 68.26, 67.83, 29.49, 29.46, 29.39, 29.34, 29.12, 26.13, 25.98, 21.39, 15.77; $\text{C}_{32}\text{H}_{38}\text{N}_2\text{O}_3$: C, 77.08; H, 7.68; N, 5.62. : C, 77.08; H, 7.71; N, 5.62

3-6: 2-{4-[10-(2,5-bis-bromomethyl-phenoxy)-decyloxy]-phenyl}-5-phenyl-[1,3,4]oxadiazole}

3-5, 가 가 200 mL, 3.00 g (6.02 mmol), N-8, 2.31 g (0.013 mol), MgSO₄, 가, 55.5%
: 108-109; MS[M+H]⁺: m/z 657; ^1H -NMR(CDCl_3 , ppm): 8.14-8.13(m, 2H), 8.09-8.06(d, J = 8.5, 2H), 7.55-7.52(m, 3H), 7.30-7.28(d, J = 7.7, 1H), 7.05-7.02(d, J = 8.8, 2H), 6.94-6.91(d, J = 7.7, 1H), 6.89(s, 1H), 4.54(s, 2H), 4.46(s, 2H), 4.07-4.03(m, 4H), 1.90-1.79(m, 4H), 1.54-1.46(m, 4H), 1.42-1.37(m, 8H); ^{13}C -NMR(CDCl_3 , ppm): 164.61, 164.10, 161.97, 157.12, 139.77, 131.49, 131.04, 129.02, 128.68, 126.83, 126.51, 124.14, 120.96, 116.19, 114.99, 112.29, 68.30, 68.27, 33.32, 29.45, 29.33, 29.28, 29.15, 29.12, 29.06, 28.48, 26.05, 25.98; $\text{C}_{34}\text{H}_{31}\text{N}_2\text{O}_3$: C, 58.55; H, 5.53; N, 4.27. : C, 58.53; H, 5.56; N, 4.19.

3-7: 2-{4-[10-(2,5-(triphenylphosphonium bromide)-phenoxy)-decyloxy]-phenyl}-5-phenyl-[1,3,4]oxadiazole}

3-6, 24, 1.31 g (2.00 mmol), 가, 1.15 g (4.40 mmol), 10 mL, 500 mL, 50.4%
: 193-194; ^1H -NMR(CDCl_3 , ppm): 8.11-8.09(m, 2H), 8.05-8.04(d, J = 8.8, 2H), 7.74-7.58(m, 3H), 7.54-7.49(m, 3H), 7.12-7.11(d, J = 5.4, 1H), 7.02-7.00(d, J = 8.8, 2H), 6.77(s, 1H), 6.27-6.25(d, J = 6.0, 1H), 5.32-5.26(m, 4H), 4.05-4.03(t, J = 6.5, 2H), 3.04-3.02(t, J = 5.7, 2H), 1.84-1.79(m, 2H), 1.50-1.45(m, 2H), 1.40-1.07(m, 12H); ^{13}C -NMR(CDCl_3 , ppm): 164.09, 163.60, 161.47, 134.63, 134.45, 134.43, 133.95, 133.87, 133.65, 133.57, 133.24, 133.16, 131.04, 130.03, 129.93, 129.82, 129.72, 129.66, 129.55, 128.55, 128.18, 126.30, 123.57, 117.84, 117.26, 117.16, 116.58, 115.66, 114.51, 67.77, 67.49, 29.04, 29.02, 28.90, 28.82, 28.70, 28.65, 28.09, 25.53, 25.37; $\text{C}_{68}\text{H}_{66}\text{Br}_2\text{N}_2\text{O}_3\text{P}_2$: C, 69.15; H, 5.63; N, 2.37. : C, 69.21; H, 5.69; N, 2.31

3-8: {2-[10'-(2''-(4'''-oxyphenyl)-5''-phenyl-1'',3'',4''-oxadiazole)-decyloxy]-1,4-phenylenevinylene-*alt*-2,5-didodecyloxy-1,4-phenylenevinylene}} (PPOXA-PPV)

2-7

3-7

2-8

45% : $^1\text{H-NMR}(\text{CDCl}_3, \text{ppm})$: 8.19-8.02(m, 9H, 1,3,4-H), 7.68-7.32 (m, 2H, H), 7.08-6.82(m, 6H, H), 4.18-4.08 (m, 8H), 1.98-1.05 (m, 56H), 0.98-0.90 (m, 6H); $\text{C}_{57}\text{H}_{74}\text{N}_2\text{O}_5$: C, 78.76; H, 8.58; N, 3.22; : C, 76.14; H, 9.15; N, 3.14.

4:

4-1: MPPOXA-PPV

2-8 MPPOXA-PPV 가

ane, TCE) 2-8 MPPOXA-PPV 1,1,2,2- (1,1,2,2-tetrachloroethane, TCE) 25 mg/mL, 0.45 μm 가, ITO가, 1500 rpm, 10⁻⁵ torr, (Sigma), 1,000 1,500, (mask) 1, 4 mm².

4-2: PPOXA-PPV

2-8 MPPOXA-PPV, 3-8 PPOXA-PPV, 4-1.

4-3: _____

4-1 4-2 (quartz plate) 4-1 4-2 (8453, Hewlett-Pakard, U.S.A.) (UV-visible) (PTI, U.S.A.) (photoluminescence, PL) 2 3.

2, MPPOXA-PPV PPOXA-PPV 302 nm, 1,3,4- MPPOXA-PPV 444 nm, PPOXA-PPV 454 nm (absorption edge) 595 nm 567 nm $\pi - \pi^*$, MPPOXA-PPV PPOXA-PPV.

3, MPPOXA-PPV 460 nm (photoluminescence, PL) 585 nm, PPOXA-PPV 450 nm PL, MPPOXA-PPV PPOXA-PPV 302 nm 557 nm 1,3,4- PL (360 nm).

2 3, 1,3,4- 가 (blue-shift) MPPOXA-PPV PPOXA-PPV 10 nm (red-shift) MPPOXA-PPV 가 PPOXA-P (steric hindrance) 가, MPPOXA-P electron-donation PV PV ng) PL 가.

4-4: _____

4-1 4-2 () (PTI, U.S.A.) 4.

4, MPPOXA-PPV 586 nm, PPOXA-PPV 559 nm, MPPOXA-PPV 가 28 nm.

PL

4-5: _____

4-1 4-2

5 6

(forward bias)

Newport

8

18UV/CM

Newport

1830 powermeter

5 mm

$$\text{양자 효율}(\%) = \frac{\text{방출된 광자의 수}}{\text{주입된 전자의 수}} \times 100$$

$$\text{방출된 광자의 수} = \frac{\text{광다이오드에서 측정된 전력값}(\text{watt})}{\text{광자의 에너지값}(\text{hc}/\lambda)} \times \text{시간}(s)$$

$$h = 6.626 \times 10^{-34} \text{ Js}^{-1} \quad ()$$

 $\lambda =$

(s) :

$$\text{주입된 전자의 수} = \frac{\text{전기발광소자에 흐르는 전류값}(A)}{\text{전자한개의 전하량}} \times \text{시간}(s)$$

(s) :

5 MPPOXA-PPV

6 PPOXA-PPV

(○)

(▲)

5

6

(rectifying diode)

MPPOXA-PPV

(turn-on voltage)

0.016%, PPOXA-PPV

4.5 V

MPPOXA-PPV

0.021%

1,3,4-

1,3,4-

가

(hole-electron recombination),

가

가

1: MEH-PPV

2-8

MPPOXA-PPV

MEH (Poly(1-methoxy-4-ethyloxy-1,5-phenylenevinylene))-PPV

4-1

7

8

7 MEH-PPV

8 MEH-PPV

590 nm

(○)

(▲)

0.0002 %

8 V

가

(turn-on voltage) 4 5 V
 0.01 0.02%
 (p - 50) 100 가
 (p -)
 1,3,4- (p -)
 (space charge)
 가 () 가
 가 (p -)

(57)

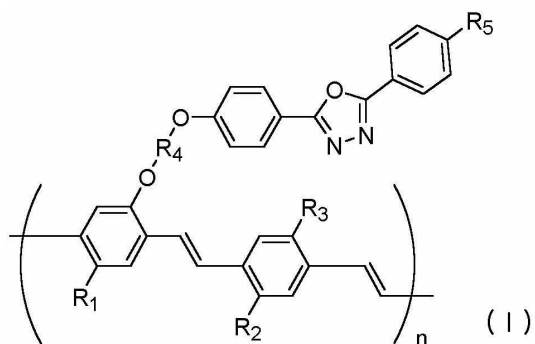
1.

1

(p -)

:

1



, R₁, R₂, R₃, R₄, R₅ 가

2.

1 R₁, R₂, R₃ 가 O(CH₂)₂(CH₂)_aCH(CH₂)_bCH₃CH(CH₃)₂ (p -)
 2) x CH₃ 18 가 , a 0 4 , b 0 10
 x 0)

3.

1 1,3,4- R₅ 1
 2-, 1,3- 1,4- (p -)

4.

1 R₄ 4 10 (p -)

5.

1 (p -) {2- -5-{6'-[2''-4'''-)-5
 ''- -1'',3'',4''-]- }-1,4- - -2,5- -1,4- , {2-

[10'-(2''-(4'''-)-5''- -1'',3'',4''-)-]-1,4- - -2,5- -
 1,4- , {2- -5-{6'-[2''-4'''-)-5''- -1'',3'',4''-]- }-1,4
 - -2,5- -1,4- {2-[10'-(2''-(4'''-)-5''- -
 1'',3'',4''-)-]-1,4- - -2,5- -1,4-
 (ρ -)

6.

(a) 1 5 (ρ -) ;

(b) ;

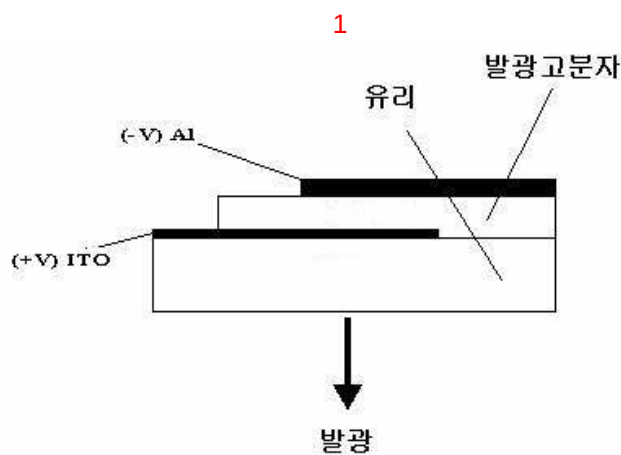
(c) .

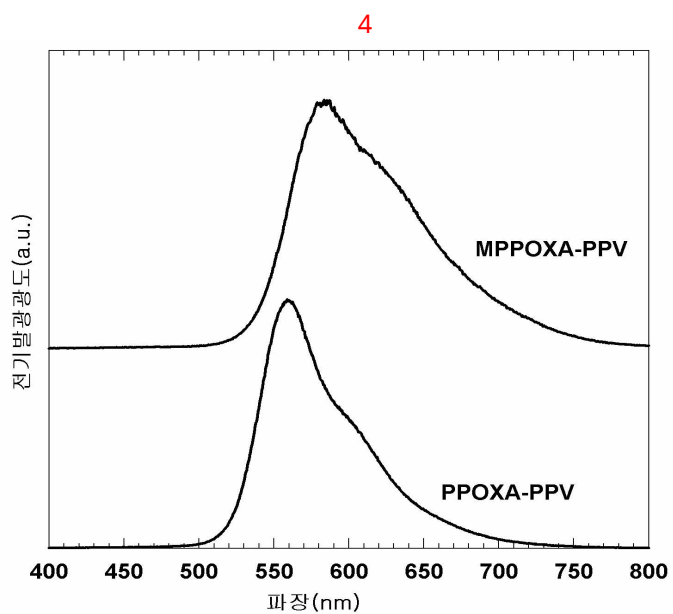
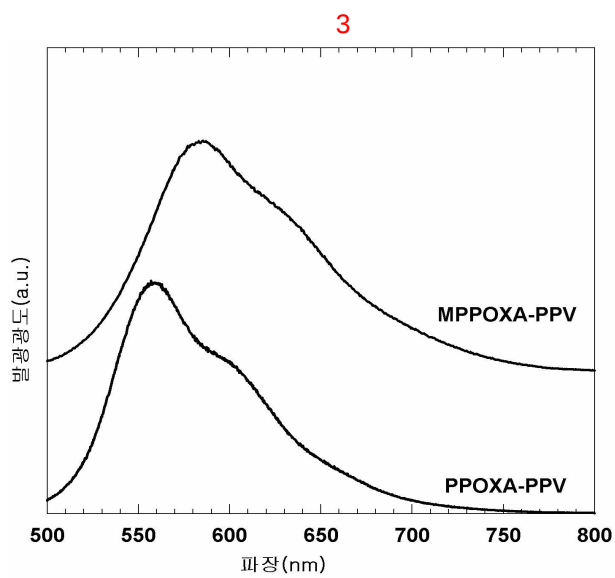
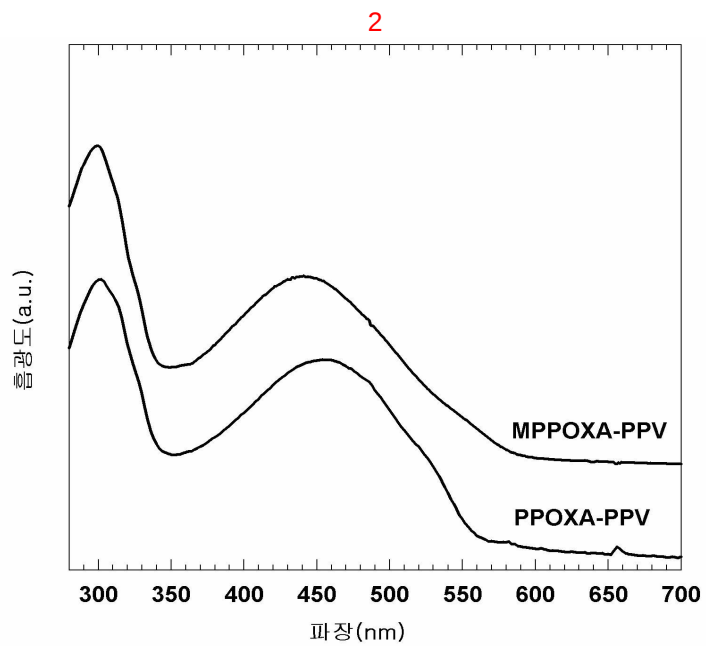
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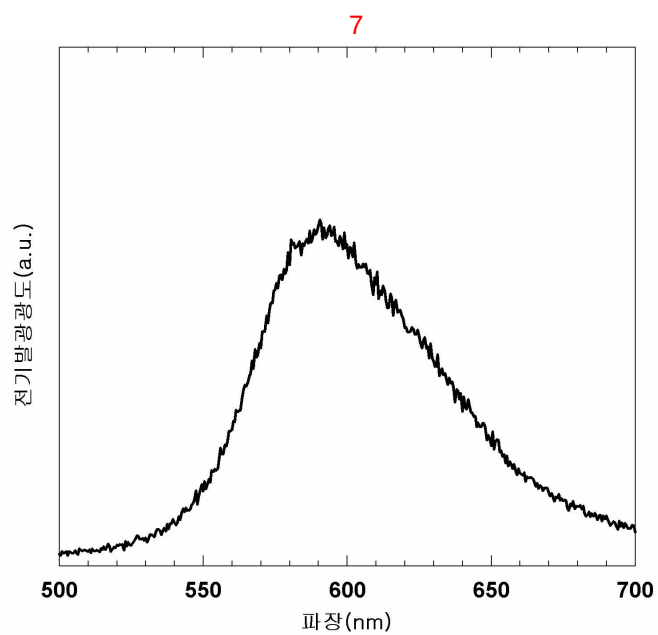
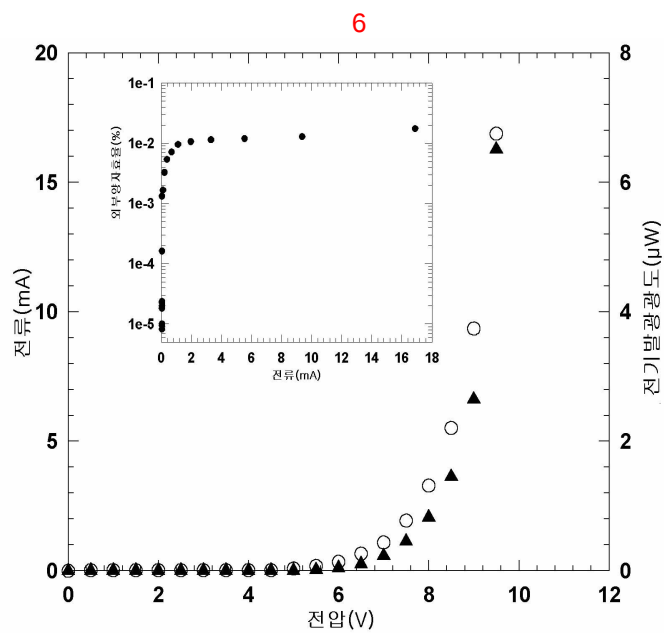
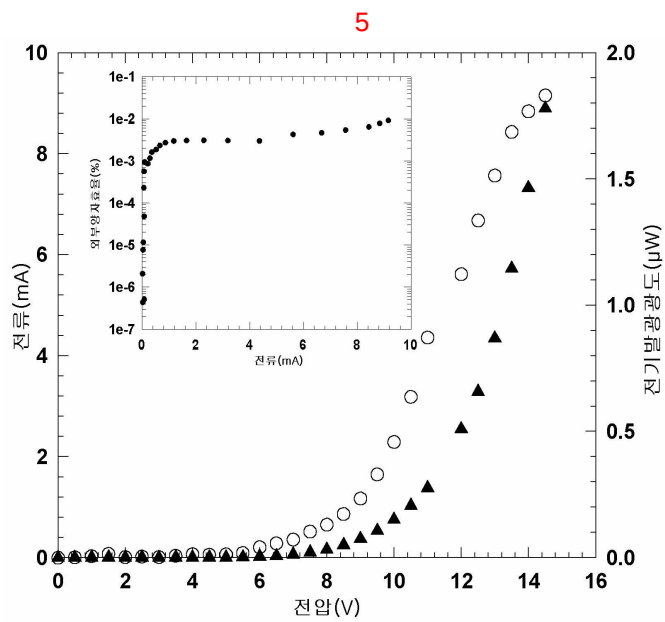
6 , Al, In, Al:Li , Mg/Ag, Mg:Ag , Ca/Ag Ca/Al

8.

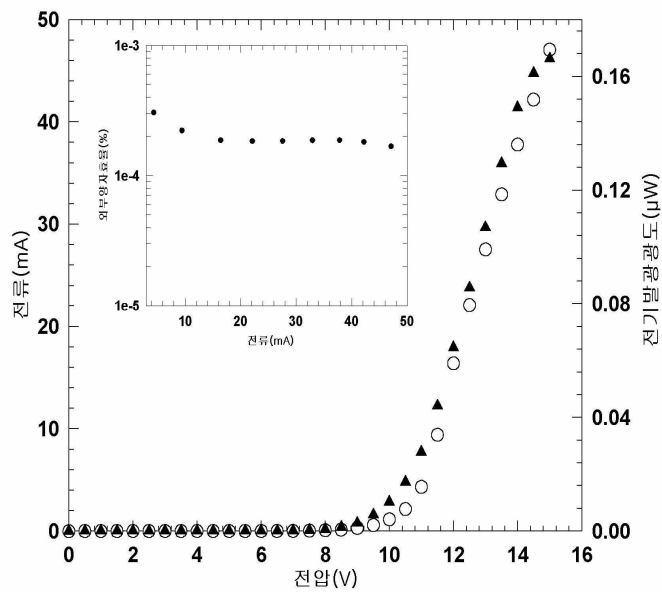
6 ,







8



专利名称(译)	一种新型机电致发光聚合物和使用其制造的电致发光二极管		
公开(公告)号	KR1020030034276A	公开(公告)日	2003-05-09
申请号	KR1020010058391	申请日	2001-09-20
申请(专利权)人(译)	学校法人西江		
[标]发明人	LEE HOOSUNG 이후성 KIM JOOHYUN 김주현		
发明人	이후성 김주현		
IPC分类号	C09K11/06		
CPC分类号	C09K11/06 H01L51/0035 H01L51/0043 H01L51/5012 H05B33/14 C09K2211/1475 H01L2251/308 Y10S428/917		
其他公开文献	KR100408233B1		
外部链接	Espacenet		

摘要(译)

目的：提供一种新型聚（对亚苯基亚乙烯基）基有机发光聚合物和使用该聚合物制备的电致发光二极管，通过提高量子效率和降低工作电压来提高发光效率。组成：聚（p-基于亚苯基亚乙烯基的有机发光聚合物由下式表示：其中R₁，R₂和R₃彼此独立且为H或脂肪族直链或支链烷基；R₄是C₂-C₁₄的脂肪族烷基。R₅为H或芳基。电致发光二极管包括发光层，该发光层包含下式的聚（对亚苯基亚乙烯基）基有机发光聚合物；金属负电极形成在发光层的一侧；和形成在发光层另一侧的正电极。优选地，负极选自Al，In，Al-Li合金，Mg / Ag，Mg-Ag合金，Ca / Ag和Ca / Al；正极是通过在有机塑料或玻璃基板上真空蒸发沉积氧化铟锡而形成的。©KIPO 2003

