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(71)

373 - 1

(72)

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2 6323

(74)

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(54) /

(organic luminescent material) (luminescent efficiency) (stability)
가 / (organic luminescent material/c
lay nanocomposite) (electroluminescent device)
(transparent substrate) (semitransparent electrode)
/ (clay nanocompos
ite emitting layer) (metal electrode)

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(electroluminescent device) / (organic luminescent material/clay nanocomposite)

가 / ,

ymer/inorganic nanocomposite) (polymer light - emitting device)가 (organic pol

TiO₂ ZnS, CdS (insulating inorganic material) (semiconducting inorganic material) SiO₂, ZnS (W. Que) CdS (H. Mattoussi)

(: W. Que, Applied Physics Letters, 73:2727, 1998; H. Mattoussi, Journal of Applied Ph

ysics, 83:7965, 1998). SiO₂ (S. A. Carter) TiO₂ (L. Gozano) (: S. A. C

arter, Applied Physics Letters, 71:1145, 1997; L. Gozano, Applied Physics Letters, 73:3911, 1998), (inorganic nanomaterial) (charge

transport) , , 가가 .

nt material) 가 / (luminesce (electroluminescence) ,

가 , .

가 /

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- 1: (transparent substrate)
- 2: (semitransparent electrode)
- 3: (hole transporting layer)
- 4: (clay nanocomposite emitting layer)
- 5: (electron transporting layer)
- 6: (metal electrode)

가 (intercalation) / (quantum well)
 0.2 2nm 50 5,000 nm
 가 (lamellar type inorganic material), (montmorillonite, MMT), (laponite),
 (kaolinite) (insulator)
 , 2
 /

MEH - PPV(poly[2 - methoxy - 5 - (2' - ethyl - hexyloxy) - p - phenylene vinylene]), poly(xylylidene tetrahydrothiophenium) (PTHT), poly(pyridylvinylene phenylene vinylene) (PPyVPV), poly[1,4 - (2,5 - bis(1,4,7,10 - tetraoxaundecyl))phenylene vinylene] (poly(p - phenylene vinylene)), poly[3 - hexylthiophene - co - 3 - cyclohexylthiophene], poly[3 - (4 - methoxyphenyl)thiophene - 2,5 - diyl] (poly(thiophene)), dimethoxy - poly(p - phenylene), ladder poly(dihydrophenanthrene), ladder poly(1,4 - phenylene - 2,5 - thienylene) (poly(p - phenylene) poly(9,9 - dioctylfluorene), poly(2,7 - bis(p - styryl) - 9,9' - di - n - hexylfluorene sebacate (poly(fluorene)) (conjugated polymer); (main chain) (side chain) (anthracene) 가 가 (luminescent functional pendant); (A lq3) (chelate metal complex), (rubrene), (anthracene), (perylene), (coumarin 6), (Nile Red), (aromatic diamine), TPD(N, N' - diphenyl - N, N' - bis - (3 - methylphenyl) - 1,1' - biphenyl - 4,4' - diamine), TAZ(terbium tris(1 - phenyl - 3 - methyl - 4 - (tertiarybutyryl)pyrazol - 5 - one) - triphenylphosphine oxide - [(tb - PMP)(3)Tb(Ph3PO)]/3 - (4 - biphenyl) - 4 - phenyl - 5 - (4 - tert - butylphenyl) - 1,2,4 - triazole), DCM(dicyanomethylene) - 2 - methyl - 6 - (p - dimethylaminostyryl) - 4H - pyran); (poly(m - methylacrylic acid)), (polystyrene), (9 -) (poly(9 - vinylcarbazole)) (non - emissive),

(polyethylene terephthalate, PET) ITO(indium tin oxide), PEDOT (polyethylene dioxythiophene), (polyaniline) (Alloy) .

(2) / 가 (1) (4)

(2) (6) 가 (3) / (4)

(6) (5) 가 (9 -), 4,4' - dicarbazolyl - 1,1' - biphenyl(CBP), TPD(N,N' - diphenyl - N,N' - bis - (3 - methylphenyl) - 1,1' - biphenyl - 4,4' - diamine) NPB(4,4' - bis[N - (1 - naphthyl - 1 -) - N - phenyl - amino] - biphenyl) ; (hole transporting moiety) TPBI(2,2',2' - (1,3,5 - benzenetriyl)tris[1 - phe benzimidazole]), poly(phenyl quinoxzline), 1,3,5 - tris[(6,7 - dimethyl - 3 - phenyl)quinoxaline - 2 - yl]benzene(Me - TPQ), polyquinoline, tris(8 - hydroxy quinoline)aluminum(Alq3), 6 - N,N - diethylamino - 1 - methyl - 3 - phenyl - 1H - pyrazolo[3,4 - b]quinoline}(PAQ - NEt₂) (electron transporting moiety)

(external quantum efficiency) , (photon) % (Photoluminescence decay)가

가 가 1:

MEH - PPV(poly[2 - methoxy - 5 - (2' - ethyl - hexyloxy) - p - phenylene vinylene]) 1,2 - (1,2 - dichloroethane) MMT MEH - PPV 1:1 , (sonicator) MEH - PPV (chain) MMT (intercalation) . , 150nm , 340nm (Optical powermeter, Newport 1830 - C) (photo diode, Newport 818 - UV)

1: 가

가 , () 1 (: 3). 3 가 , () 1 . 3 , 가

2:

MMT MEH - PPV 가 1:2 1:5(w/w) , 1
 , Keithley 236 Source measurement unit , 1, 1
 2 (: 4). 4
 , () MMT가 1
 , () MMT MEH - PPV 가 1:5(w/w)
 , () MMT MEH - PPV 가 1:2(w/w)
 , () MMT MEH - PPV 가 1:1(w/w) 1
 . 4 , MMT MEH - PPV 가 1:1(w/w)
 0.38%(photons/electrons) , MMT가 1
 0.004%(photons/electrons) , 가 , 가

3: (I)

ITO poly(xylylidene tetrahydrothiophenium,PTHT) MMT 1:1
 150nm , 170 3 가 ,
 (thermal evaporator) , 5 /s 100nm

4: (II)

MEH - PPV(poly[2 - methoxy - 5 - (2' - ethyl - hexyloxy) - p - phenylene vinylene]) , 120
 nm , 3

5: (III)

(Alq3) (9 -) (poly(9 - vinylcarbazole)) 5%
 , 120nm , 2

6: (IV)

ITO (9 -)(PVK) , MEH - PPV
 가 1:1 100nm , (Alq3)
 10 /s 50nm , 5 /s
 100nm ,

가 / / ,
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(-) ,
 () , (-)
 ()
 / .

6.

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(main chain)

(side chain) 가 가

/ .

7.

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(rubrene), (anthracene), (perylene),

(coumarin 6), (Nile Red),

(aromatic diamine), TPD(N, N' - diphenyl - N,N' - bis - (3 - methylphenyl) -

1,1' - biphenyl - 4,4' - diamine), TAZ(terbium tris(1 - phenyl - 3 - methyl -

(tertiarybutyryl)pyrazol - 5 - one) - triphenylphosphine oxide - tb - PMP))

(Ph3PO)]/3 - (4 - biphenyl) - 4 - phenyl - 5 - (4 - tert - butylphenyl) - 1,2,4 -

iazole), DCM(dicyanomethylene) - 2 - methyl - 6 - (p - dimethylaminostyryl)

H - pyran)

/ .

8.

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(-) (poly(m - methylacrylic

acid)), (polystyrene) (9 -) (poly

(9 - vinylcarbazole))

/ .

9.

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, (quartz), PET (polyethylene

terephthalate)

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11.

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ITO(indium tine oxide), PEDOT (polyethylene

dioxythiophene) (polyaniline)

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(9 -), 4,4' - dicarbazolyl - 1,1' - biphenyl

(CBP), TPD(N,N' - diphenyl - N,N' - bis - (3 - methylphenyl) - 1,1' - biphenyl -

4,4' - diamine) NPB(4,4' - bis[N - (1 - naphthyl - 1 -) - N - phenyl -

amino] - biphenyl) ;

(triarylamine) (pyrazoline)

;

(hole transporting moiety)

15.

1 / 가

16.

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TPBI(2,2',2' - (1,3,5 - benzenetriyl)tris

[1 - phe benzimidazole]), poly(phenyl quinoxzline), 1,3,5 -

tris[(6,7 - dimethyl - 3 - phenyl)quinoxaline - 2 - yl]benzene(Me - TPQ),

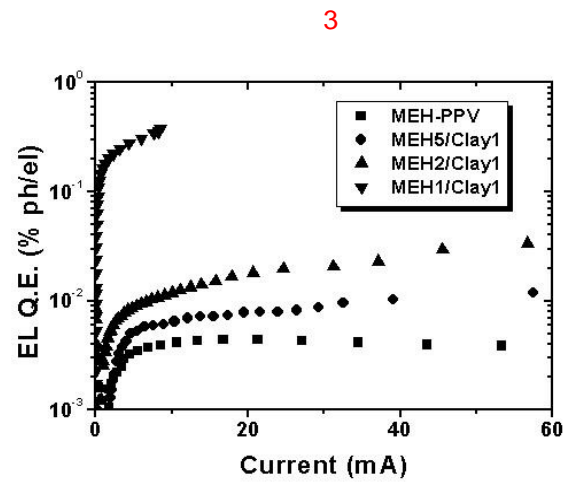
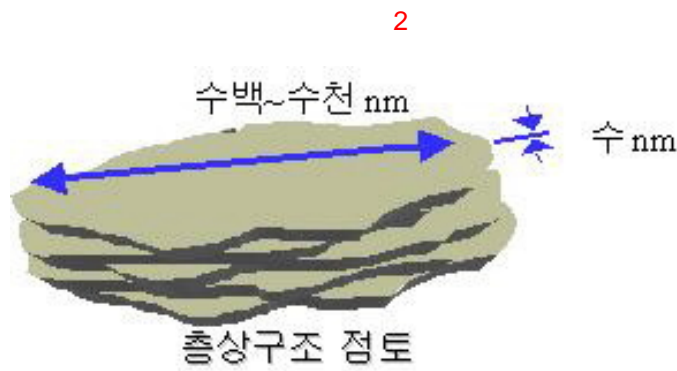
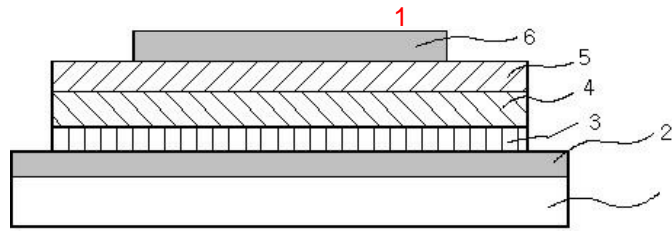
polyquinoline, tris(8 - hydroxy quinoline)aluminum(Alq3), {6 - N,N -

diethylamino - 1 - methyl - 3 - phenyl - 1H - pyrazolo[3,4 - b]quinoline} (PAQ -

NEt₂) (electron transporting moiety)

17.

14 , 16 1 / 가 ,



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