

(19)
(12)(KR)
(A)(51) 。 Int. Cl.⁷
H05B 33/14(11)
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(21)	10-2003-7016625		
(22)	2003 12 19		
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(86)	PCT/JP2002/006139	(87)	WO 2003/001616
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(30)	JP-P-2001-00186120	2001 06 20	(JP)
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Kodak C. W. Tang (Appl. Phys. Lett. 51, p.913, 1987) 1987

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. Nature, Vol.397, p.121(1999)

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(Appl. Phys. Lett. Vol.75, p.4, (1999), WO00/70655).

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(Nature, Vol.403, p.750 (2000)).

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et al., Polymer Preprints., Vol.40(2), p.1212(1999)).

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(P. J. Djurovich et al., Polymer Preprints, Vol.41(1), p.770(2000)).

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- [2] [1] 1
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[20] [19] , 1

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[22] [15] ,

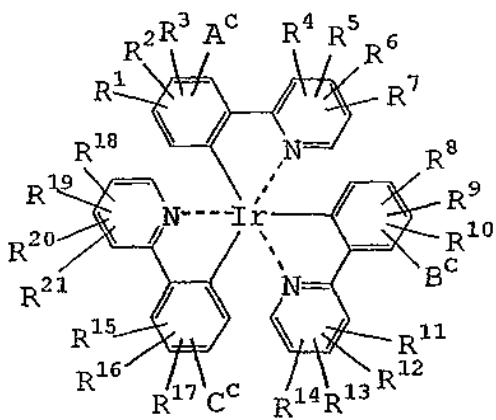
[23] [22] ,

[24] [22] ,

[25] [22]~[24] ,

[26] [25] , ,
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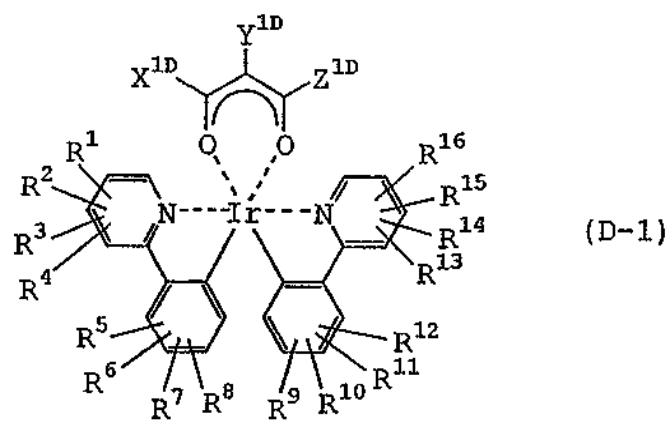
[27] [16] , (C-1)



(C-1)

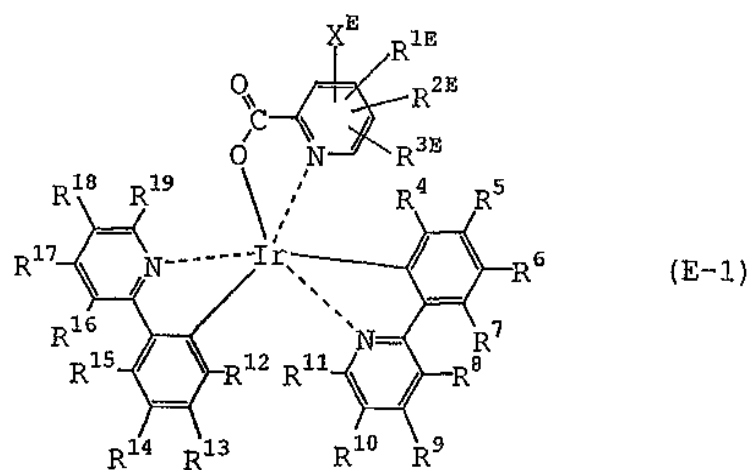
(, A^C, B^C C^C 1 , ,
1~20 , ; R¹~R²¹ ,
1 , 1~20 ,
)

[28] [16] , (D-1)



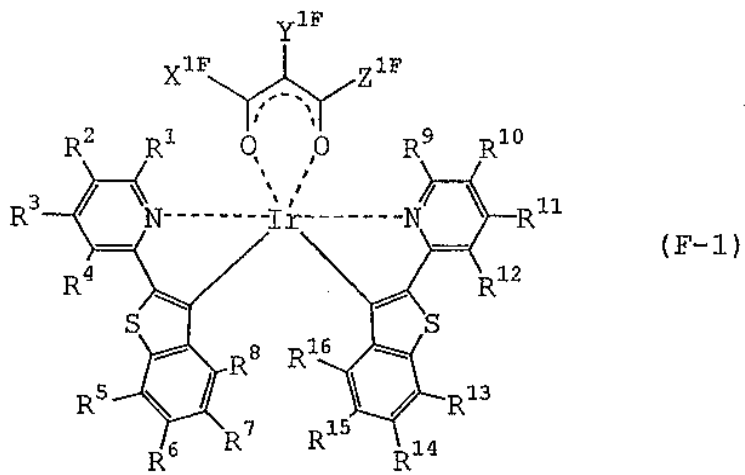
(, X^{1D}, Y^{1D}, Z^{1D} 1
 ~R¹⁶ , 1
 1~20 , , , , ,
 1~20)

[29] [16] , (E-1)



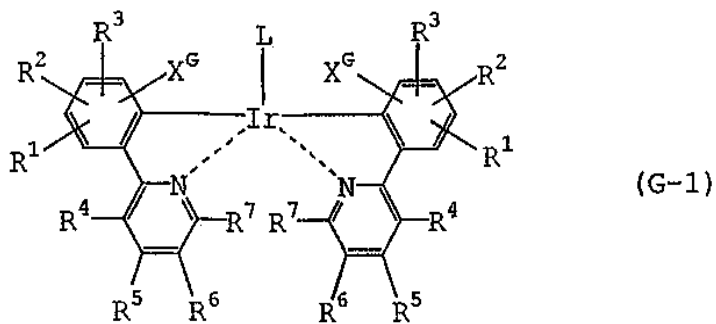
(, X^E 1~20 ; R^{1E}, R^{2E}, R^{3E} , , ,
 ; R⁴ ~R¹⁹ , 1~20 , , ,)

[30] [16] , (F-1)



(, X^{1F}, Y^{1F}, Z^{1F} 1 , X^{1F}, Y^{1F}, Z^{1F} 1~20 , R¹~R¹⁶ , 1~20)

[31] [16] (G-1)



(, L 1가 ; X^G , R¹~R⁷ 1~20)

[32] [1]~[31]

[33] [32]

[34] [32]

[35] [1]~[31]

[36] [35]

[37] [35]

[38] [1]

[39] [38] , [1]

[40] [39] , 가

[41] [38] , 1

[42] [41] , 가

[43] [41] , 가

[44] [1]~[31]

[45] [44] , [1]~[31] , /

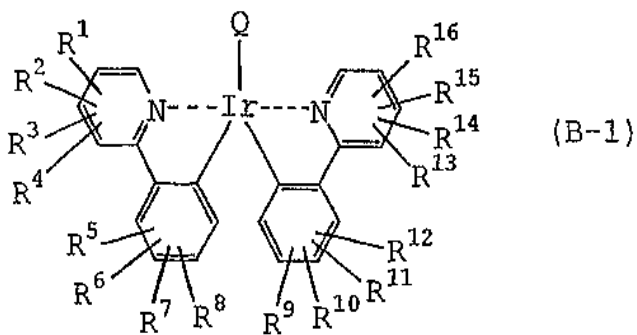
[A1]~[A3], [B1]~[B2], [C1]~[C60], [D1]~[D38], [E1]~[E34], [F1]~[F38] [G1]~[G26]

[A1] 1 , 1 1 1

[A2] [A1] ,

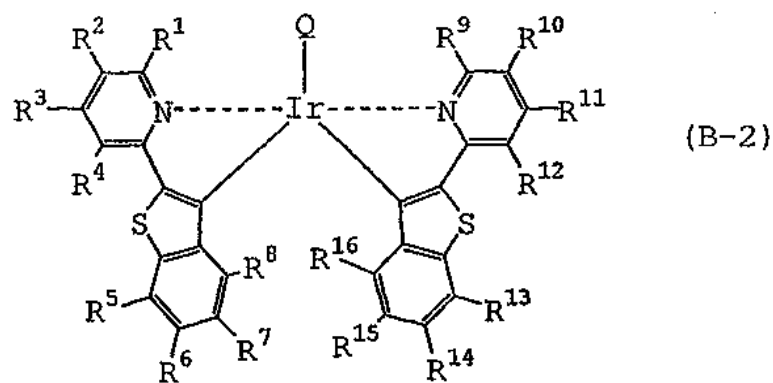
[A3] [A1] [A2] ,

[B1] (B-1)



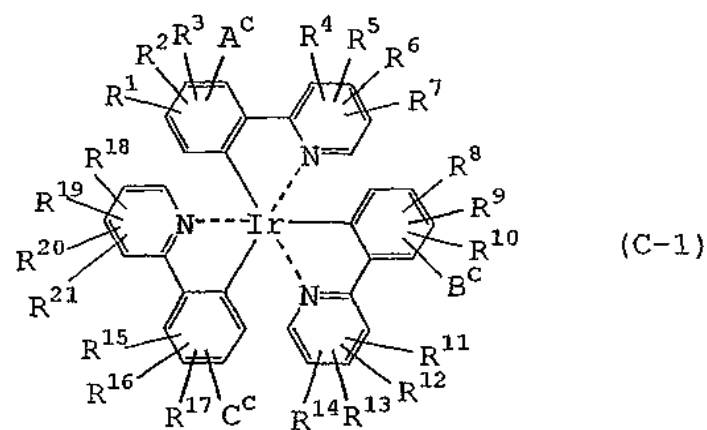
(, Q 1 , R 1 ~R 16 , 1~20)

[B2] (B-2)



(, Q 1 , R 1 ~R 16 , 1~20)

[C1] (C-1)

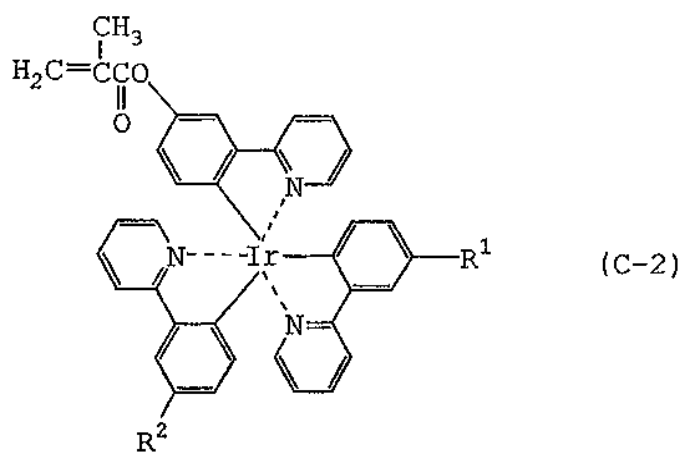


(, A^C, B^C, C^C 1 , A^C, B^C, C^C 1~20 , R 1 ~R 21 , 1~20)

[C2] [C1] , (C-1) A^C, B^C, C^C 1

[C3] [C2] , (C-1) A^C, B^C, C^C 1

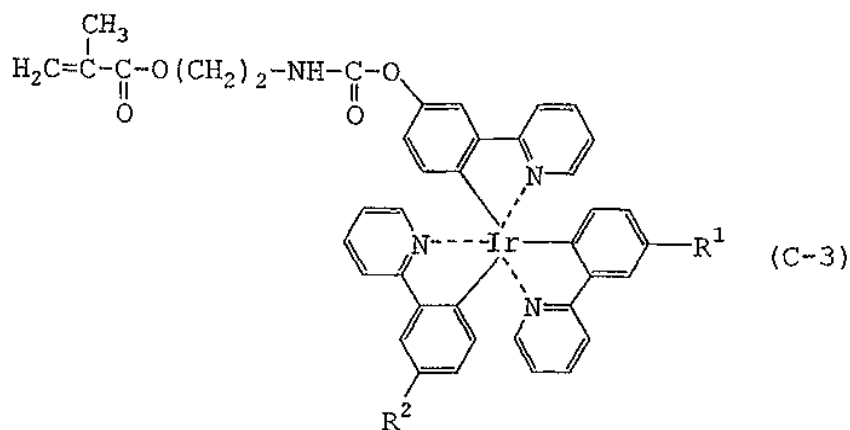
[C4] (C-2)



(, R¹ R² , 1~20 , ,) , 1

[C5] [C4] , (C-2) R¹ R² .

[C6] (C-3) .

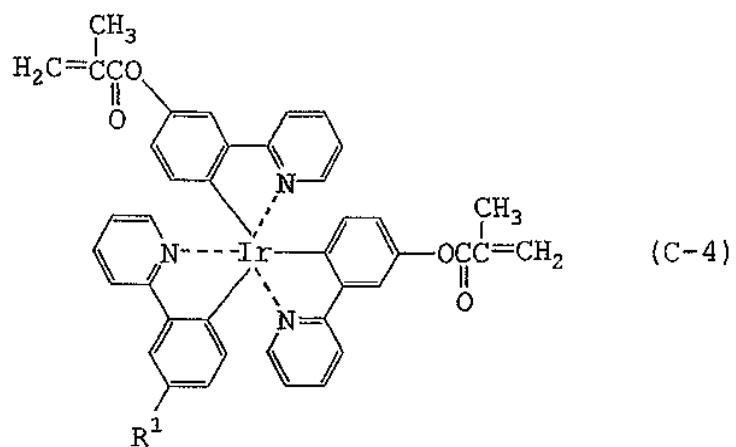


(, R¹ R² , 1~20 , ,) , 1

[C7] [C6] , (C-3) R¹ R² .

[C8] [C2] , (C-1) A^C, B^C C^C 2

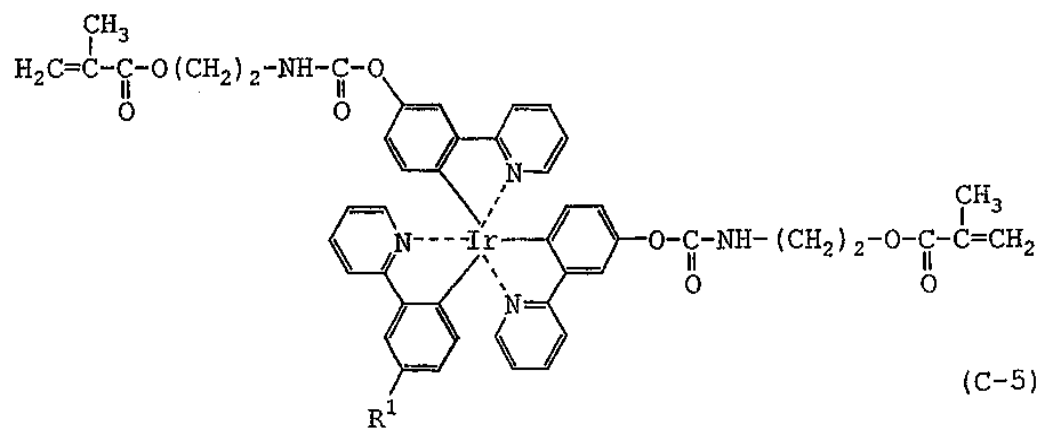
[C9] (C-4) .



(, R¹ , 1~20 , ,) , 1

[C10] [C9] , (C-4) R¹ .

[C11] (C-5) .

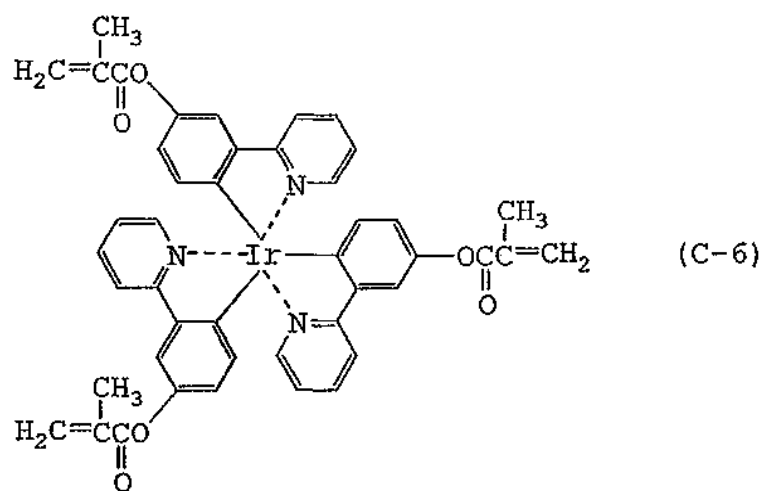


(, R¹ , 1~20 , ,) , 1

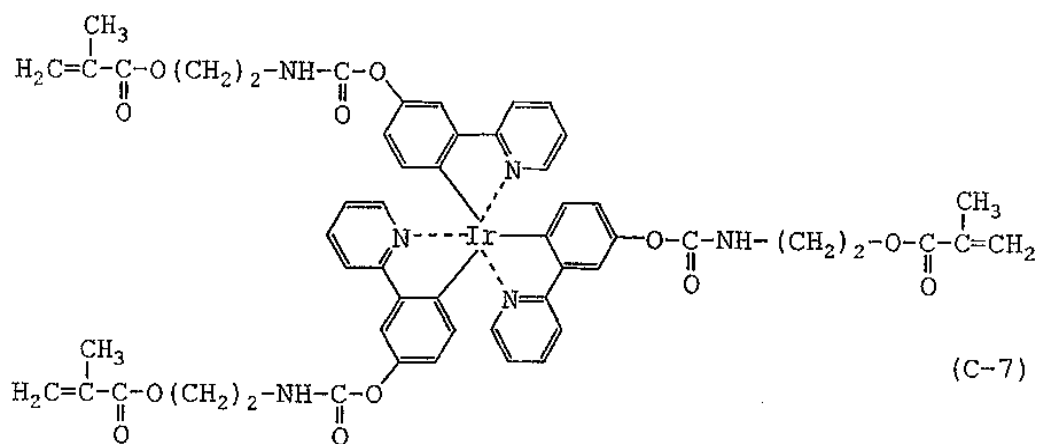
[C12] [C11] , (C-5) R¹ .

[C13] [C2] , (C-1) A^C , B^C C^C .

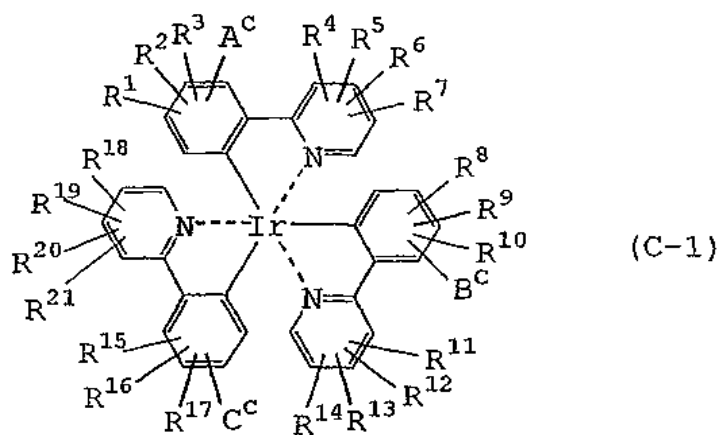
[C14] (C-6) .



[C15] (C-7)



[C16] (C-1)

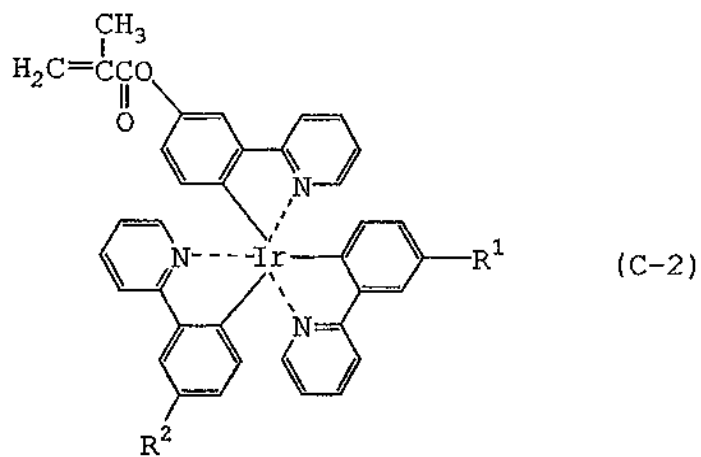


(, A^C, B^C, C^C, 1 , , , 1 , A^C, B^C, C^C , 1-20 , , , R¹ ~ R²¹ , 1-20 , ,)

[C17] [C16] , (C-1) A^C, B^C, C^C, 1

[C18] [C17] , (C-1) A^C, B^C C^C 1

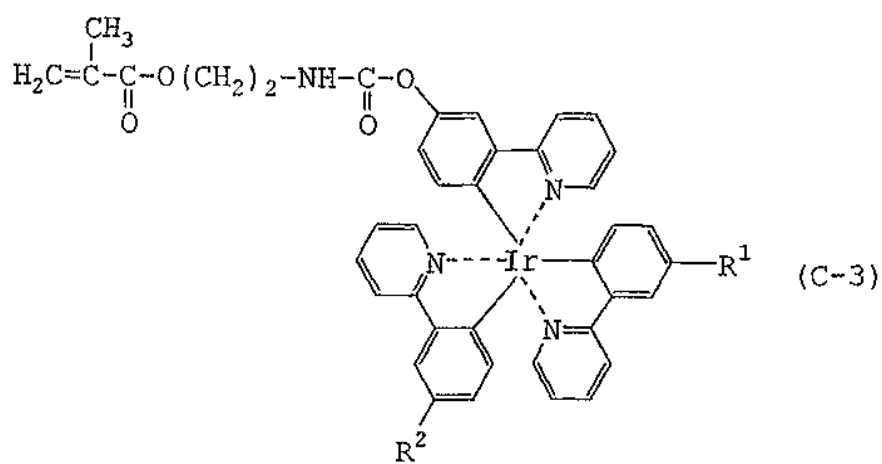
[C19] (C-2)



(, R¹ R² , 1~20 ,) 1

[C20] [C19] , (C-2) R¹ R²

[C21] (C-3)

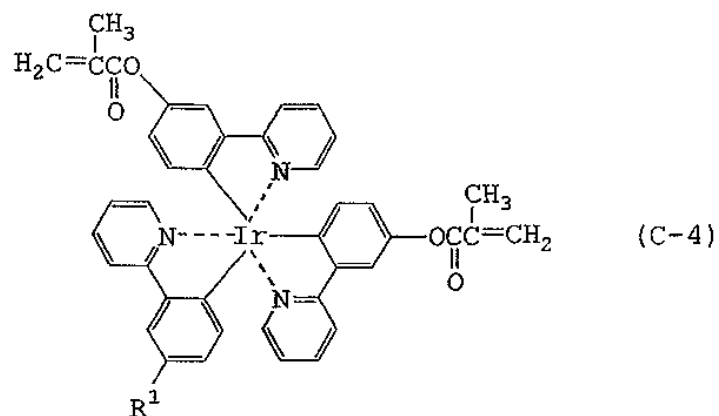


(, R¹ R² , 1~20 ,) 1

[C22] [C21] , (C-3) R¹ R²

[C23] [C17] , (C-1) A^C, B^C C^C 2

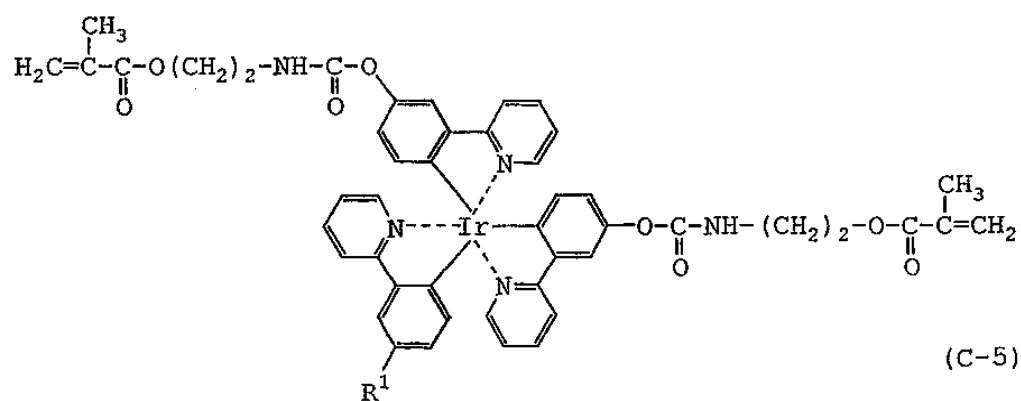
[C24] (C-4)



(, R¹ , 1~20 , ,) 1

[C25] [C24] , (C-4) R¹ .

[C26] (C-5) .

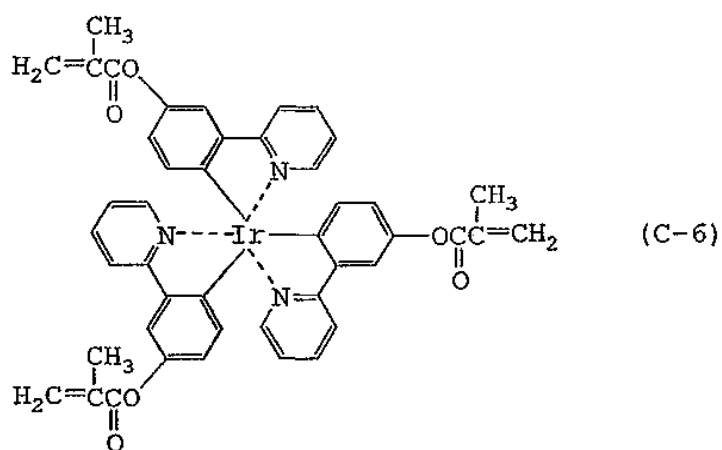


(, R¹ , 1~20 , ,) 1

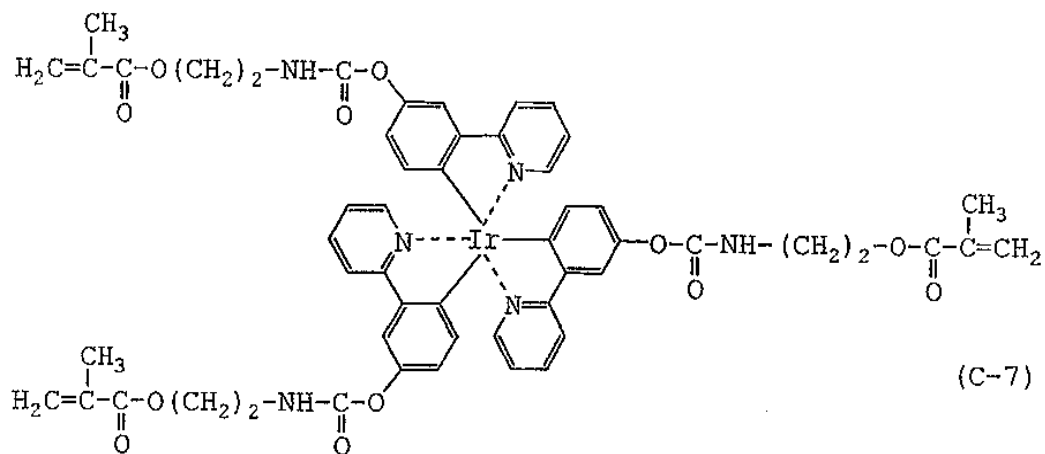
[C27] [C26] , (C-5) R¹ .

[C28] [C17] , (C-1) A^C , B^C C^C .

[C29] (C-6) .



[C30] (C-7)

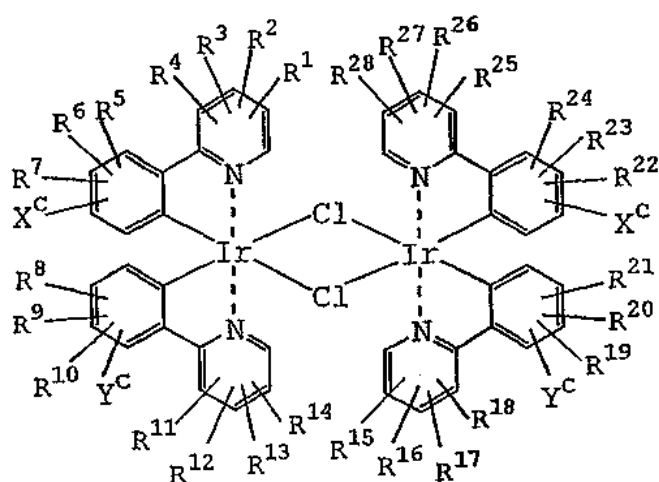


[C31] (C-1)~(C-7)

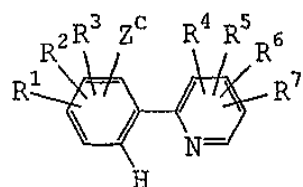
1

[C32] (C-8)

(C - 9)



(C-8)

$$\left(\begin{array}{c} X^C \\ Y^C \\ 1 \end{array} \right), \quad \begin{array}{c} 1 \sim 20 \\ 1 \end{array} \right)$$


(C-9)

(, Z^C , , 1~20 , , ; R¹ ~R⁷ 1 ,
1~20 , , (C-8) X^C Y^C , (C-9) Z^C 1)

[C33] [C32] , (C-8) X^C Y^C , 1~20 ,
 , (C-9) Z^C 1

[C34] [C33] , (C-9) Z^C

[C35] [C34] ,

[C36] [C34] ,

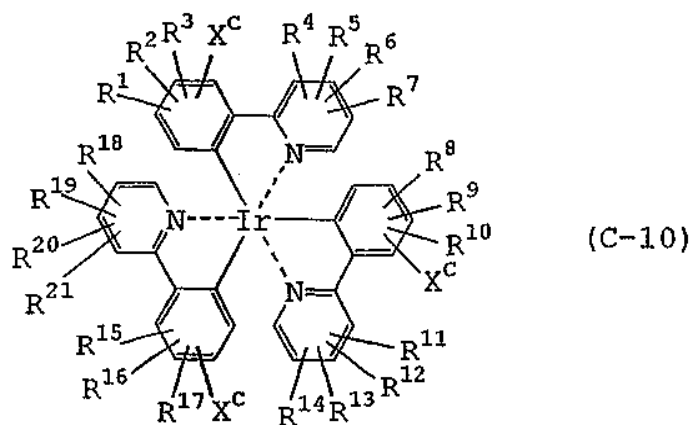
[C37] [C32] , (C-8) X^C Y^C , 1
 (C-9) Z^C , 1~20 ,

[C38] [C37] , (C-9) Z^C

[C39] [C38] ,

[C40] [C37] ,

[C41] (C-10) ,



(, X^C ; $R^1 \sim R^{21}$, 1~20 ,)

[C42] [C41] , (C-10) 1:(
 0.5~1.5)

[C43] [C42] , (C-10)

[C44] [C43] ,

[C45] [C43]

,

[C46] [C41]
1.5~2.5)

,

(C-10)

1:(

[C47] [C46]

,

(C-10)

[C48] [C47]

,

[C49] [C47]

,

[C50] [C41]
2.5)

,

(C-10)

1:(

[C51] [C50]

,

(C-10)

[C52] [C51]

,

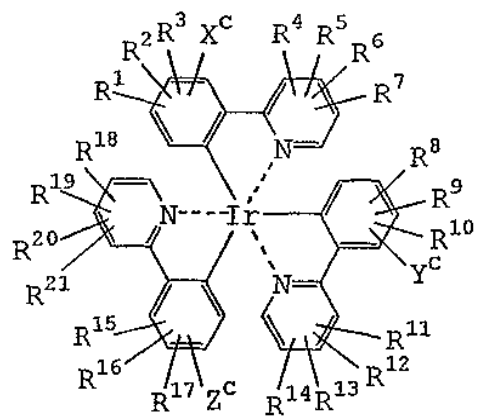
[C53] [C51]

,

[C54]

(C-11)

,



(C-11)

(, X^c, Y^c Z^c 1

,

X^c, Y^c Z^c

,

1~20

,

; R¹ ~R²¹

1

,

1~20

,

,

)

[C55] [C54]

,

(C-11)

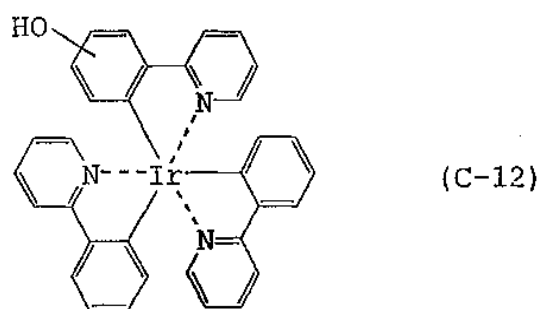
X^c, Y^c Z^c 1

,

[C56]

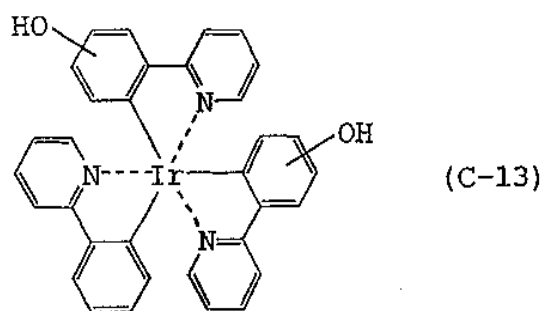
(C-12)

,



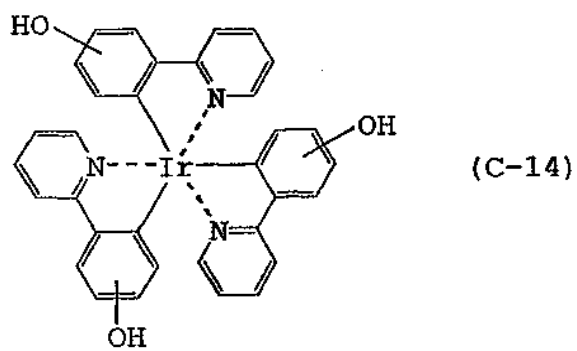
[C57] [C54] , (C-11) $X^C, Y^C Z^C 2$

[C58] (C-13)

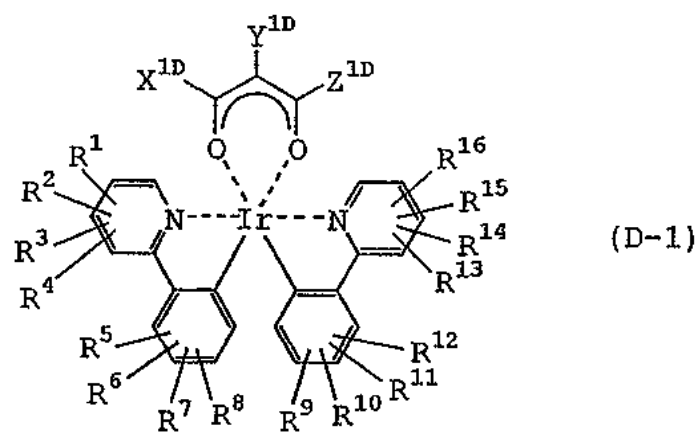


[C59] [C54] , (C-11) $X^C, Y^C Z^C$

[C60] (C-14)



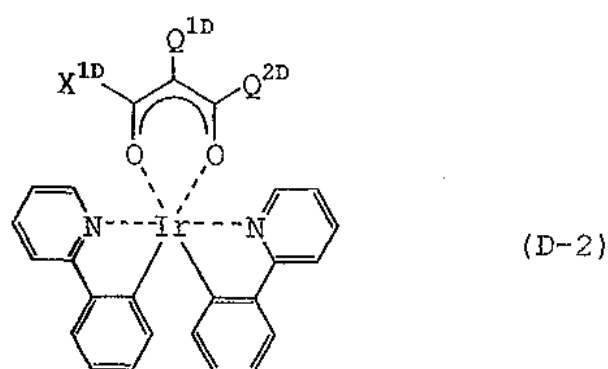
[D1] (D-1)



(, X^{1D}, Y^{1D}, Z^{1D}, 1
~R¹⁶, 1~20,)

[D2] [D1], (D-1) X^{1D} Z^{1D}

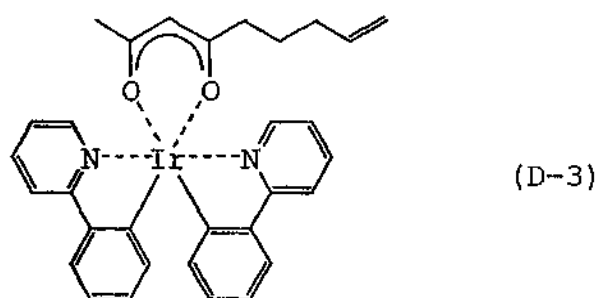
[D3] (D-2)



(, X^{1D}, Q^{1D}, Q^{2D}, 1
1~20,)

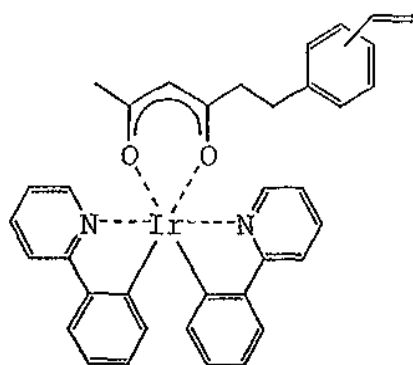
[D4] [D1]~[D3]

[D5] (D-3)



[D6] [D1]~[D3]

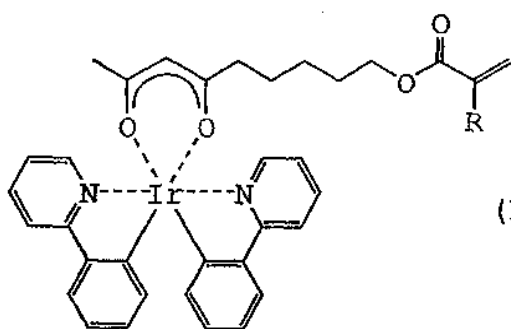
[D7] (D-4)



(D-4)

[D8] [D1]~[D3]

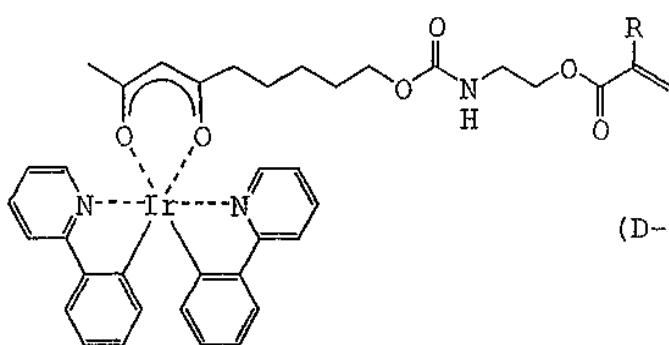
[D9] (D-5)



(D-5)

(, R)

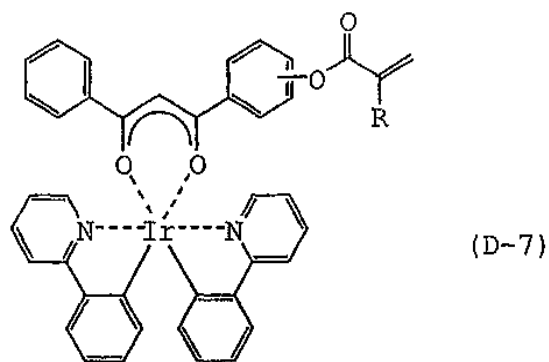
[D10] (D-6)



(D-6)

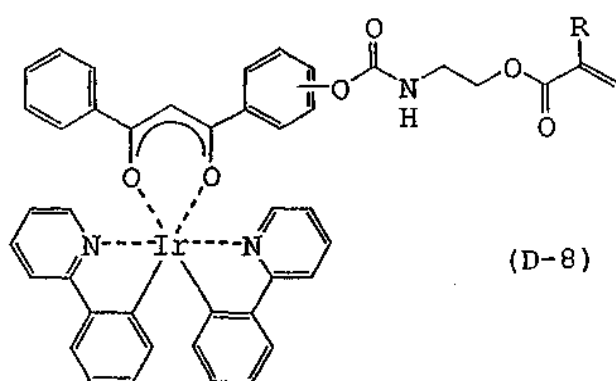
(, R)

[D11] (D-7)



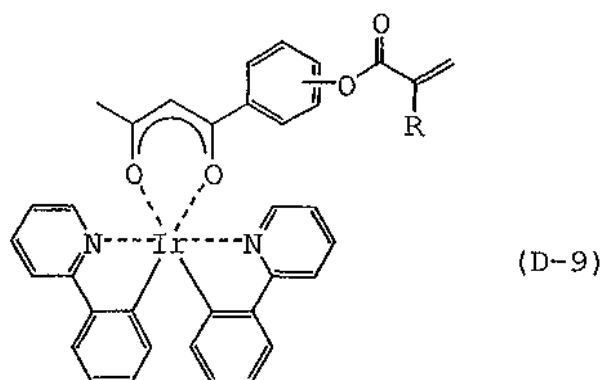
(, R)

[D12] (D-8)



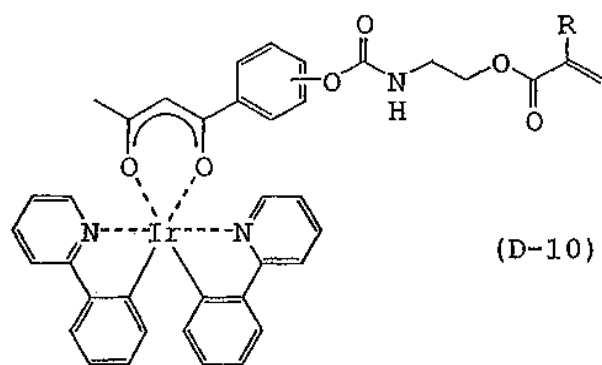
(, R)

[D13] (D-9)



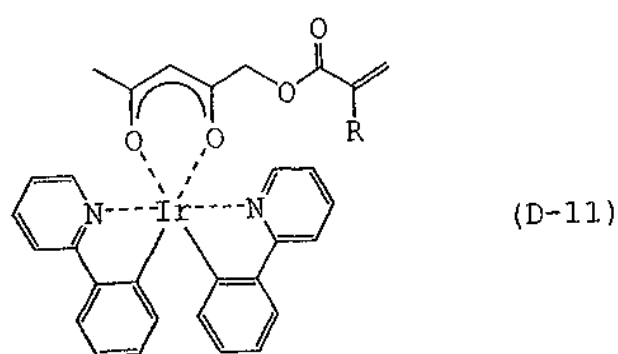
(, R)

[D14] (D-10)



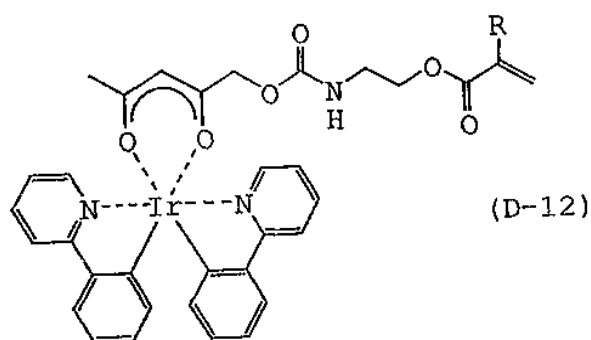
(, R)

[D15] (D-11) .



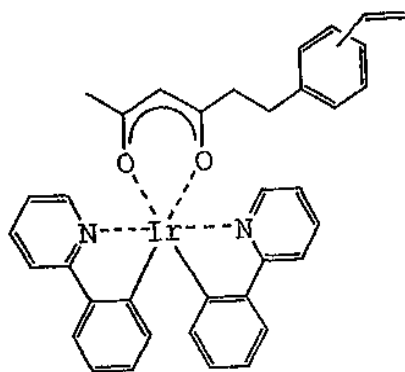
(, R)

[D16] (D-12) .



(, R)

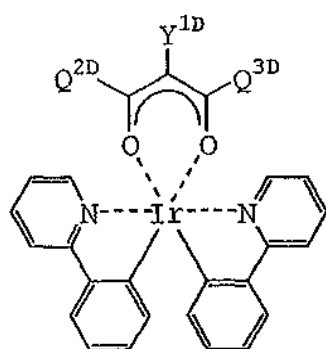
[D17] (D-13) .



(D-13)

[D18] [D1] , (D-1) Y^{1D}

[D19] (D-14)



(D-14)

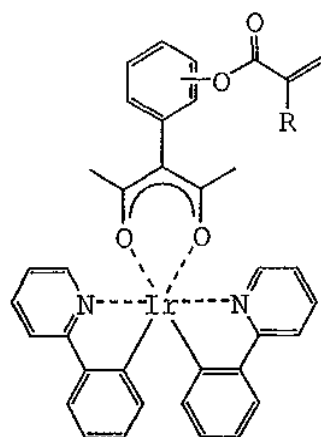
(, Y^{1D} , Q^{2D} Q^{3D} , 1
1~20)

[D20] [D18] [D19] , -

[D21] [D18] [D19] ,

[D22] [D18] [D19] ,

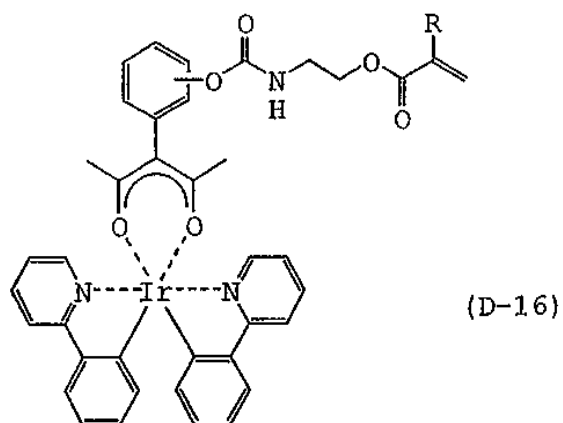
[D23] (D-15)



(D-15)

(, R)

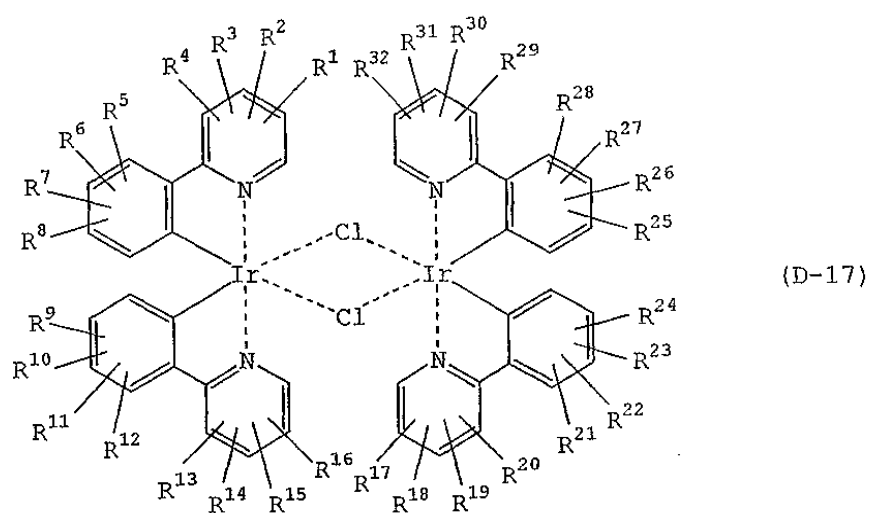
[D24] (D-16)



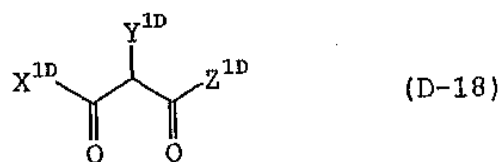
(, R)

[D25] (D-17)

(D-18)



(, R¹ ~ R³² , 1~20 , , , 1)

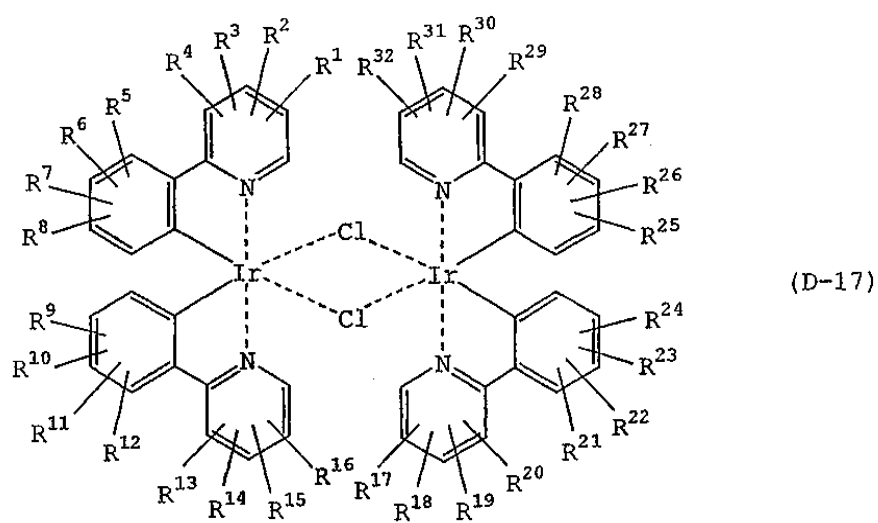


(, X^{1D} , Y^{1D} , Z^{1D} , 1 , X^{1D} , Y^{1D} , Z^{1D} , 1~20)

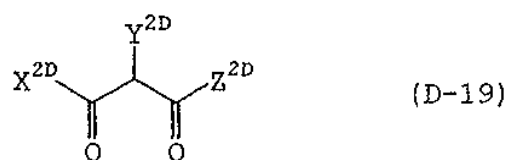
[D26] [D25] , (D-18) X^{1D} Z^{1D}[D27] [D25] , (D-18) Y^{1D}

[D28] (D-17)

(D-19)

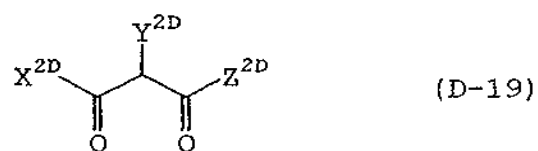


(, R¹ ~ R³² , 1~20 ,) 1



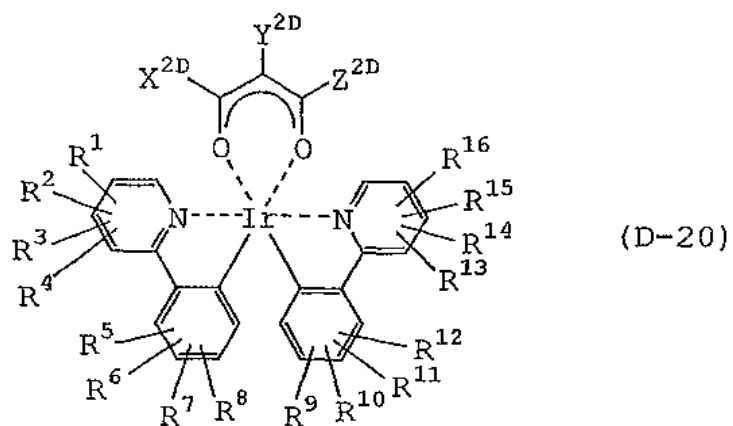
(, X^{2D} , Y^{2D} , Z^{2D} 1 , 1 , X^{2D} , Y^{2D} , Z^{2D} 1~20)

[D29] [D28] , (D-19) X^{2D} Z^{2D}



[D30] [D28] , (D-19) Y^{2D}

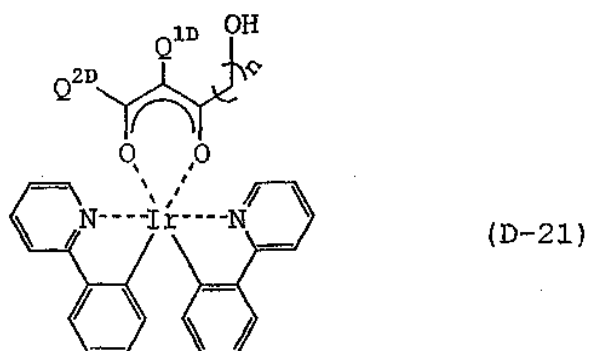
[D31] (D-20)



(, X^{2D}, Y^{2D}, Z^{2D} 1
R¹⁶ , 1
1~20 , X^{2D}, Y^{2D}, Z^{2D} 1
; R¹ ~
1
1~20)

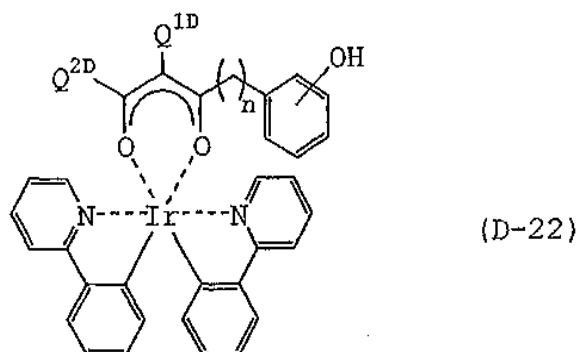
[D32] [D31] , (D-20) X^{2D} Z^{2D} .

[D33] (D-21) .



(, n 0 1~20 , Q^{1D} Q^{2D} , 1
1~20)

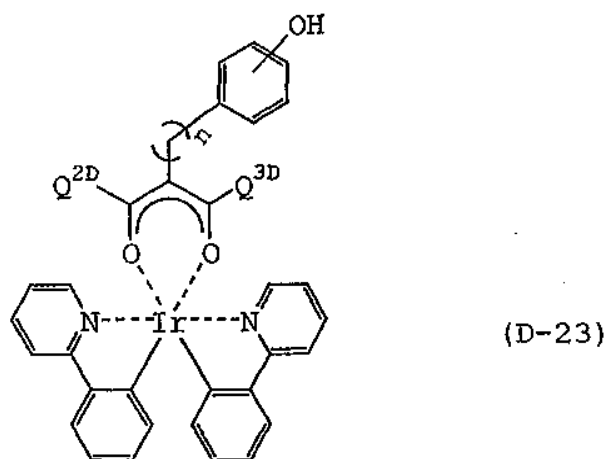
[D34] (D-22) .



(, n 0 1~20 , Q^{1D} Q^{2D} , 1
1~20)

[D35] [D31] , (D-20) Y^{2D} .

[D36] (D-23)

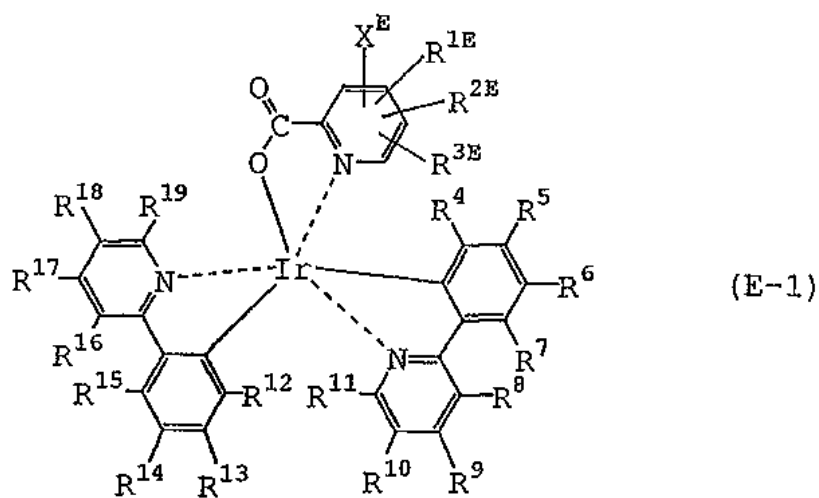


(, n 0 1~20 , Q^{2D} Q^{3D} , 1
1~20)

[D37] [D1]~[D24]

[D38] [D1]~[D24] 1

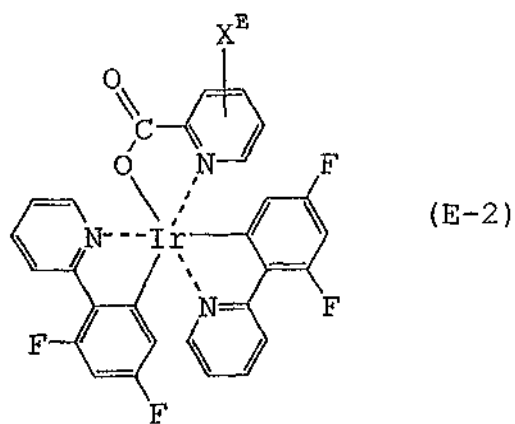
[E1] (E-1)



(, X^E ; R^{1E}, R^{2E} R^{3E} ,
1 1~20 ; R⁴~R¹⁹ ,
1~20 ,) 1

[E2] [E1] , (E-1) X^E -

[E3] (E-2)

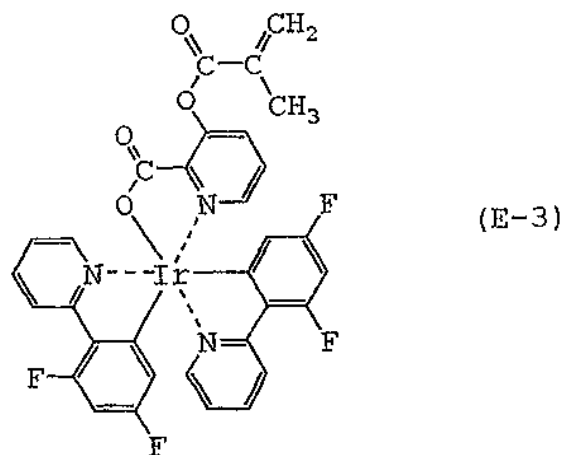


(, X^E)

[E4] [E1]~[E3]

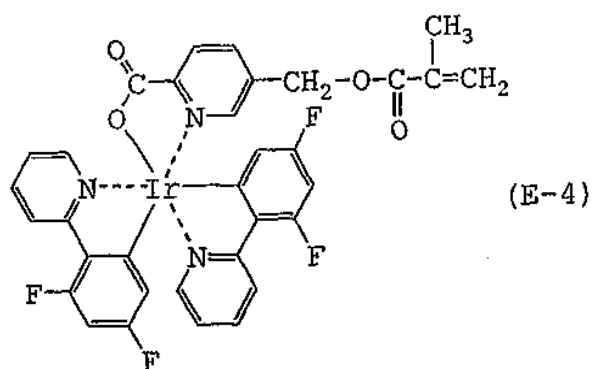
[E5] [E1]~[E3] , (E-1) (E-2) X^E

[E6] (E-3)



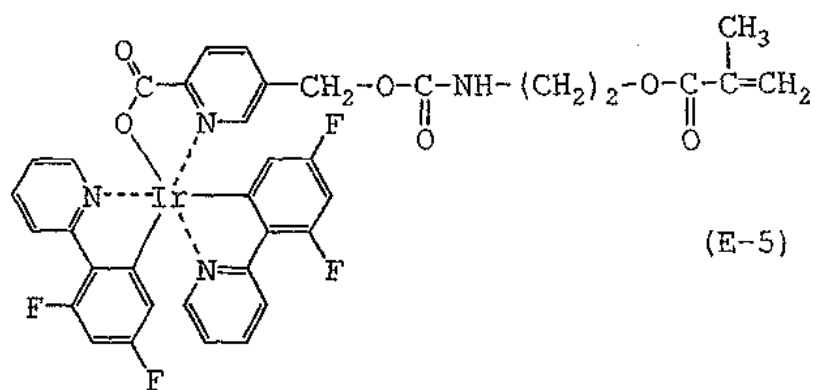
[E7] [E1]~[E3] , (E-1) (E-2) X^E

[E8] (E-4)



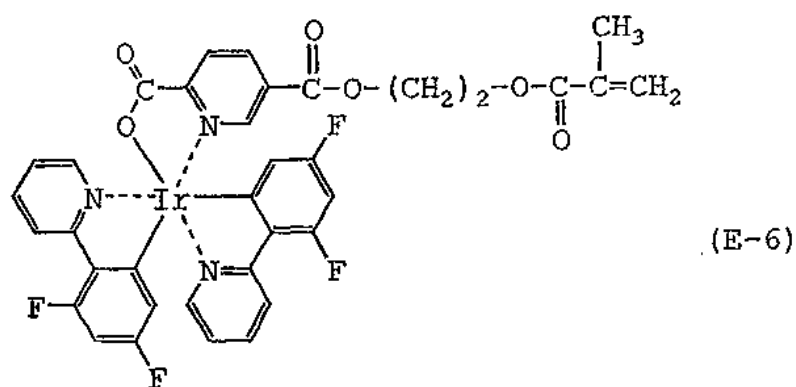
[E9] [E1]~[E3] , (E-1) (E-2) X E

[E10] (E-5)



[E11] [E1]~[E3] , (E-1) (E-2) X E

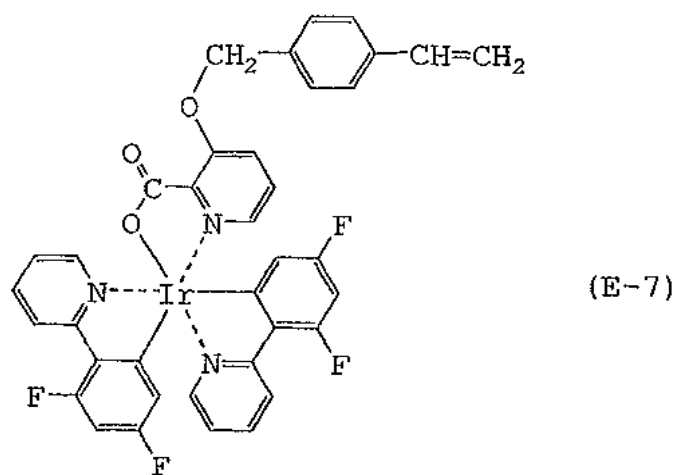
[E12] (E-6)



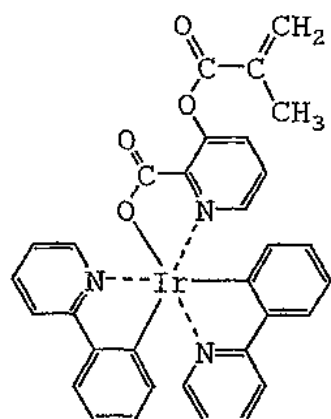
[E13] [E1]~[E3] ,

[E14] [E1]~[E3] , (E-1) (E-2) X E

[E15] (E-7)



[E16] (E-8)

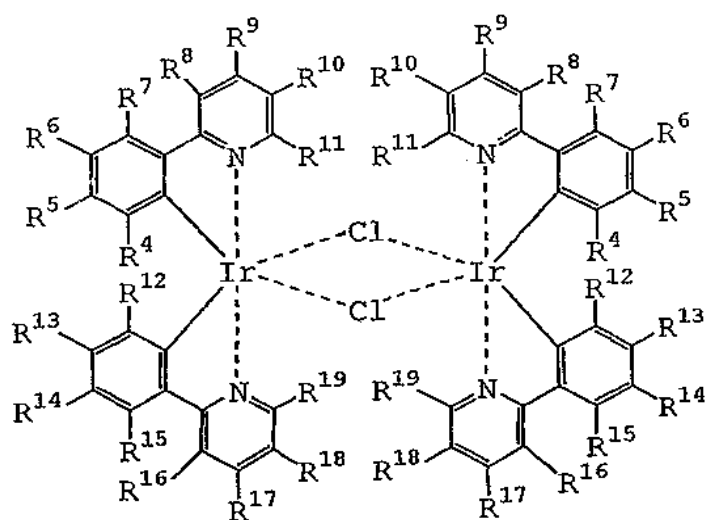


(E-8)

[E17] (E-9)

Y^E

(E-10)

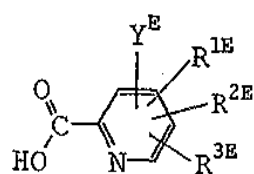


(E-9)

(, R⁴ ~ R¹⁹

1~20

1



(E-10)

(, Y^E; R^{1E}, R^{2E}, R^{3E}
1~20

)

1

[E18] [E17] , (E-10) Y^E[E19] [E17] , (E-10) Y^E

[E20] [E19] , Y E

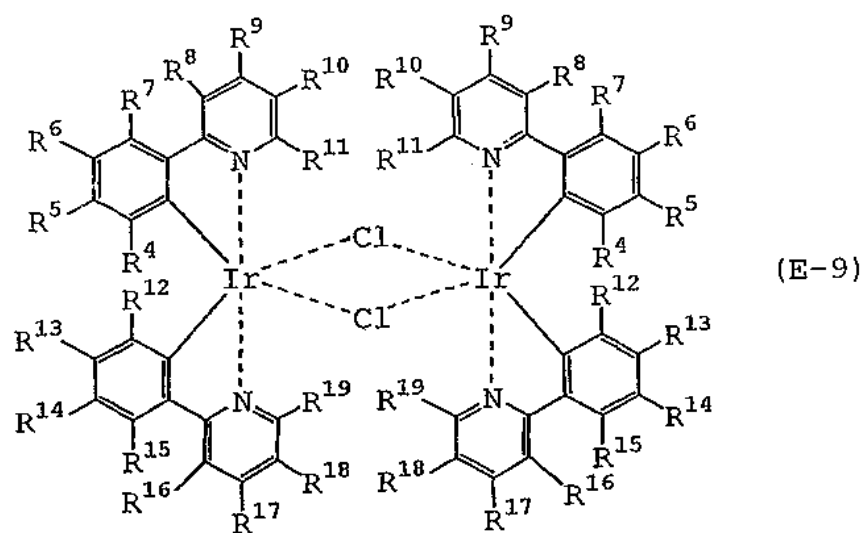
[E21] [E19] , Y E

[E22] [E18] [E19] , Y E

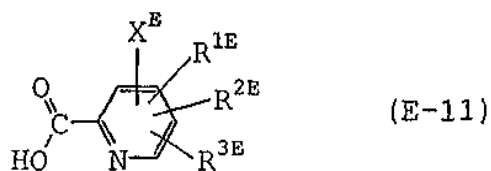
[E23] [E17] , (E-10) Y E

[E24] [E23] , Y E

[E25] (E-9) (E-11)



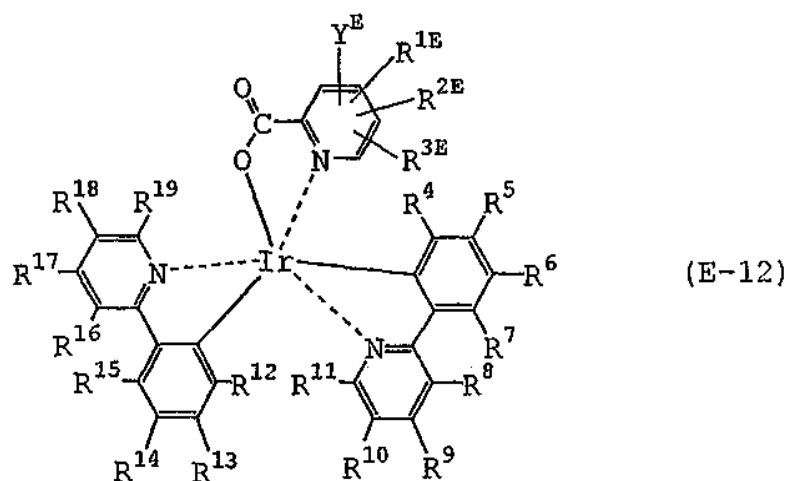
(, R⁴ ~ R¹⁹ , 1~20 ,) 1



(, X^E ; R^{1E} , R^{2E} R^{3E} ,)
1 1~20

[E26] [E25] , (E-11) X^E ,

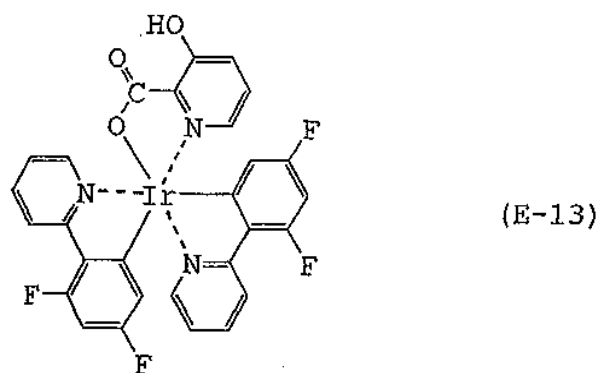
[E27] (E-12)



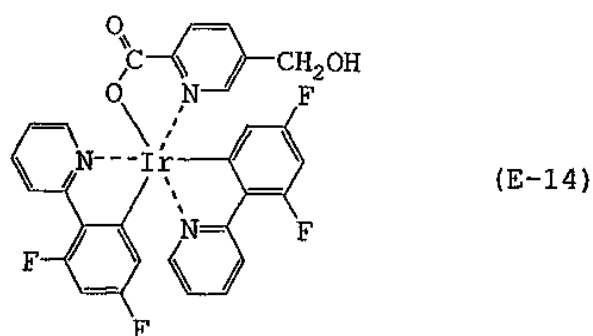
(, Y^E ; R^{1E}, R^{2E}, R^{3E} 1~20 , R⁴~R¹⁹ 1~20)

[E28] [E27] , (E-12) Y^E .

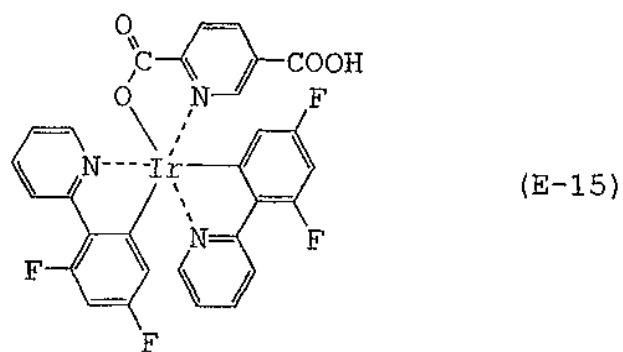
[E29] (E-13) .



[E30] (E-14) .



[E31] (E-15) .

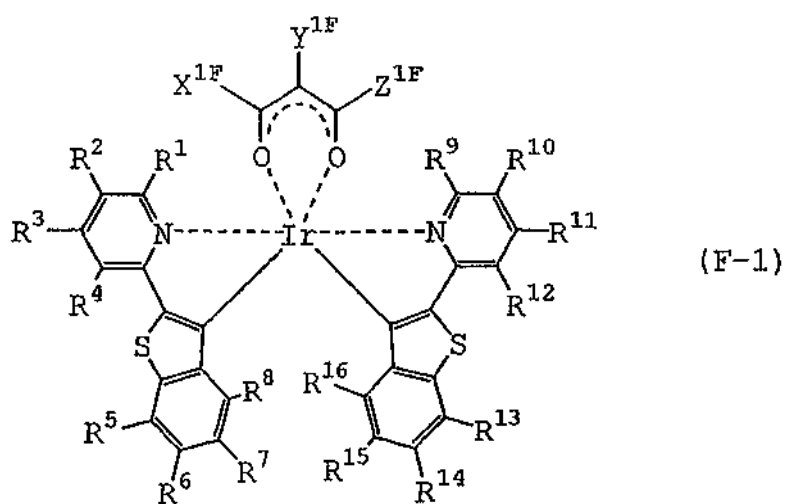


[E32] [E1]~[E16]

[E33] [E1]~[E16]

[E34] [E32]

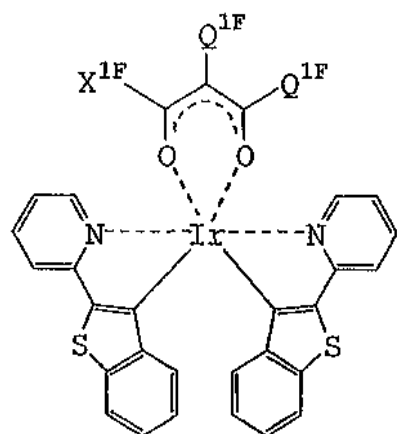
[F1] (F-1)



(, X^{1F}, Y^{1F}, Z^{1F} 1 , X^{1F}, Y^{1F}, Z^{1F} 1~20 , 1~20)

[F2] [F1] , X^{1F} Z^{1F}

[F3] (F-2)

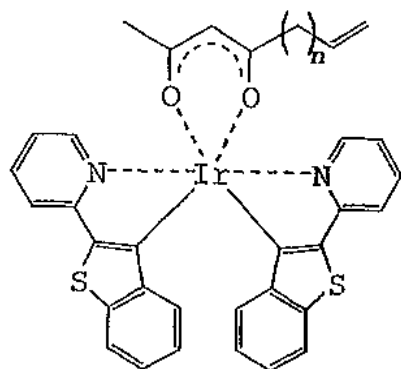


(F-2)

(, X^{1F} , Q^{1F} Q^{2F} , , 1
1~20)

[F4] [F1]~[F3]

[F5] (F-3)

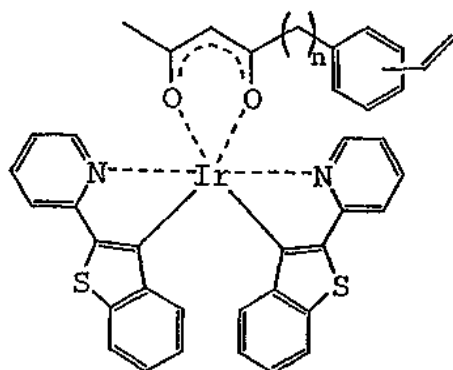


(F-3)

(, n 0 1~20)

[F6] [F1]~[F3]

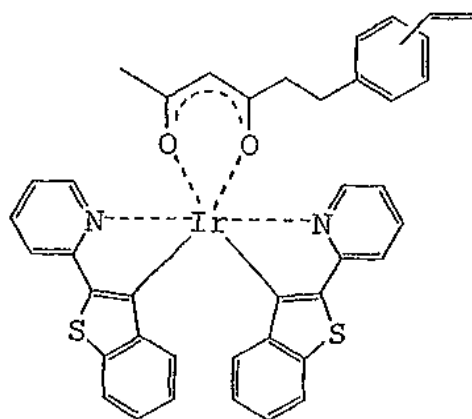
[F7] (F-4)



(F-4)

(, n 0 1~20)

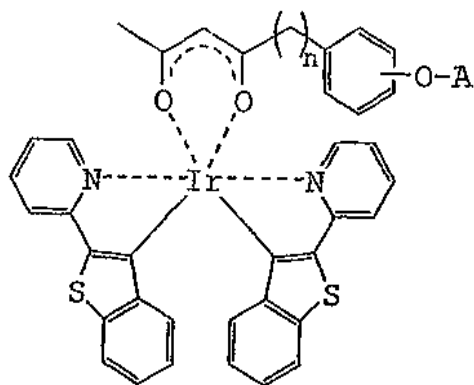
[F8] (F-5)



(F-5)

[F9] [F1]~[F3]

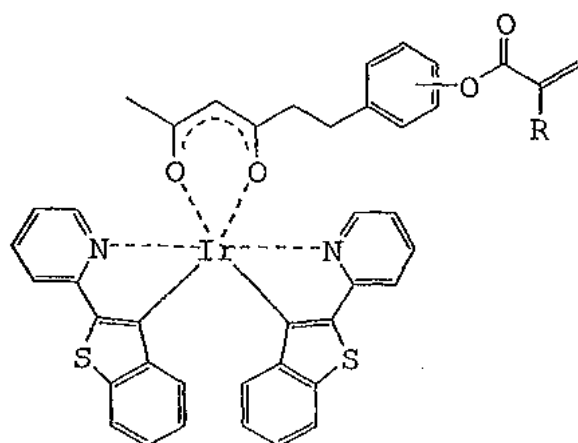
[F10] (F-6)



(F-6)

(, n 0 1~20 , A)
3~20)

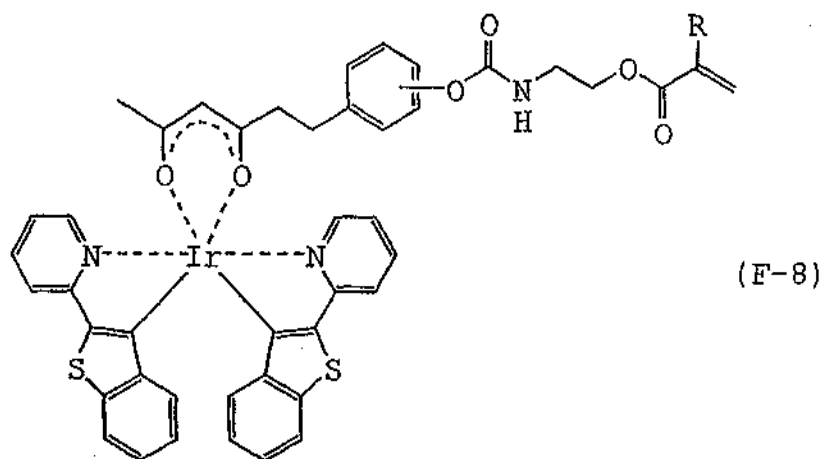
[F11] (F-7)



(F-7)

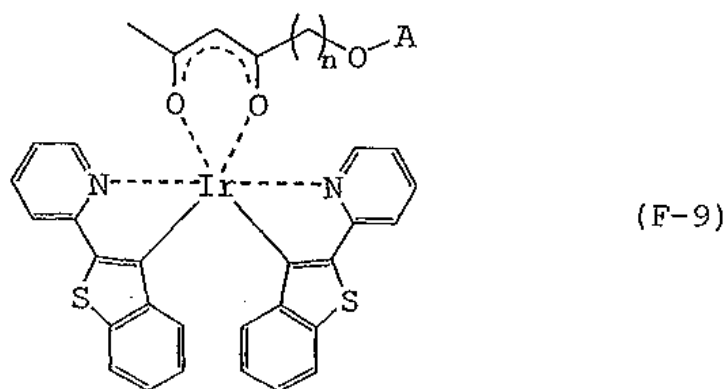
(, R)

[F12] (F-8)



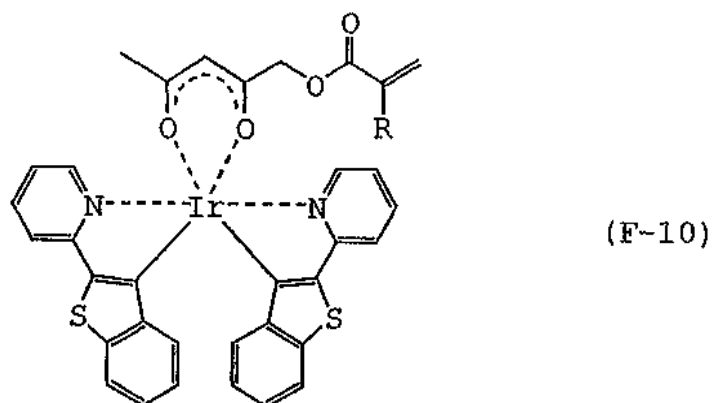
(, R)

[F13] (F-9)



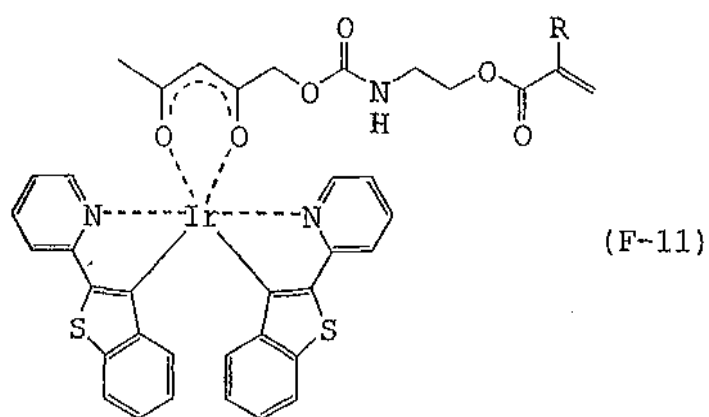
(, n 0 1~20 , A) , ,

[F14] (F-10) .0



(, R)

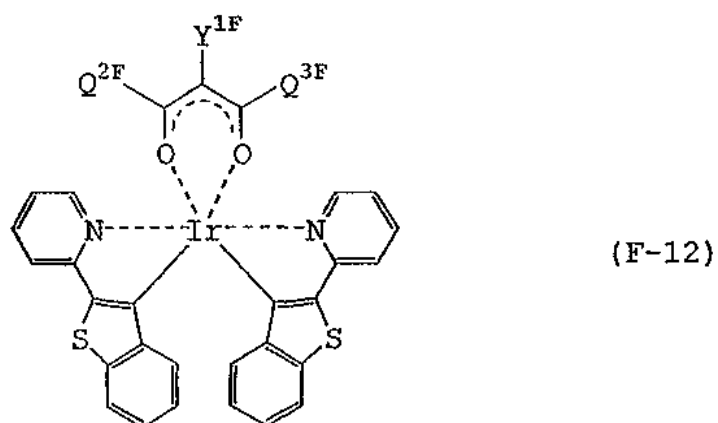
[F15] (F-11)



(, R)

[F16] [F1] , (F-1) Y^{1F}

[F17] (F-12)



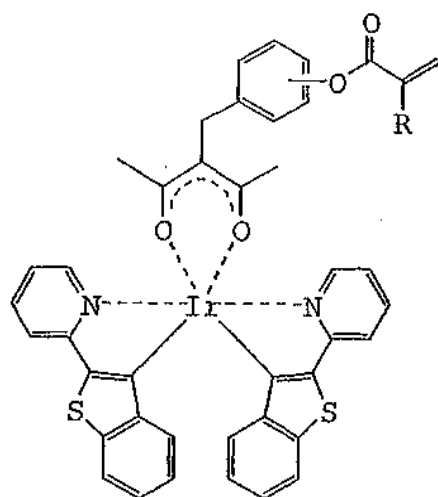
(, Y^{1F} , Q^{2F} Q^{3F} 1~20) , 1

[F18] [F16]~[F17]

[F19] [F16] [F17]

[F20] [F16] [F17]

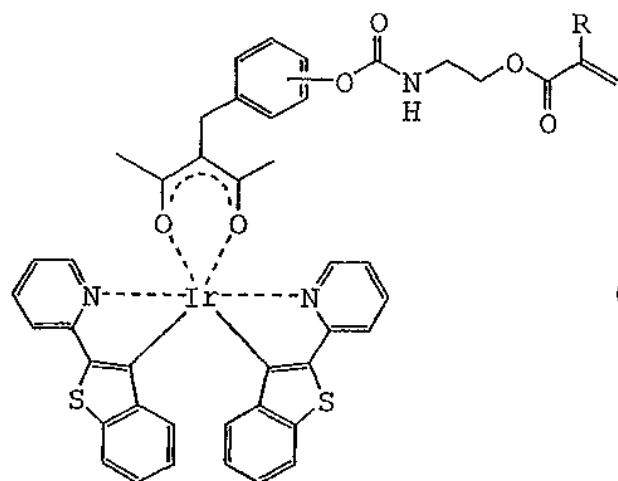
[F21] (F-13)



(F-13)

(, R)

[F22] (F-14)

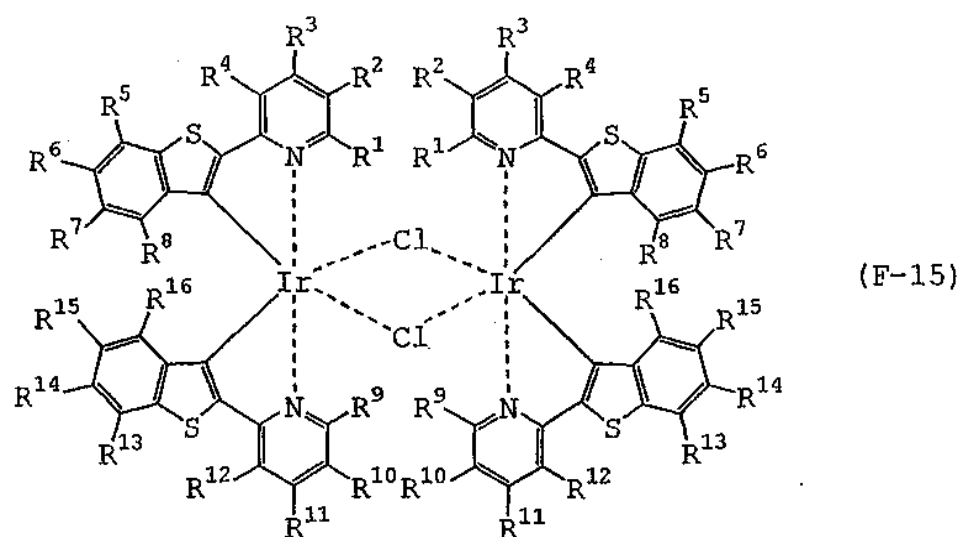


(F-14)

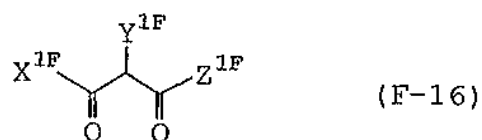
(, R)

[F23] (F-15)

(F-16)



(, R¹ ~ R¹⁶ , 1 ~ 20) , 1



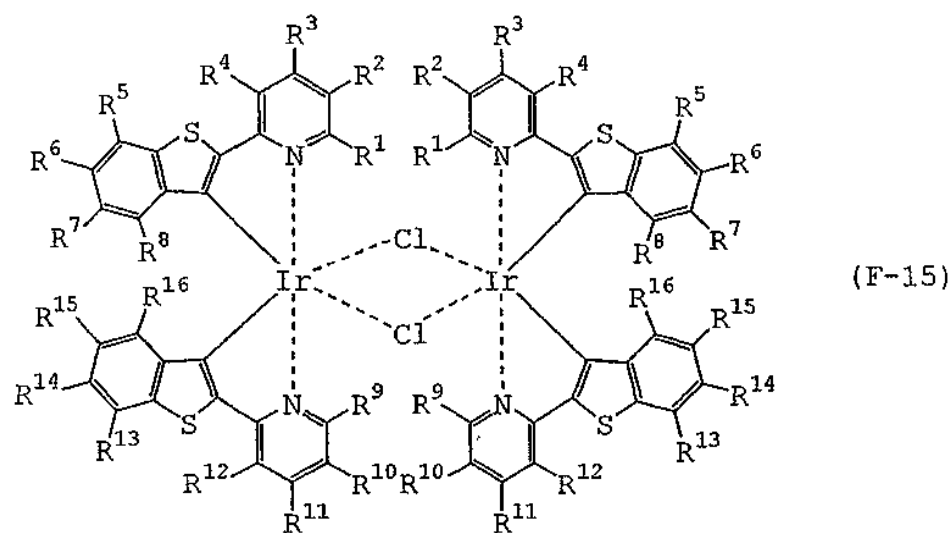
(, X^{1F} , Y^{1F} , Z^{1F} 1 , 1 , X^{1F} , Y^{1F} , Z^{1F} 1 ~ 20)

[F24] [F23] , (F-16) X^{1F} Z^{1F}

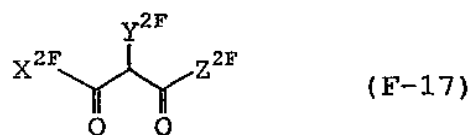
[F25] [F23] , (F-16) Y^{1F}

[F26] (F-15) (F-17)

(X^{2F} , Y^{2F} , Z^{2F} 1) (F-17)



(, R¹ ~ R¹⁶ , 1~20 ,) 1



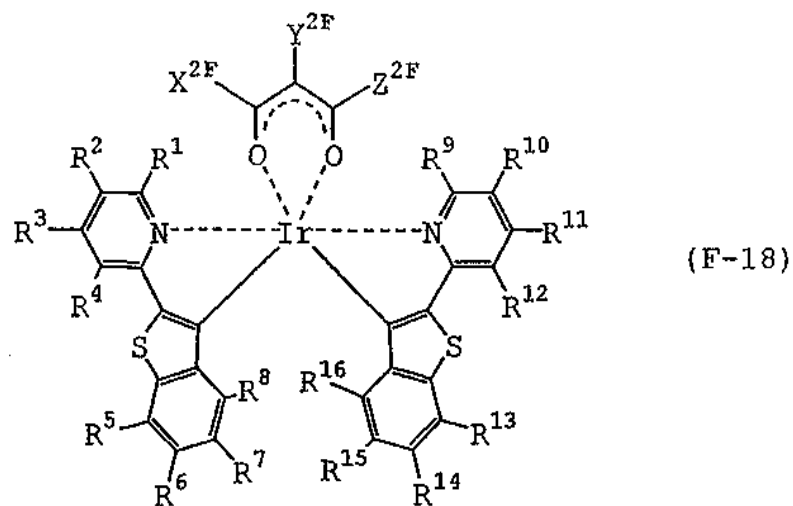
(, X^{2F} , Y^{2F} , Z^{2F} , 1 , X^{2F} , Y^{2F} , Z^{2F} , 1~20)

[F27] [F26] , (F-17) X^E , Y^E , Z^E

[F28] [F26] , (F-17) X^{2F} , Z^{2F}

[F29] [F26] , (F-17) Y^{2F}

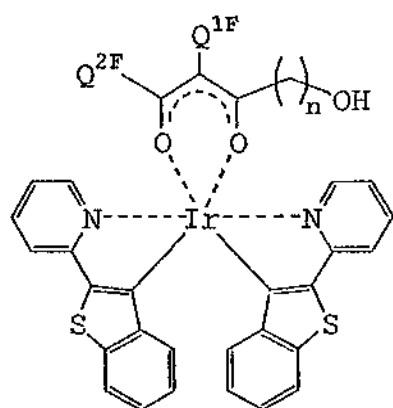
[F30] (F-18)



(, X^{2F} , Y^{2F} , Z^{2F} 1 , X^{2F} , Y^{2F} , Z^{2F} 1~20
; $R^1 \sim R^{16}$, 1 , 1~20 ,) 1

[F31] [F30] , (F-18) X^{2F} Z^{2F} .

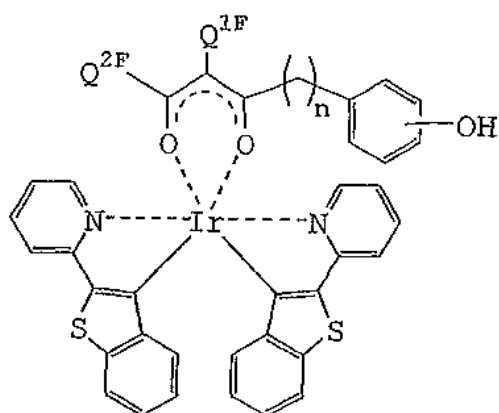
[F32] (F-19) .



(F-19)

(, n 0 1~20 , Q^{1F} Q^{2F} 1~20) , 1

[F33] (F-20) .

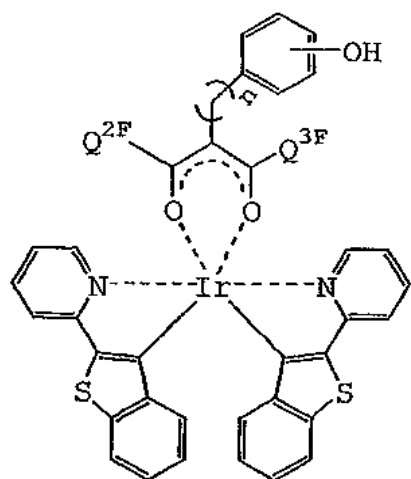


(F-20)

(, n 0 1~20 , Q^{1F} Q^{2F} 1~20) , 1

[F34] [E30] , (E-18) Y^{2F} .

[F35] (F-21) .



(F-21)

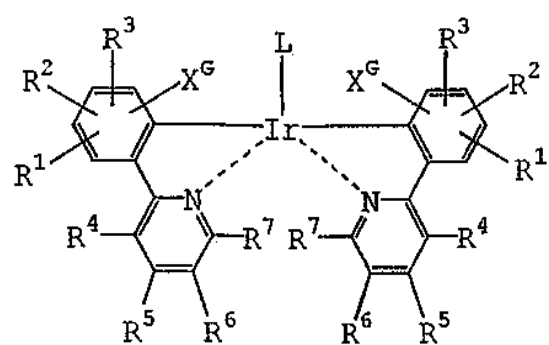
(, n 0 1~20 , Q^{2F} Q^{3F} 1~20) , 1

[F36] [F1]~[F22]

[F37] [F1]~[F22] 1

[F38] [F1]~[F22] 1

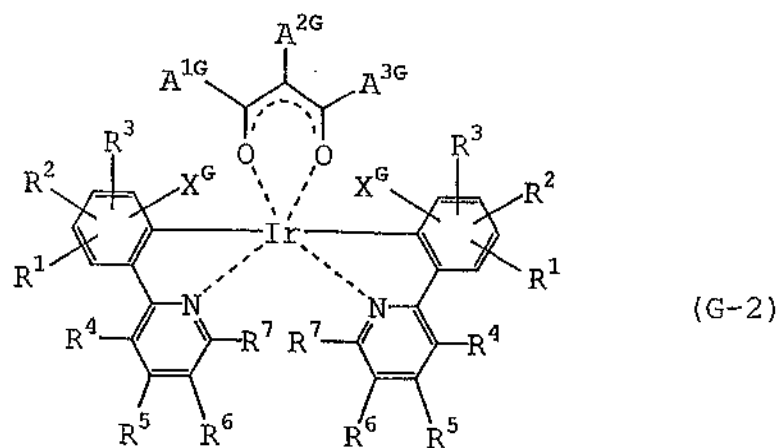
[G1] (G-1)



(G-1)

(, L 17+ , X^G , R¹~R⁷ 1~20) 1

[G2] (G-2)

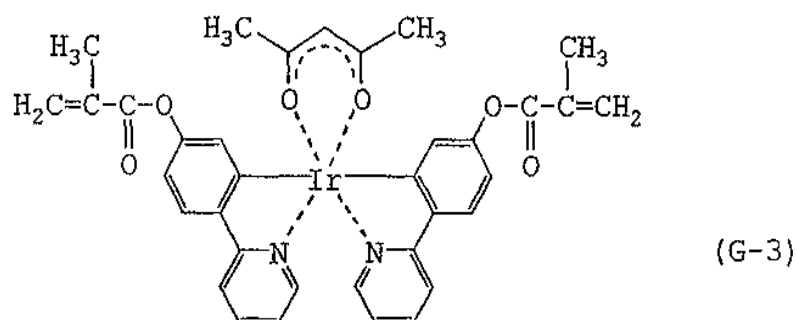


(A^{1G}, A^{2G}, A^{3G} 1~20; X^G 1, $R^1 \sim R^7$ 1~20)

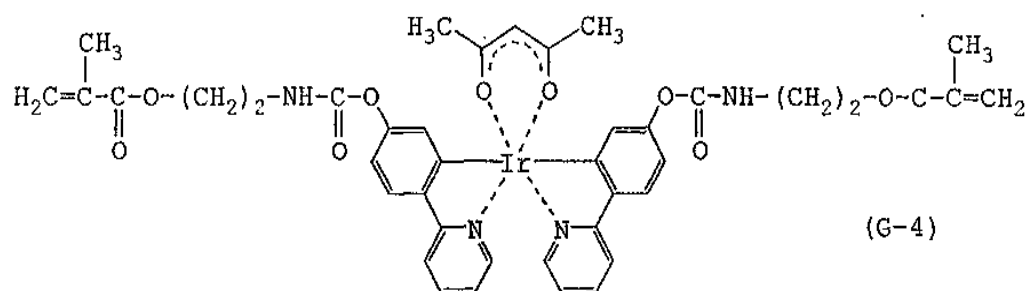
[G3] [G1] [G2] (G-1) (G-2) X^G

[G4] [G1] [G2] (G-1) (G-2) X^G

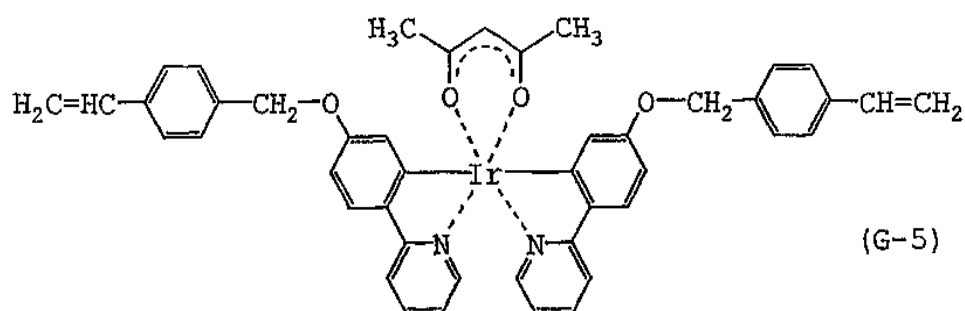
[G5] (G-3)



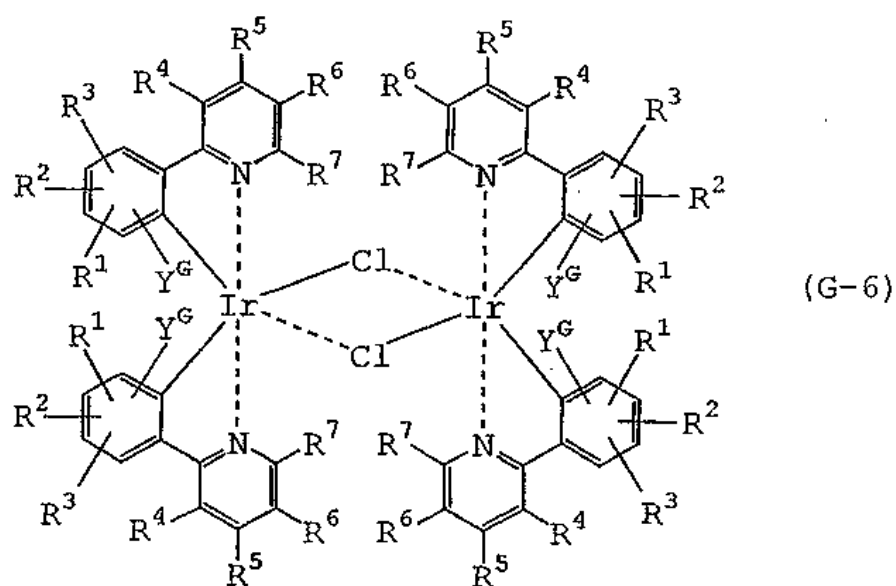
[G6] (G-4)



[G7] (G-5)



[G8] (G-6) 17가 L Y^G



(, Y^G , R¹~R⁷ , 1~20 ,)

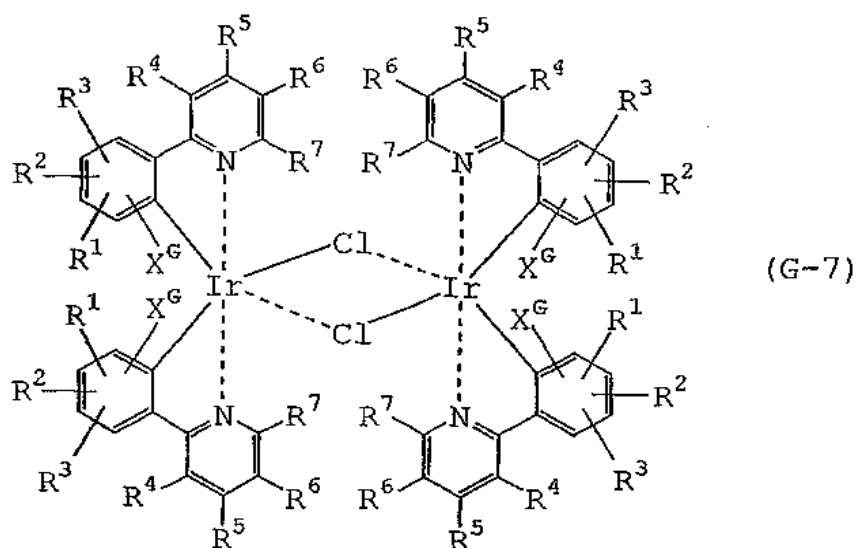
[G9] [G8] (G-6) Y^G

[G10] [G8] (G-6) Y^G

[G11] [G10] (G-6)
Y^G

[G12] [G9] [G10] (G-6)
Y^G

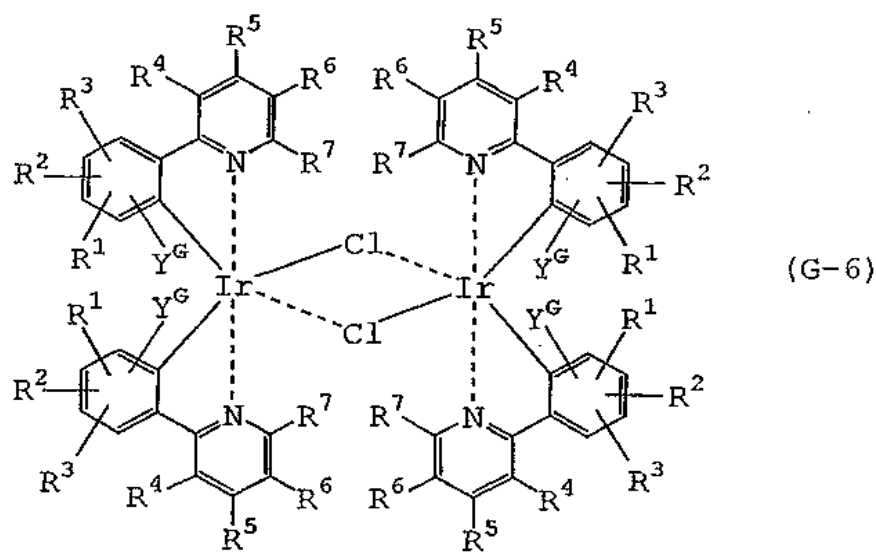
[G13] (G-7) 17가 L



(, X^G , R¹~R⁷ , 1~20 ,)

[G14] [G13] , (G-7) X^G ,

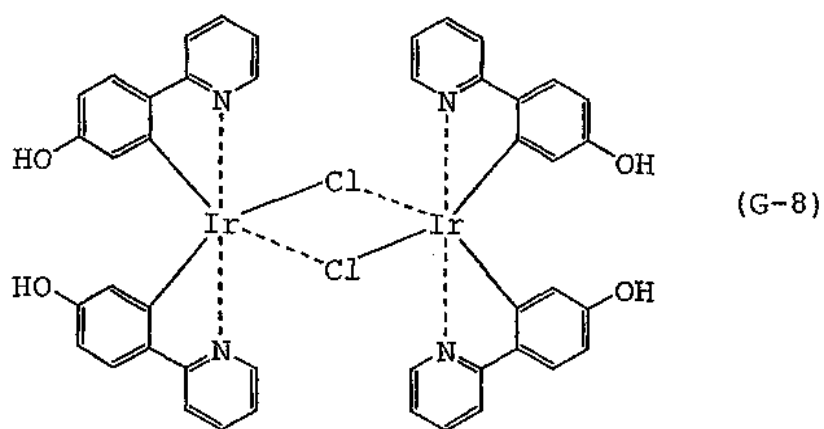
[G15] (G-6)



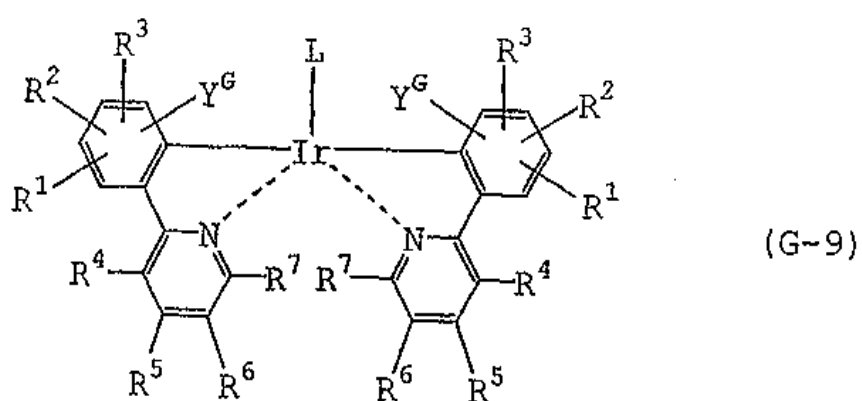
(, X^G , R¹~R⁷ , 1~20 ,)

[G16] [G15] , (G-6) Y^G ,

[G17] (G-8)

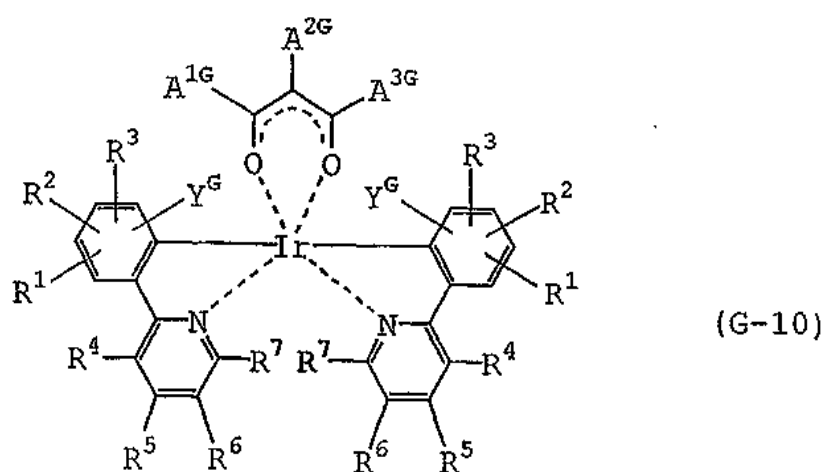


[G18] (G-9)



(, L 17) , Y^G , R¹ ~ R⁷ 1
1~20)

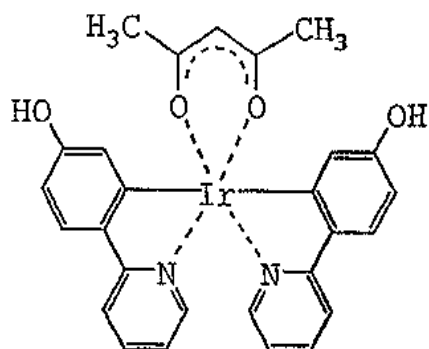
[G19] (G-10)



(, A^{1G} , A^{2G} , A^{3G} , Y^G , R¹ ~ R⁷ 1
1~20)
1~20)

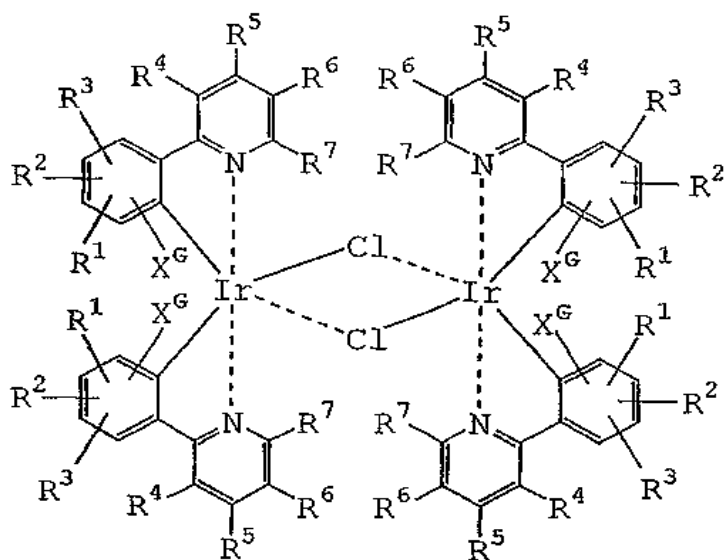
[G20] [G18] [G19] , (G-9) (G-10) Y^G

[G21] (G-11)



(G-11)

[G22] (G-7)



(G-7)

(, X^G , R¹ ~ R⁷ , 1~20 ,)

[G23] [G22] , (G-7) X^G ,

[G24] [G1]~[G7]

[G25] [G1]~[G7]

[G26] [G1]~[G7]

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가

가

1,1'- (3- -4,4'-) , α -NPD(4,4'-) [N-(1-)-N- TPD(N,N'- -N,N'-(3-)-]) m-MTDATA(4,4',4'-)- CBP(4,4'-N,N'-) 가

(N-) TPD, α -NPD, m-MTDA

A CPD
8-157575

[5-(p-tert-)-1,3,4- -2-] PBD(2- -4- -5-(4-tert-)-1,3,4-) Alq₃ () OXD-7(1,3- , TAZ(3- -4- -5-(4-tert-)-4- -4H-1,2,4-)

PBD(가 PBD 10-1665) Alq₃, OXD-7 TAZ 가

0~100 %가 , 10~70 %가 , 20~50 /
%가 , 0~200 %가 , 20~150 /
40~100 %가 , %가

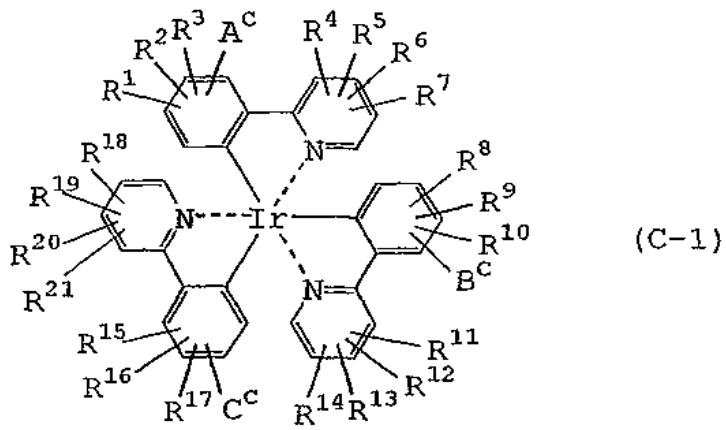
, PMMA(()),

%가 , 0~20 %가 , 0~10 %가 0~40

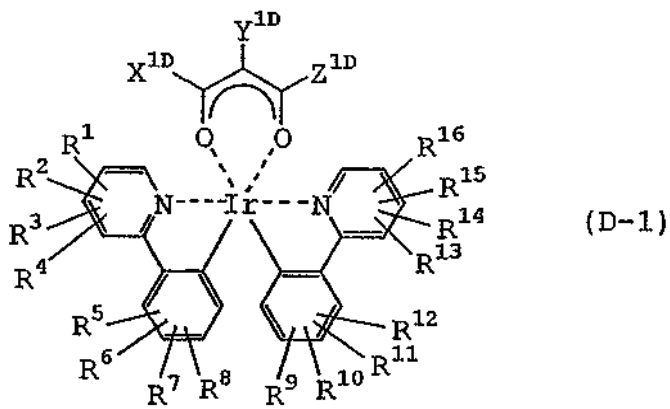
(C-1), (D-1), (E-1), (F-1) (G-1)

가

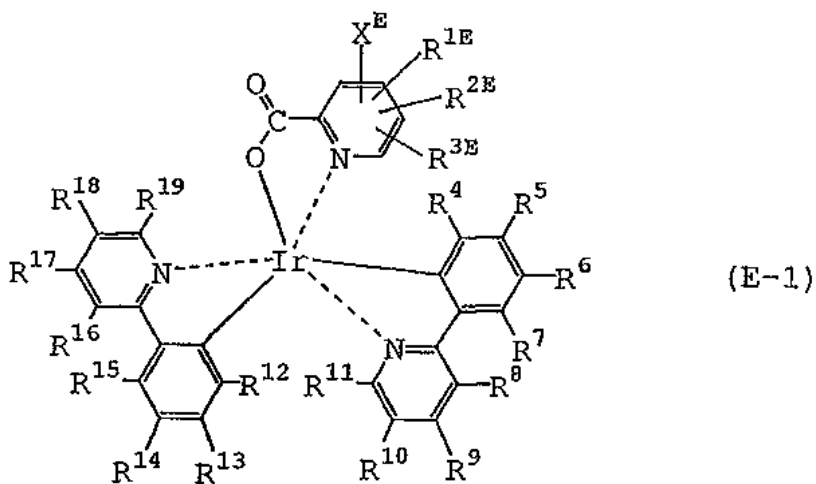
가



(C-1) , A^C, B^C C^C 1 , A^C, B^C 1
 C C C , 1~20 , R¹~R²¹ , 1~20
 , , , 1



(D-1) , X^{1D}, Y^{1D} Z^{1D} 1 , X^{1D}, 1~20
 Y^{1D} Z^{1D} , 1
 . R¹~R¹⁶ , 1~20
 1



(E-1)

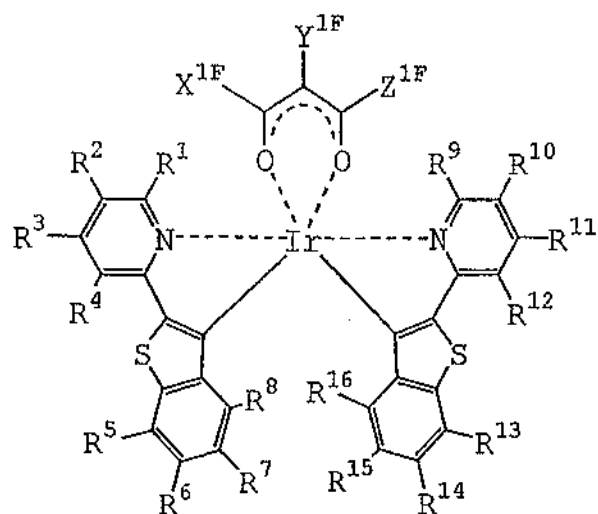
, X^E, R^{1E}, R^{2E}, R^{3E}

1~20

, R⁴~R¹⁹

1

1~20

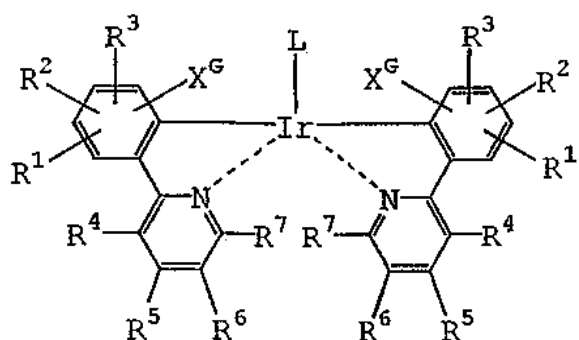


(F-1)

(F-1) , X^{1F}, Y^{1F}, Z^{1F} 1
 Y^{1F} Z^{1F} ,
 1 , R¹~R¹⁶ 1
 1~20

1

1~20

, X^{1F},
1~20

(G-1)

(G-1) , L 1가
 , R¹~R⁷ 1~20

1~20

, X^G

1

(C-1)~(G-1)

(C-1)

(C-1) A^C, B^C, C^C

()

() 가
 2-, 3-, 4- 5-

가

(C-1)~(C-5) (C-8)~(C-11) , '1

1~20

20
가

1~

(C-1) , A^C, B^C C^C, R¹~R²¹

tert-

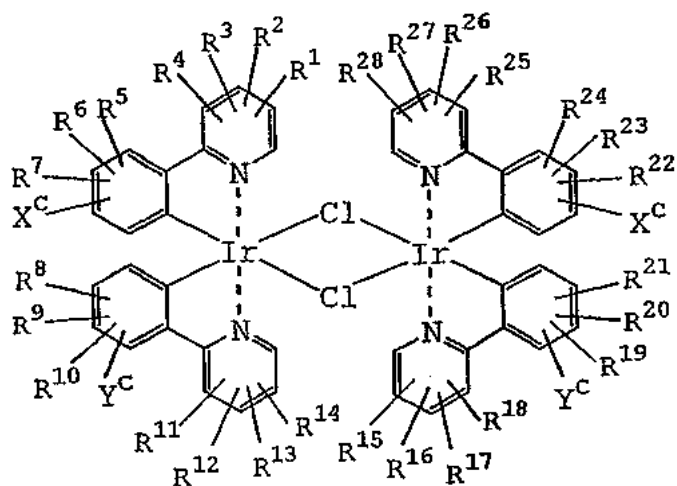
가

(C-1)

1

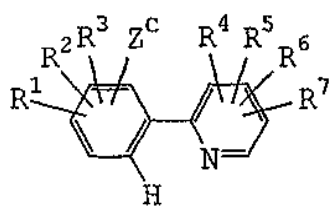
(C-8)

(C-9)



(C-8)

(, X^C Y^C , 1~20 , R¹~R²⁸)



(C-9)

(, Z^C , 1~20 , R¹~R⁷)

1~20

(C-8)

X^C Y^C ,

(C-9)

Z^C 1

(C-8)

(C-8)

(S. Lamansky et al., Inorganic Chemistry, 40, 1704(2001))

R¹~R²⁸

rt-

tert-

가

(C-8)

X^C Y^C ,

(C-9)

Z^C 1

(C-9)

 $R^1 \sim R^7$

tert-

가

()

가

()

가

1
(C-9)

(C-8)

 Z^C $X^C \quad Y^C$

1

 $X^C \quad Y^C$

2

(C-9)

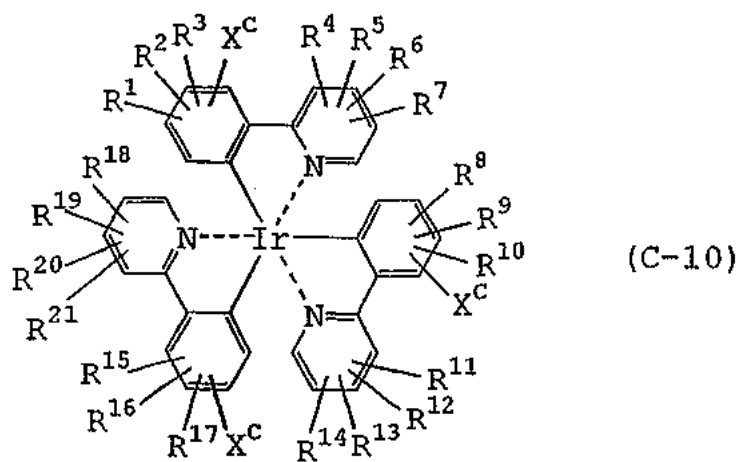
(C-8)

 Z^C

(C-1)

2

(C-10)

 X^C

1

 $R^1 \sim R^{21}$

1~20

(C-10)

 X^C
(C-10)

가

가

2

(C-10)

1:(0.5~1.5)

/

1:1 가

가 1:2 가

1:(1.5~2.5)

가 1:3 가

1:(2.5)

가 1:(3)

가

가

2

(C-1) (C-9) (III) (2-)

3~5,000

(D-1)

(D-1) X^{1D}, Y^{1D} Z^{1D} 가

가 ()

) 가 (

0 (D-1), (D-2), (D-14) (D-17)~(D-23) , '1 1~2

1~20 가

(D-1), (D-2), (D-14) (D-18)~(D-23) , X^{1D}, Y^{1D} Z^{1D} Q^{1D}, Q^{2D} Q^{3D}

Q^{1D} ~Q^{3D} , tert-

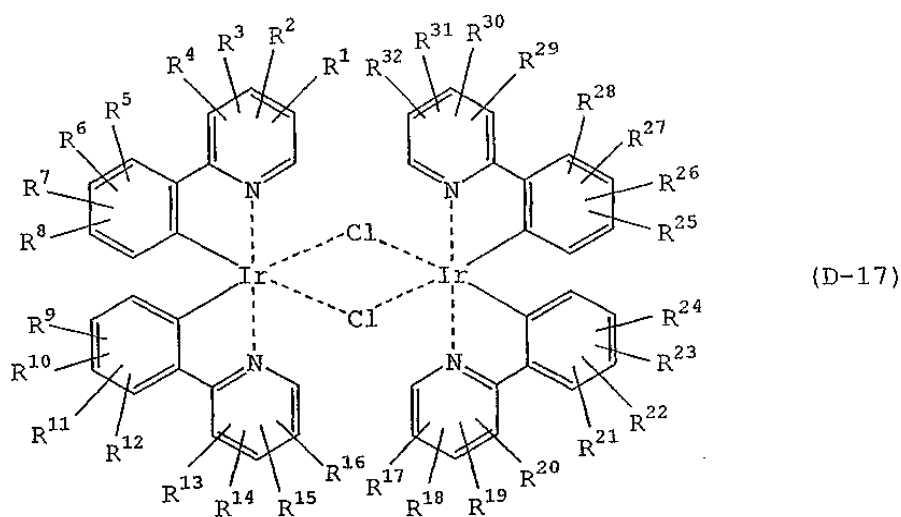
tert-

(D-1), (D-17) (D-20) R¹ ~R¹⁶ R¹⁷ ~R³² ,

tert-

(D-1)

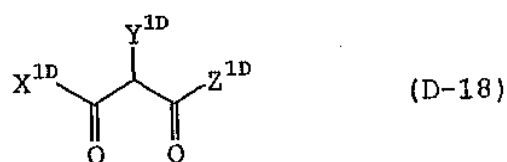
1 (D-17) (D-18)



, R¹ ~ R³²

1~20

1



, X^{1D}, Y^{1D} Z^{1D} 1

X^{1D}, Y^{1D} Z^{1D} 1~20

(D-17)

(D-17)

(S. Lamansky et al., Inorganic Chemistry, 40, 1704 (2001))
R¹ ~ R³²

, tert-

가

(D-18)

X^{1D}, Y^{1D} Z^{1D} 1
(D-18)
(D-1)

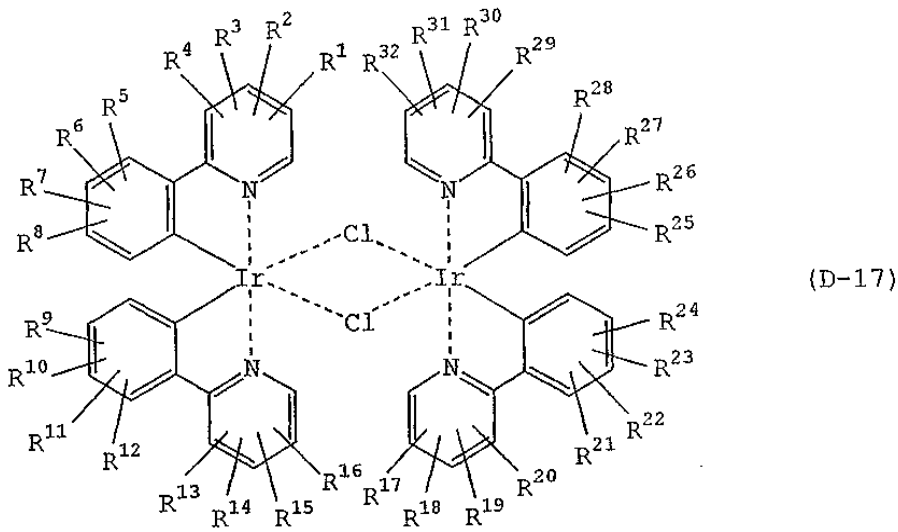
X^{1D}, Y^{1D} Z^{1D} (D-

(D-1)

2

(D-17)

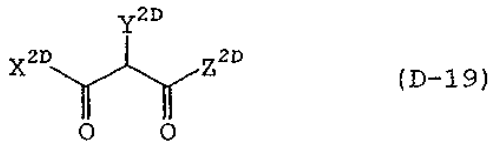
(D-



, R¹ ~ R³²

1-20

1



, X^{2D}, Y^{2D}, Z^{2D} 1

1-20

X^{2D}, Y^{2D}, Z^{2D}

(D-19)

X^{2D}, Y^{2D}, Z^{2D} 1

(D-19)

, X^{2D}, Y^{2D}, Z^{2D}

, tert-

tert-

가

(D-19)

(D-19)

X^{2D}, Y^{2D}, Z^{2D}

(D-17)

가
R¹ ~ R³²

2

가

가

가

()

()

가

가

(D-1)
가

, O-C-C-C-O

(E-1)

(E-1) X E
가

()

()

가

가

3-, 4-, 5- 6-

(E-1) (E-9)~(E-12) , '1

1~20

1~20
가

(E-1) R^{1E}, R^{2E} R^{3E}
, tert-

ert-

가

(E-1) R⁴~R¹⁹

, tert-
tert-

가

1~20

가

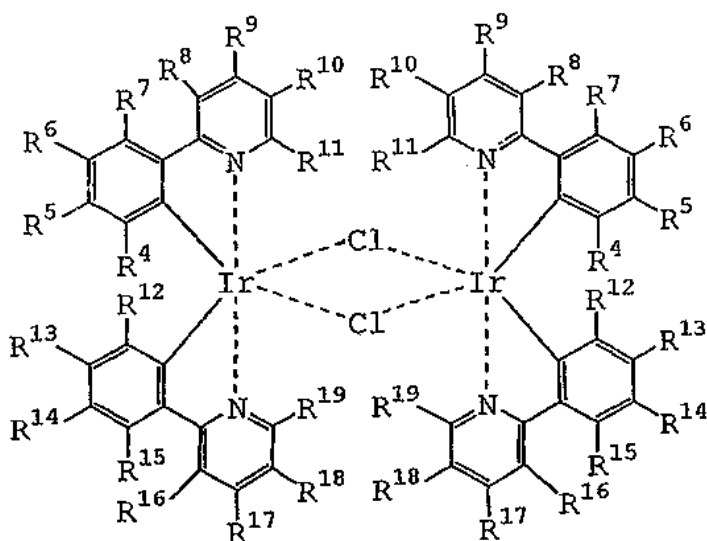
(E-1)

(E-1)

1

(E-9)

(E-10)

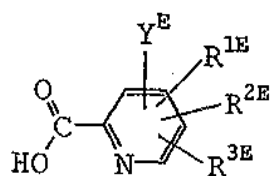


(E-9)

, R⁴~R¹⁹

1~20

1



(E-10)

$$Y^E, R^{1E}, R^{E2}, R^{3E}, \dots, 1$$

(E-9) (S. Lamansky et al., Inorganic Chemistry, 40 , 1704 (2001))

(E-9) $R^4 \sim R^{19}$

tert-

1~20

(E-10) $Y \in$

가 . , 가 . ,

$$(E-10) \quad R^{1E}, R^{2E}, R^{3E}$$

ert- , tert- , 가 1~20 가 .

(E - 9)

(E - 10)

$$(E-10) \quad Y^E$$
$$\begin{array}{c} Y \ E \ \text{가} \\ Y \ E \ \text{가} \\ (E-19) \end{array}$$
$$R^4 \sim R^{19}$$

가 ,
(R-COCl)가

가

()

가

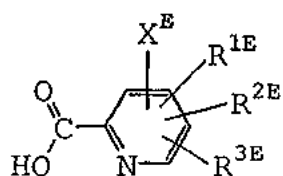
가

(E - 1)

2

(E - 9)

(E - 11)



(E-11)

X^E , R^{1E} , R^{E2} , R^{3E} , $1 \sim 20$

)

$$(E-11) \quad \begin{aligned} & \text{가 } \cdot \quad , \quad , \quad - \\ & \quad , \quad , \quad , \quad , \end{aligned}$$

(E-11) $R^{1E}, R^{2E}, R^{3E}, \dots, R^{nE}$ 가 t 에 대한 함수로 주어질 때, R^E 는 $R^E = (R^{1E}, R^{2E}, R^{3E}, \dots, R^{nE})$ 로 정의된다.

(F - 1)

(F-1) X^{1F}, Y^{1F}, Z^{1F} 가

가

()

가

()

가

(F-1), (F-2), (F-12) (F-15)~(F-21) , '1 1~20
가 1~20
가

(F-1), (F-2), (F-12) (F-15)~(D-21) X^{1F}, Y^{1F} Z^{1F} Q^{1F}, Q^{2F} Q^{3F}
 , tert- , , , , , ,
 tert- , , , , , , 가
 , , , 1~20 가 .

(F-1), (F-15) (F-18)

R⁻¹ ~ R⁺¹⁶

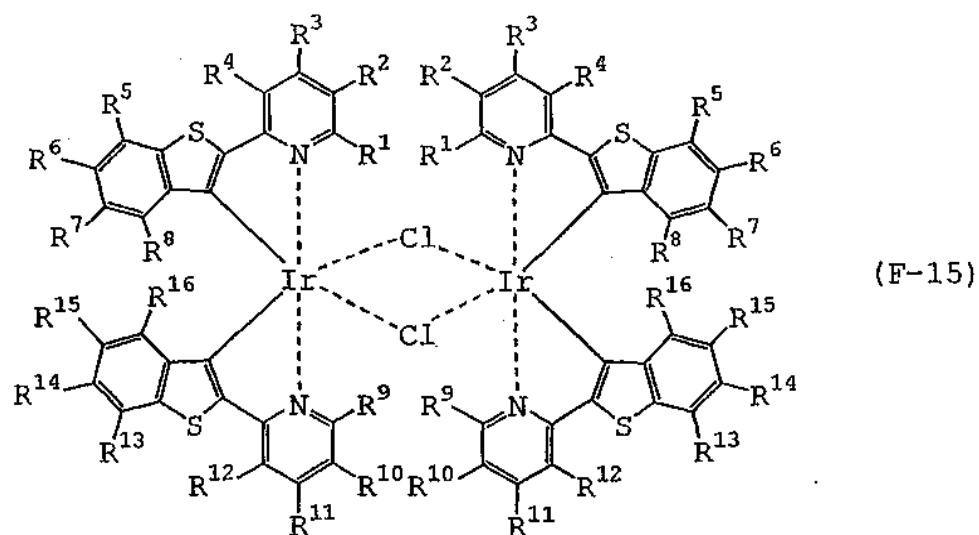
tert-

tert-

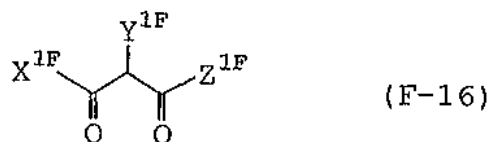
1~20 가 .

(F-6) (F-9) 'A' , ,
3~20 . ,
, 가 . ,
, (F-11) . ,

$$1 \quad (F-15) \quad (F-16)$$



, R¹ ~ R¹⁶ , 1~20 , , , , , 1



, X^{1F}, Y^{1F}, Z^{1F} 1 , , 1 , X^{1F}, Y^{1F}, Z^{1F} 1~20

(F-15)

(F-15)

(S. Lamansky et al., Inorganic Chemistry, 40, 1704 (2001))
R¹ ~ R¹⁶

tert-
tert-

1~20

가

(F-16)

X^{1F}, Y^{1F}, Z^{1F} 1

(F-16)

X^{1F}, Y^{1F}, Z^{1F}

(F-1

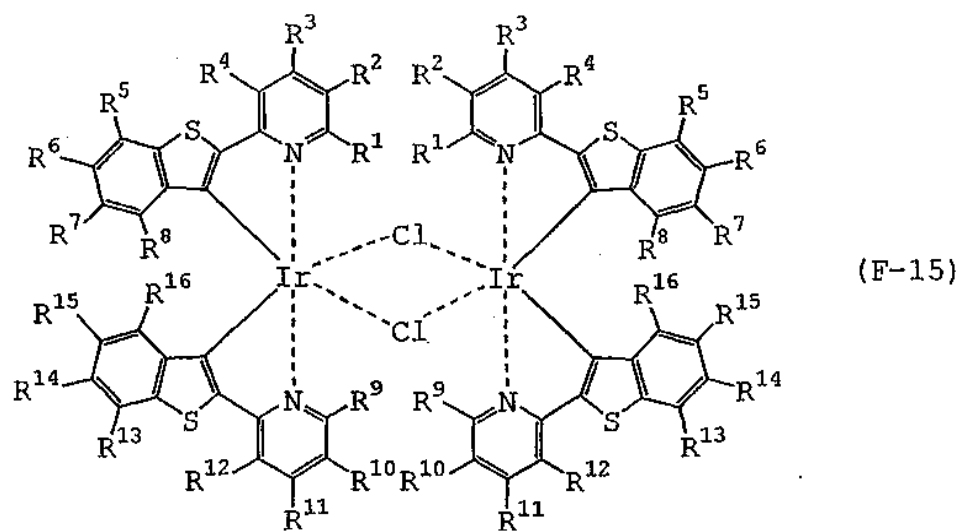
(F-1)

(F-1)

2

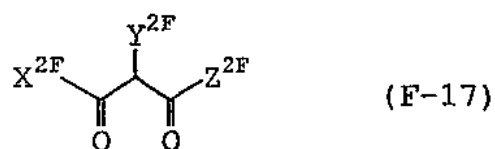
(F-15)

(F-17)

, R¹ ~ R¹⁶

1~20

1

, X^{2F}, Y^{2F}, Z^{2F} 1X^{2F}, Y^{2F}, Z^{2F} 1~20

(F-17)

X^{2F}, Y^{2F}, Z^{2F} 1

가

가

(F-19)

X^{2F}, Y^{2F}, Z^{2F}

tert-

가

(F-17)

(F-17)

X^{2F}, Y^{2F}, Z^{2F} 가

가

X^{2F}, Y^{2F}, Z^{2F} 가
(R-COCl)가X^{2F}, Y^{2F}, Z

2F 가

(F-1)

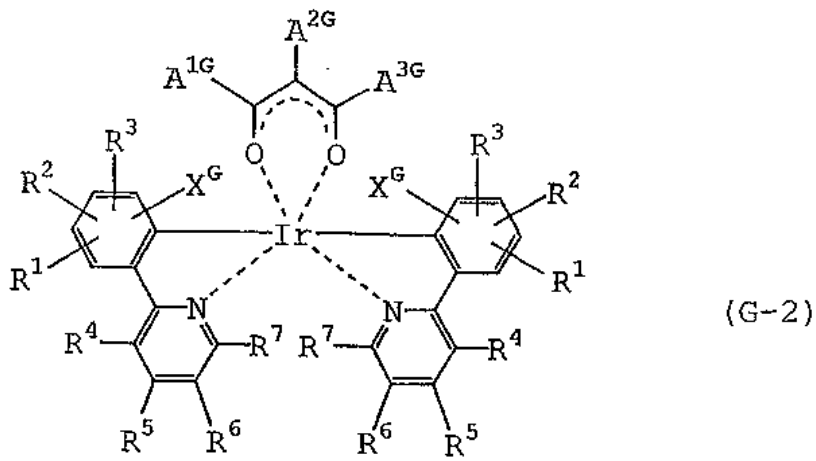
2

(F-15)

R¹ ~ R¹⁶

가

, 가
 , 가
 , () , 가
 , () 가
 ,
 .
 .
 , (F-1) , O-C-C-C-O
 가
 (G-1)
 (G-1) L 1가 , 1가
 가 , β - 1 1가
 2 1가 1가
 1가 2 1가
 5 6 , 2 1가
 2- , β - , N- , 8- 1
 1가 , β - , N-
 1 1가
 .
 (G-1) X G , 가
 , 가
 , 가
 , () , 가
 , () 가
 , 가
 3-, 4-, 5- 6-
 (G-1), (G-2), (G-6), (G-7), (G-9) (G-10) '1
 1~20
 1~20
 가
 (G-1) R¹ ~R⁷ , , , , tert-
 , , , , tert-
 , 가 1~20 가
 (G-1) 2 2 R¹ ~R⁷
 .
 (G-1) , L 1가 (G-2) 가 β - 1



, A^{1G}, A^{2G}, A^{3G}
1~20

, X^G

1

, R¹~R⁷

1

1~20

(G-2)

A^{1G}, A^{2G}, A^{3G}

tert-

, tert-

가

(G-2)

, X^G R¹~R⁷

(G-1)

(G-1)

O-C-C-C-O

가

(G-1)

(G-1)

1

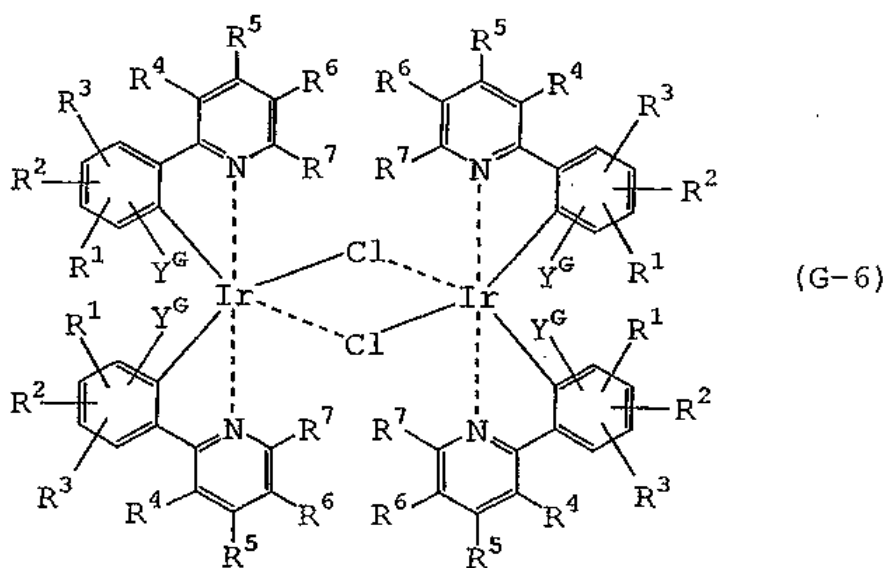
1

(G-6)

17가

가

1



, Y^G, R¹ ~ R⁷, 1, 1~20

(G-6) (S. Lamansky et al., Inorganic Chemistry, 40, 1704 (2001))

(G-6) Y^G, Y^G, Y^G, Y^G, 17가 L, Y^G

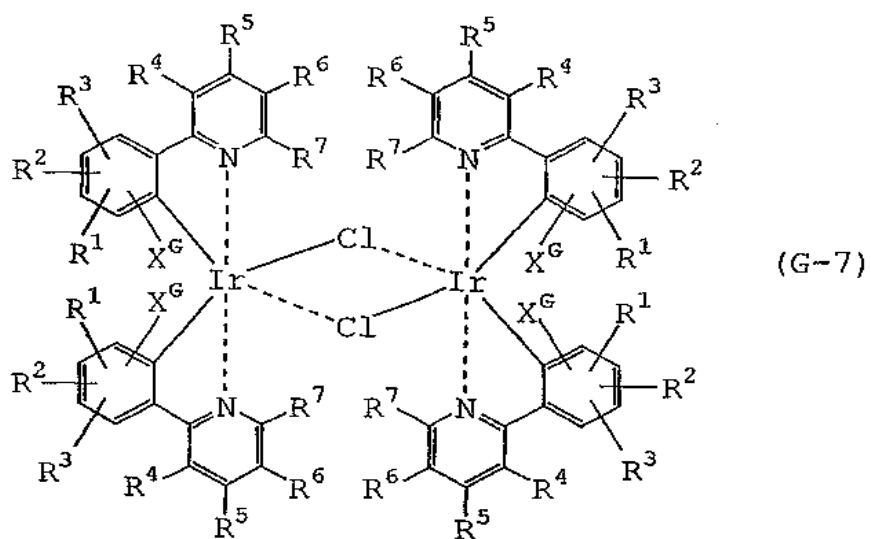
(G-6) R¹ ~ R⁷ (G-1) (G-1), 4, R¹ ~ R⁷

1, N-, 1가, 8-, 가, 2-, β-

(G-6) 1, 17가, Y^G, Y^G, (G-6), (G-6) R¹ ~ R⁷

가, 가, 가, 가, (), 가, 가, 가, 가

(G-1) 1, 2, 1가, (G-7) 가



X^{G} , $\text{R}^1 \sim \text{R}^7$, 1~20 ,
 (G-7) , X^{G} (G-1) . R
 1~R⁷

1 , N- 17가 , 8- 가 가 2- , β -

가

가 가

Alq₃ ()

()

1

가

가

가

가

10nm~1 μ m

10nm~10 μ m,

Alq₃ (),

10nm~10 μ m,

10nm~1 μ m

ITO(),

1~50 Ω /□(/)가

50~300nm가

가

, Al, Mg-Ag , Ca

, Al-Ca Al

가
가

10nm~1 μ m

, 50~500nm가

0.1~10nm

가

가

, PET()

가

< >

1) ^1H -NMR

JNM EX270(JEOL, Ltd.)

270MHz

: -d₁ -d₆

2) GPC ()

: Shodex KF-G + KF804L + KF802 + KF801

: (THF)

: 40

: RI(Shodex RI-71)

3)

Model CHNS-932(LECO)

4) ICP

ICPS 8000()

< >

()

1: Ir(3-MA-PPy)(3-PrCO-PPy)₂

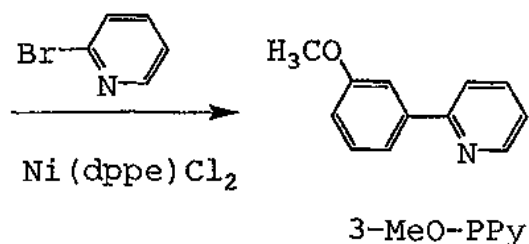
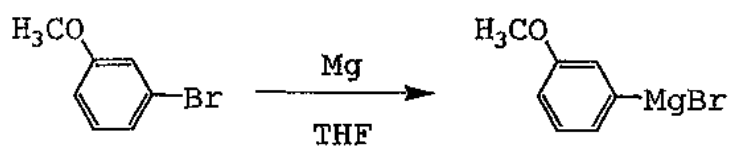
(1) 2-(3-) (3-MeO-PPy)

, 3- 22.4g(120mmol) (3- (THF) 3.4g
 . THF 2- 15.8g(100mmol) (1,2- ()-) (II)
 (Ni(dppe)Cl₂) 1.8g 가 , 50 1 .
 5% 250ml 가 ,
 . 2-(3-) (3-MeO-PPy) 17.4g(93.9mmol) . CHN
 ^1H -NMR .

^1H -NMR(CDCl₃, ppm): δ 8.68(d, 1H), 7.72(m, 2H), 7.59(s, 1H), 7.54(d, 1H), 7.37(t, 1H), 7.22(d, 1H), 6.97(d, 1H), 3.89(s, 3H)

Calcd: C 77.81, H 5.99, N 7.56

Found: C 77.44, H 6.01, N 7.53



(2) , 3-MeO-PPy () (III)(Ir(acac)₃)
 , [2-(3-)] (III)(Ir(3-MeO-PPy)₃)

, 3-MeO-PPy 5.00g(27.0mmol) Ir(acac)₃ 2.0g(4.1mmol) 200ml 250 9
 , Ir(3-MeO-PPy)₃ 0.400g(0.54mmol)

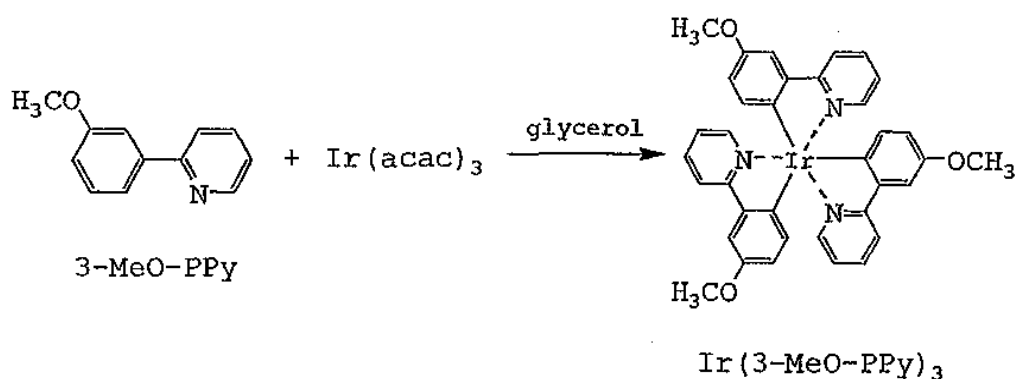
8 Ir(3-MeO-PPy)₃ 3.20g(4.32mmol)

¹H-NMR CHN

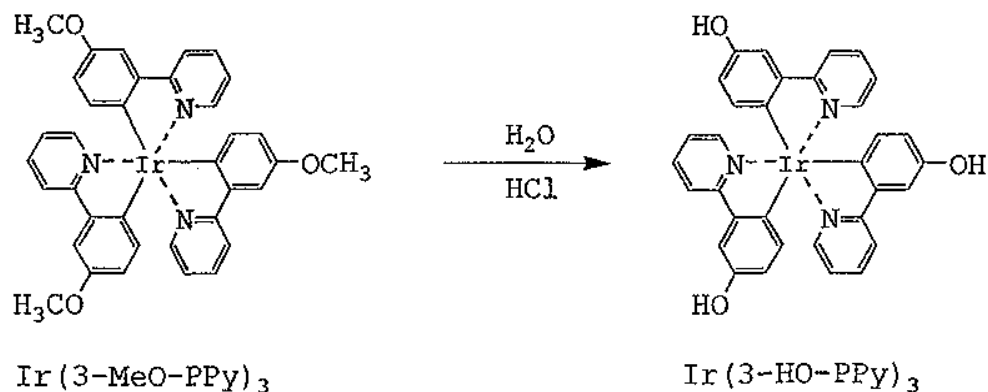
¹H-NMR(CDCl₃, ppm): δ 7.82(d, 3H), 7.56(t, 3H), 7.53(s, 3H), 7.25(d, 3H), 6.84(t, 3H), 6.67(d, 3H), 6.60(d, 3H), 3.80(s, 9H)

Calcd: C 58.05, H 4.06, N 5.64

Found: C 57.60, H 4.17, N 5.57



(3) Ir(3-MeO-PPy)₃ 가
 [2-(3-)] (III)(Ir(3-HO-PPy)₃)

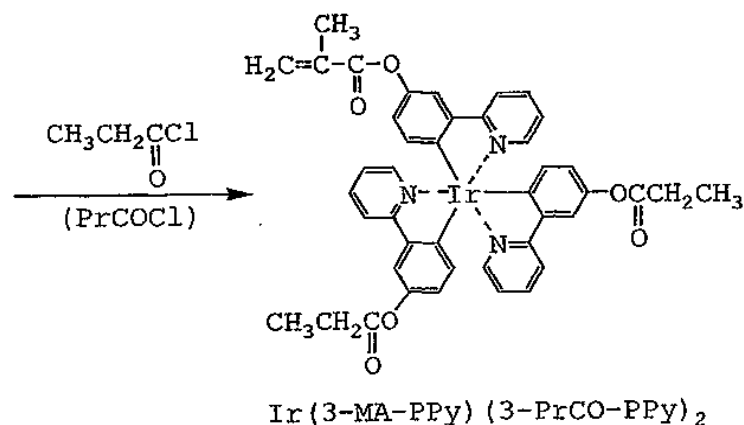
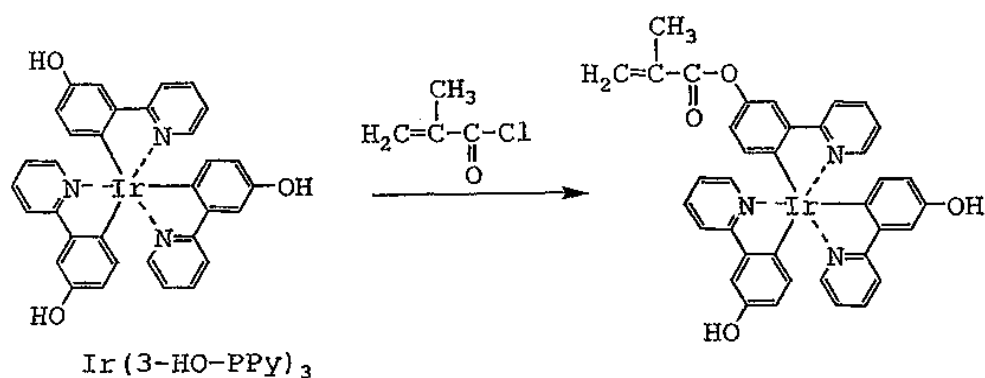


(4) , Ir(3-HO-PPy)_3 1:1 ,
 $\text{Ir(3-MA-PPy)(3-HO-PPy)}_2$,
 (PrCOCl) $\text{Ir(3-MA-PPy)(3-PrCO-PPy)}_2$,
 , THF 32ml, Ir(3-HO-PPy)_3 2.81g(4mmol) 2.40g(23.6mmol)
 , THF 16ml 0.424g(4mmol) 30 ,
 20 5 THF 16ml 1.48g(16mmol)
 30 20 5 ,
 가 , ,
 , / 2 , Ir(3-MA-P
 Py)(3-PrCO-PPy)_2 2.305g(2.60mmol) . $^1\text{H-NMR}$ CHN .

$^1\text{H-NMR}(\text{CDCl}_3, \text{ppm}): \delta$ 7.82(m, 3H), 7.56(m, 3H), 7.26(m, 3H), 6.84(m, 3H), 6.67(m, 3H), 6.61(m, 3H), 6.35(s, 1H), 5.74(s, 1H), 2.067(q, 4H), 2.08(s, 3H), 1.42(t, 6H)

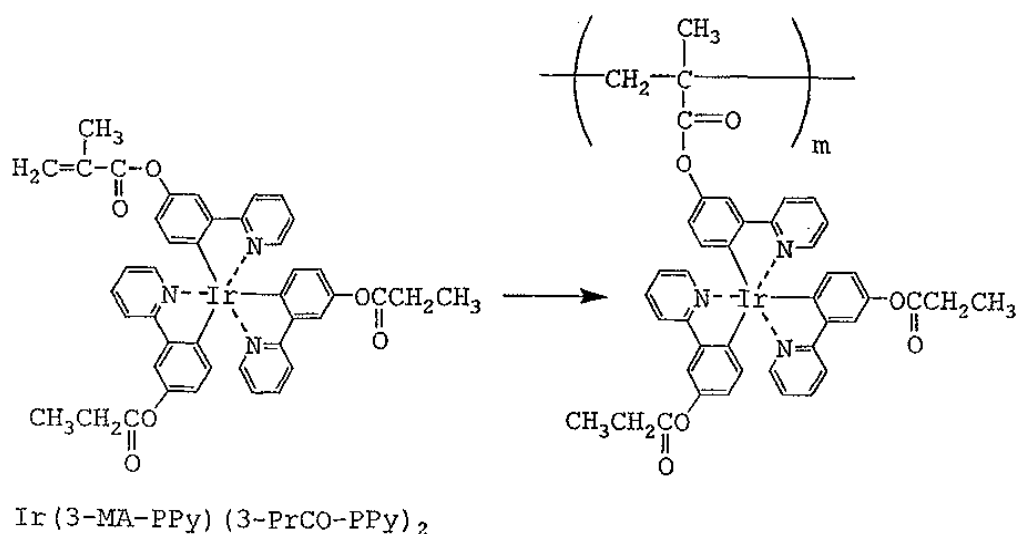
Calcd: C 58.49, H 4.11, N 4.76

Found: C 58.13, H 4.10, N 4.72



2: $\text{Ir}(3\text{-MA-PPy})(3\text{-PrCO-PPy})_2$

1.85g (AIBN) 0.010g(0.061mmol) $\text{Ir}(3\text{-MA-PPy})(3\text{-PrCO-PPy})_2$ 2.22g(2.5mmol), 2,2'- (80
10 (). 30ml , , 2
C, H N Ir $\text{Ir}(3\text{-MA-PPy})(3\text{-PrCO-PPy})_2$
)₂ (HFIP(
GPC) 8,000



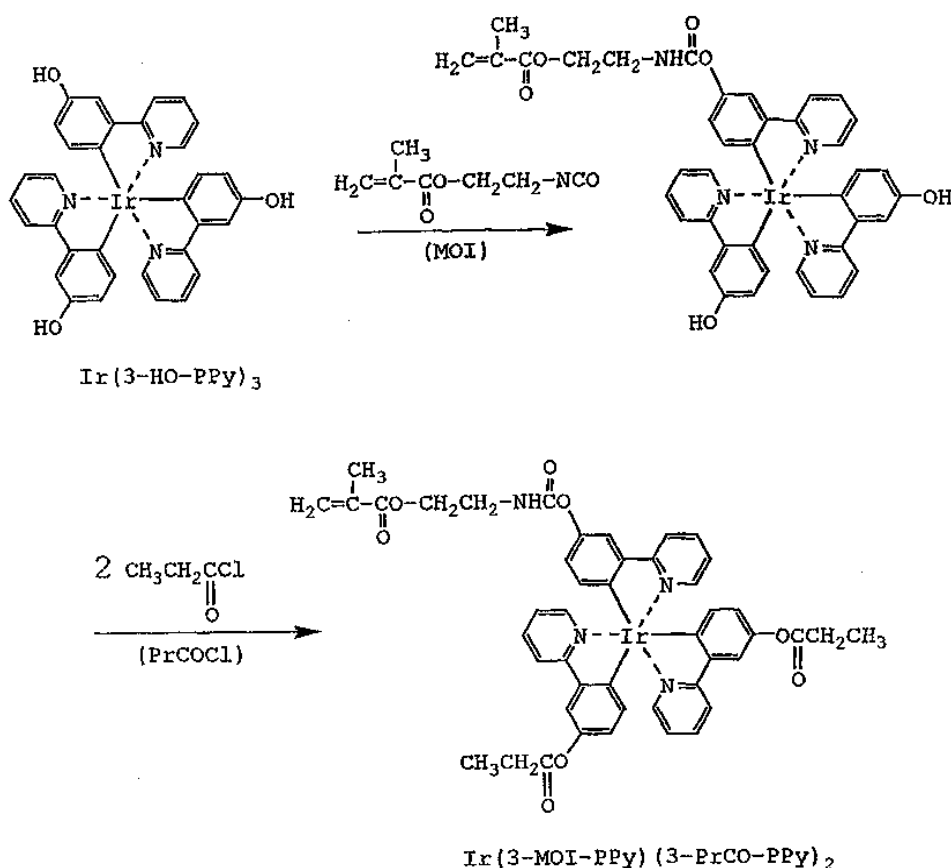
1
'Karenz MOI', Showa Denko K. K. , Ir(3-HO-PPy)₃ 2-
'MOI' , Ir(3-MOI-PPy)(3-PrCO-PPy)₂ 1:1 () ()

THF 32ml, Ir(3-HO-PPy)₃ 2.81g(4mmol) MOI 0.636g(4mmol)
(IV) 20 5
.400g(24.5mmol) 가 THF 16ml 1.48g(16mmol)
30 , 20 5
Ir(3-MOI-PPy)(3-PrCO-PPy)₂ 2.62g(2.70mmol)
1 H-NMR CHN

1 H-NMR(CDCl₃, ppm): δ 7.82(m, 3H), 7.56(m, 6H), 7.26(m, 3H), 6.84(m, 3H), 6.67(m, 3H), 6.61(m, 3H), 6.14(s, 1H), 5.61(s, 1H), 5.23(br, 1H), 4.29(t, 2H), 3.58(m, 2H), 2.66(q, 4H), 1.95(s, 3H), 1.41(t, 6H)

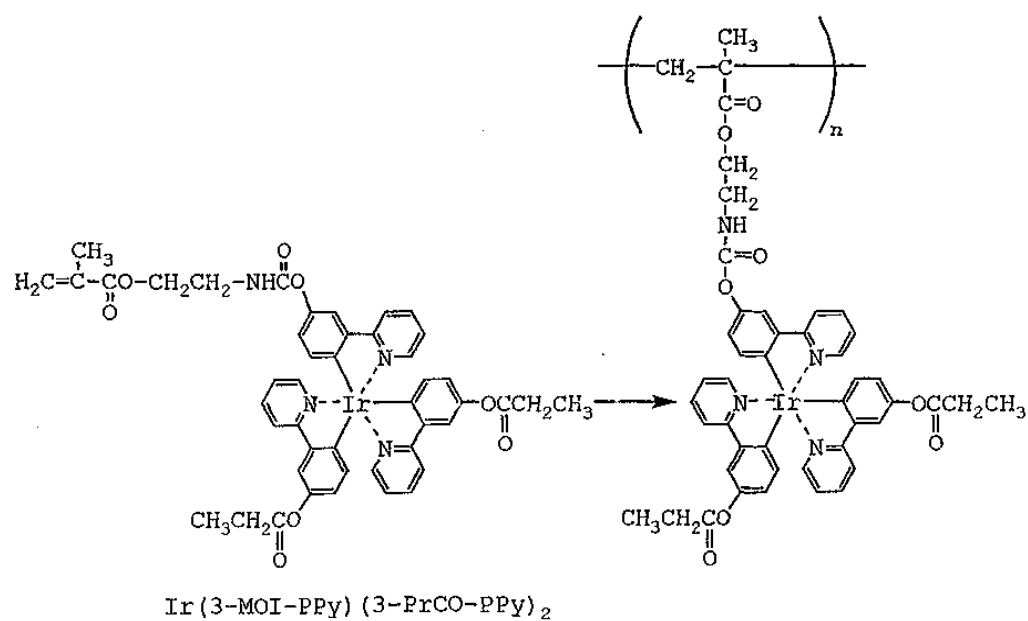
Calcd: C 56.95, H 4.26, N 5.78

Found: C 56.58, H 4.25, N 5.72

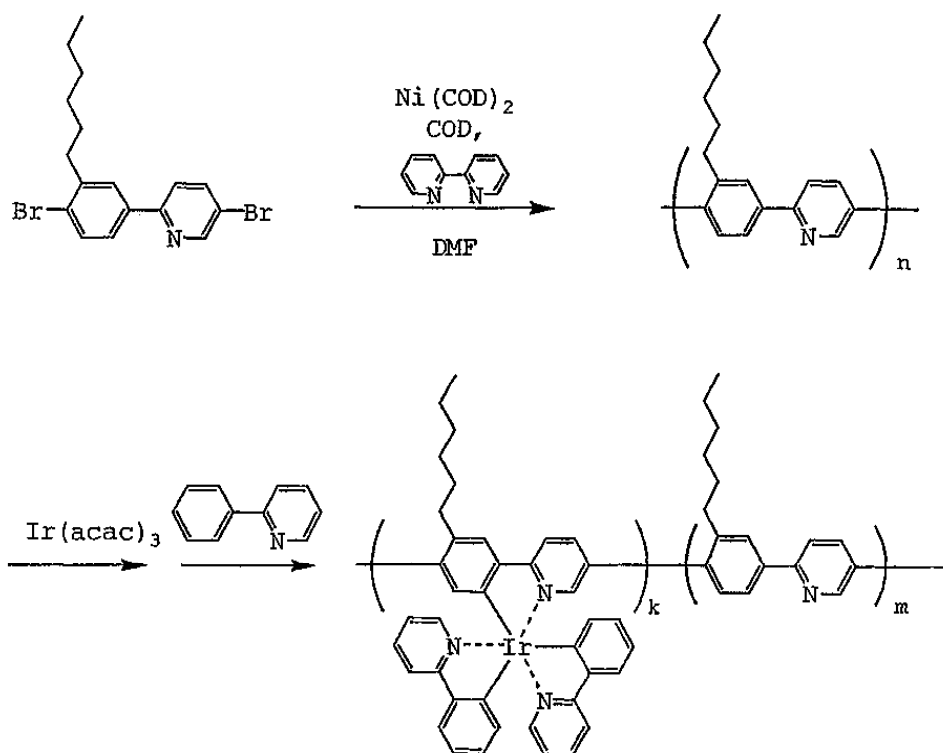


4: Ir(3-MOI-PPy)(3-PrCO-PPy)₂

3 Ir(3-MOI-PPy)(3-PrCO-PPy)₂ 2.43g(2.5mmol), 2,2'-
(AIBN) 0.010g(0.061mmol) 30ml , () 80
10 ()
2 2.05g C, H N Ir
Py)₂ HFIP(GPC) 18,000
Ir(3-MOI-PPy)(3-PrCO-PPy)
Ir(3-MOI-PPy)(3-PrCO-PPy)
()



5: (HPPy) Ir/PPy
 (COD) N,N- 2,2'- , 5- -2-(4- -3-) (HPPyBr₂) 1.98g(5.00mmol)
 (DMF) 10ml (0)(Ni(COD)₂),
 (HPPy)
 , HPPy 0.625g(4mmol) Ir(acac)₃ 0.099g(0.2mmol) m- , 250 10
 (PPy) 0.062g(0.4mmol) 가 , 250 10
 DMF ,
 (HPPy) Ir/PPy 0.564g , C, H N
 Ir () GPC) 23,000 (HFI
 P()



6~8:

가

2, 4 5
(3-PrCO-PPy)₂ 3 (HPPy) Ir/PPy, Ir(3-MA-PPy)(3-PrCO-PPy)₂, Ir(3-MOI-PPy)
(PEDOT, Bayer AG) 500 5 % ITO (ITO
5mm×5mm 1000 80 10 가
, PEDOT/ITO
3 (2) /PEDOT/ITO PBD(2-(4-)-5-(4-tert
)-1,3,4-) 500 , 2) 1/1
0 Ag/Mg 1,000 , 6 ()
가

Advantest 가 TR6143
Topcon BM-8
DC 가 , 10V 10V 240
1 (2).

1 2 : 가

6, 7 8 3 5 % HFIP 2 1
Ir(3-MeO-PPy)₃ PMMA(()) 5 %
6, 7 8 4 (2)
6, 7 8 DC 가 , 10V, 11V
12V 240 2 ()
12V 2).

[1]

		10V (Cd/m ²)
--	--	--------------------------

		(V)		240
6	Ir(3-MA-PPy)(3-PrCO-PPy) ₂	5	1280	1180
7	Ir(3-MOI-PPy)(3-PrCO-PPy) ₂	6	1450	1250
8	(HPPy) Ir/PPy	3	730	680

[2]

	(Ir(3-MeO-PPy) ₃ /PMMA ())	(V)	12V (Cd/m ²)	
				240
1	1/5	10	150	70
2	1/2	11	120	50

9 :
가

3 4 , Ir(3-MOI-PPy)(3-PrCO-PPy)₂ (N-)
% Ir(3-MOI-PPy)(3-PrCO-PPy)₂ 70 % (N-)
) 30 % 6, 7 8 3 5
% HFIP 6, 7 8 2
1,860cd/m² 6, 7 8 DC 가 , 5V , 12V
2 12V 240 1,690cd/m² ().

10 :
가

4 , Ir(3-MOI-PPy)(3-PrCO-PPy)₂ PBD 4 %
Ir(3-MOI-PPy)(3-PrCO-PPy)₂ 70 % PBD 30 %
(PEDOT, Bayer AG) 500
ITO 가 (ITO) 5mm×5mm , 80
10 , PEDOT/ITO 1000
, 2 Ag/Mg(: 9/1) 1,000
가
DC 가 , 6V , 12V 1,580cd/m² , 12V
240 1,340cd/m² (2).

11:
가

4 , Ir(3-MOI-PPy)(3-PrCO-PPy)₂ 10-1665
PBD 3 % Ir(3-MOI-PPy)(
3-PrCO-PPy)₂ 70 % PBD 30 % 10
PBD 5 % 10
5V , 12V 1,710cd/m² 6, 7 8 DC 가 ,
1,580cd/m² (2) 12V 240

12: Ir(3-MA-PPy)₃

1 Ir(3-MeO-PPy)₃ 가
(3-) (III)Ir(3-HO-PPy)₃ (

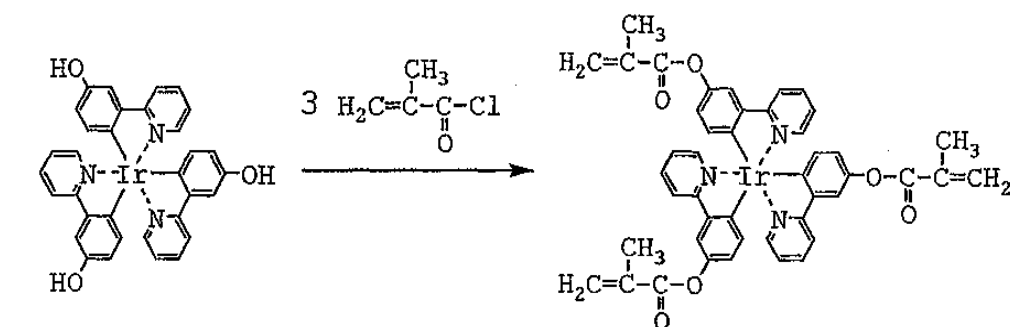
, Ir(3-HO-PPy)₃ 1:3
Ir(3-MA-PPy)₃ ,

, THF 32ml, Ir(3-HO-PPy)₃ 2.81g(4mmol) 2.40g(23.6mmol)
, THF 32ml 1.293g(12.2mmol) 90
20 5
Ir(3-MA-PPy)₃ 2.805g(3.08mmol) / 2
1 H-NMR CHN

¹H-NMR(CDCl₃, ppm): δ 7.82(d, 3H), 7.58(t, 3H), 7.55(s, 3H), 7.26(d, 3H), 6.86(t, 3H), 6.67(d, 3H), 6.63(d, 3H), 6.36(s, 3H), 5.74(s, 3H), 2.09(s, 9H)

Calcd: C 59.59, H 4.00, N 4.63

Found: C 59.21, H 3.98, N 4.58

Ir(3-HO-PPy)₃Ir(3-MA-PPy)₃13: Ir(3-MOI-PPy)₂ (3-PrCO-PPy)

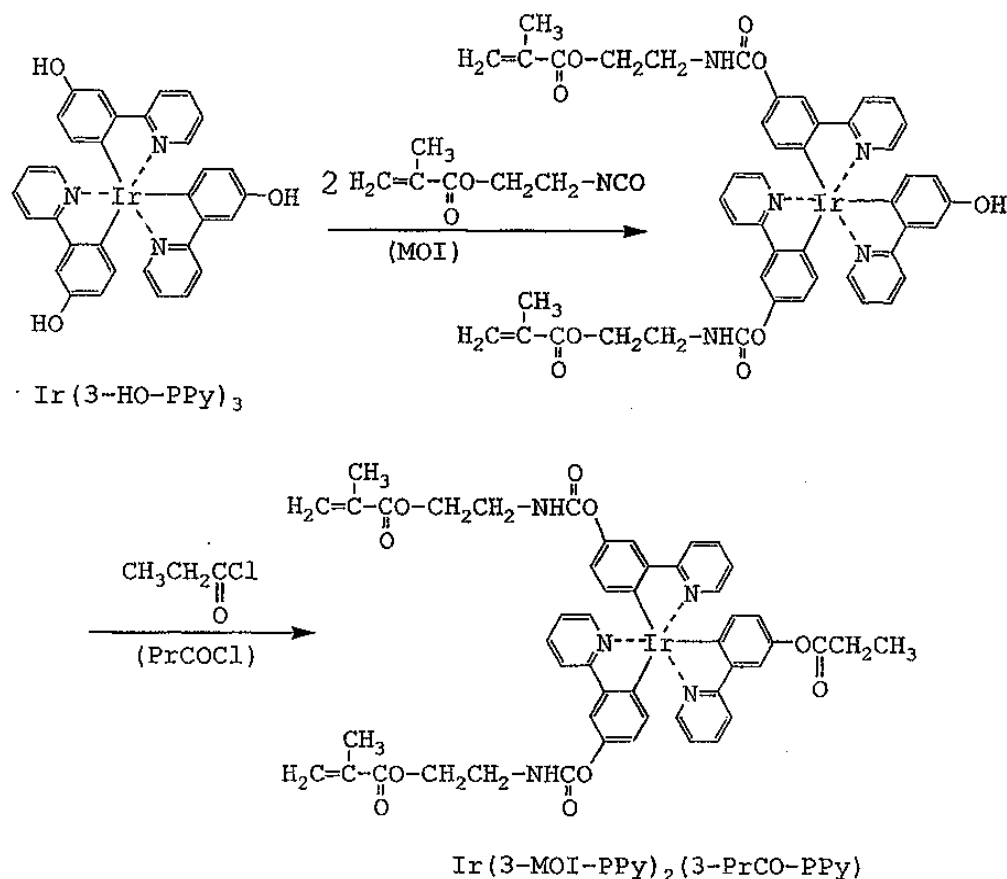
1 Ir(3-HO-PPy)₃ 2-
'Karenz MOI', Showa Denko K. K. , 'MOI') 1:3 ()
(PrCOCl) , Ir(3-MOI-PPy)₂ (3-PrCO-PPy)

, THF 48ml, Ir(3-HO-PPy)₃ 2.81g(4mmol) MOI 1.272g(8mmol)
(IV) 20 5
.400g(24.5mmol) 가 , THF 8ml PrCOCl 0.74g(8.0mmol) 30
20 5
2
Ir(3-MOI-PPy)₂ (3-PrCO-PPy) 2.75g(2.57mmol)
1 H-NMR CHN

¹H-NMR(CDCl₃, ppm): δ 7.81(m, 3H), 7.54(m, 6H), 7.26(m, 3H), 6.86(m, 3H), 6.68(m, 3H), 6.59(m, 3H), 6.13(s, 2H), 5.60(s, 2H), 5.22(br, 2H), 4.27(t, 4H), 3.57(m, 4H), 2.67(q, 2H), 1.95(s, 6H), 1.41(t, 3H)

Calcd: C 56.17, H 4.34, N 6.55

Found: C 55.86, H 4.37, N 6.51



14~19:

가

1, 3, 12 13 4
 Ir(3-MOI-PPy)(3-PrCO-PPy)₂, Ir(3-MOI-PPy)₃ Ir(3-MA-PPy)(3-PrCO-PPy)
 2, 3 10 %
 100 2
 er AG 500
 mm 8 PEDOT/ITO 60 2 가 ITO (ITO)
 AIBN((PEDOT, Bay 5mm×5 80

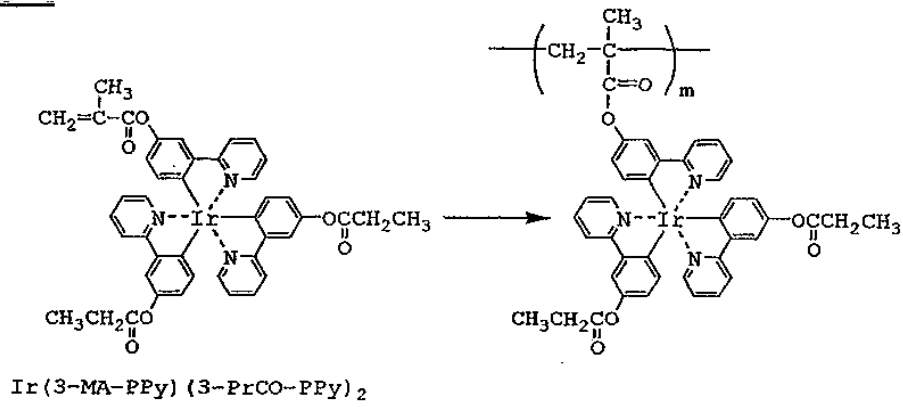
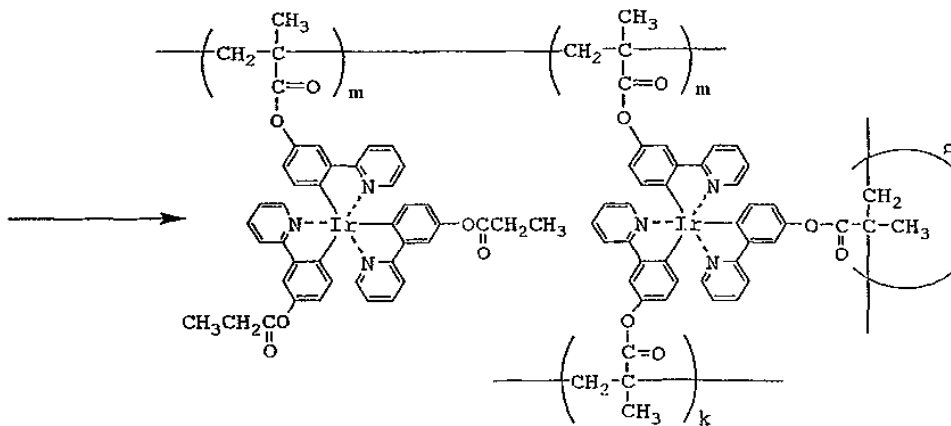
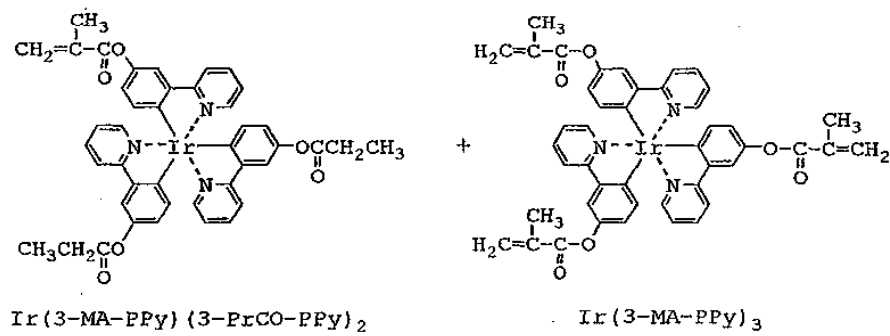
6 (12) /PEDOT/ITO TAZ(3-(4-)-4-
 -5-(4-tert-)-1,2,4-) 500
 Ag/Mg(:9/1) 1,000 , 6 (2)
 가

Advantest 가 / TR6143 가 Top
 con BM-8
 DC 가 , 10V 10V 240
 3 (2).

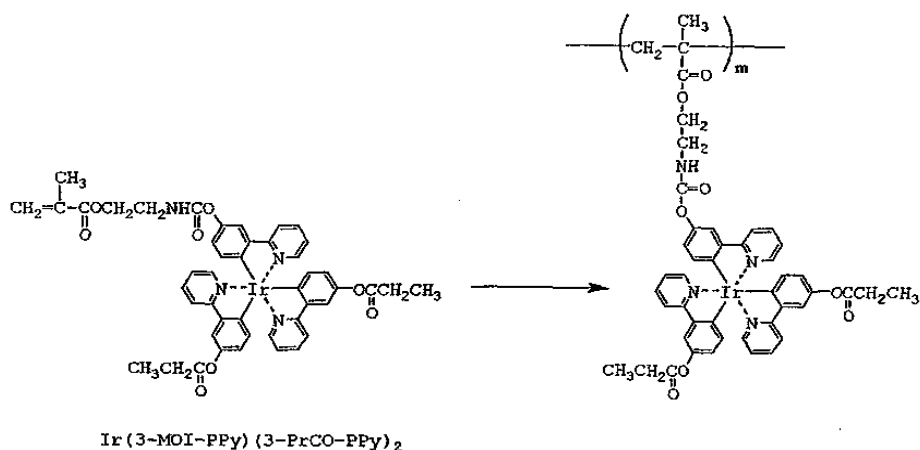
[3]

				10V (Cd/m ²)	
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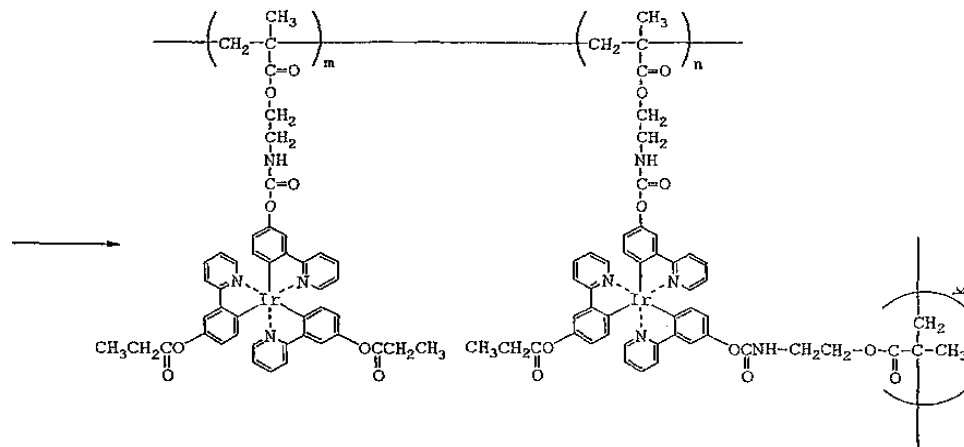
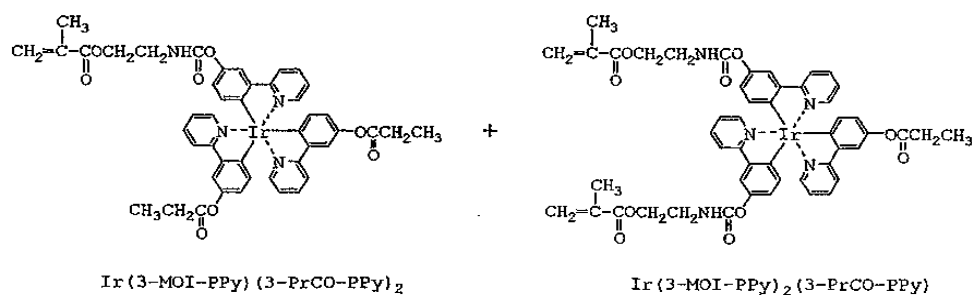
	()		(V)		240	
14	$\text{Ir}(3\text{-MA-PPy})/(3\text{-PrCO-PPy})_2$	가	5	1560	1150	(A)
15	$\text{Ir}(3\text{-MA-PPy})_3$	가	6	1430	1350	-
16	$\text{Ir}(3\text{-MA-PPy})(3\text{-PrCO-PPy})_2$ / $\text{Ir}(3\text{-MA-PPy})_3$ (1/1)	가	5	1580	1420	(B)
17	$\text{Ir}(3\text{-MOI-PPy})(3\text{-PrCO-PPy})_2$	가	6	1600	1280	(C)
18	$\text{Ir}(3\text{-MOI-PPy})_2(3\text{-PrCO-PPy})$	가	6	1510	1380	-
19	$\text{Ir}(3\text{-MOI-PPy})(3\text{-PrCO-PPy})_2$ / $\text{Ir}(3\text{-MOI-PPy})_2(3\text{-PrCO-PPy})$ (1/1)	가	6	1600	1450	(D)

스킴 A스킴 B

스킴 C



스킴 D



20~23:

가

(PPy) () (III)(Ir(acac)₃)
() (III)(Ir(PPy)₃)

300

Py)₃ 1 12

Ir(3-MA-PPy)(3-PrCO-PPy)₂
(BSODA)

(3-MOI-P
(ODA) 4

10 %
AIBN(

(PEDOT, Bayer AG
5mm×5mm

가

100

2

가

ITO
2 가

(ITO
가

, PEDOT/ITO

1000

5 (10) , 5 (/PEDOT/ITO 2) , Ag/Mg(:9/1) 1,000
가 . 14~19

[4]

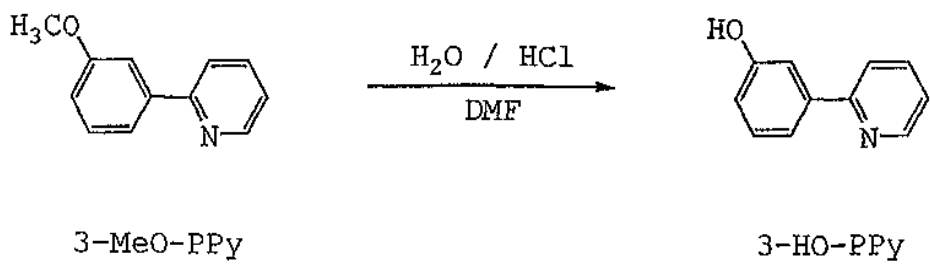
	/ ()		(V)	10V (Cd/m ²)	
					240
20	Ir(PPy)/BSODA(1/1)	가	6	1660	1120
21	Ir(3-MA-PPy)(3-PrCO-PPy) ₂ /BSODA(1/1)	가	7	1480	1210
22	Ir(3-MA-PPy) ₃ /ODA (1/1)	가	5	1380	1320
23	Ir(3-MA-PPy)(3-PrCO-PPy) ₂ /ODA (1/1)	가	5	1510	1080
3	Ir(PPy) ₃ /ODA (1/1)	가	5	1680	880

25: Ir(MA-PPy)(PPy)₂
(1) 1 3-MeO-PPy 가 .
3-MeO-PPy 16.0g(86.4mmol) , 13
0 4 . / 2-(3-
) (3-HO-PPy) 10.4g(60.7mmol) . ¹H-NMR CHN .

¹H-NMR(CDCl₃, ppm): δ 8.66(d, 1H), 7.76(t, 1H), 7.67(d, 1H), 7.56(s, 1H), 7.40(d, 1H), 7.30(t, 1H), 7.26(t, 1H), 6.88(d, 1H), 2.08(br, 1H)

Calcd: C 77.17, H 5.30, N 8.18

Found: C 76.81, H 5.37, N 8.11



(2) 3-HO-PPy tert- (TBDMS-Cl) .
10.2g tert- , 200ml N,N- 3-HO-PPy 8.6g(50.2mmol),
11.3g(75.0mmol) 4
, 2-(3-tert-) (3-SiO-PPy) 13.0g(45.5mmol)
¹H-NMR CHN .

¹H-NMR(CDCl₃, ppm): δ 8.68(d, 1H), 7.74(t, 1H), 7.68(d, 1H), 7.58(d, 1H), 7.48(s, 1H), 7.32(t, 1H), 7.22(t, 1H), 6.89(d, 1H), 1.01(s, 9H), 0.24(s, 6H)

Calcd: C 71.53, H 8.12, N 4.91

$\text{Ir(PPy)}_2(3\text{-HO-PPy})$ 1.69g(2.52mmol)

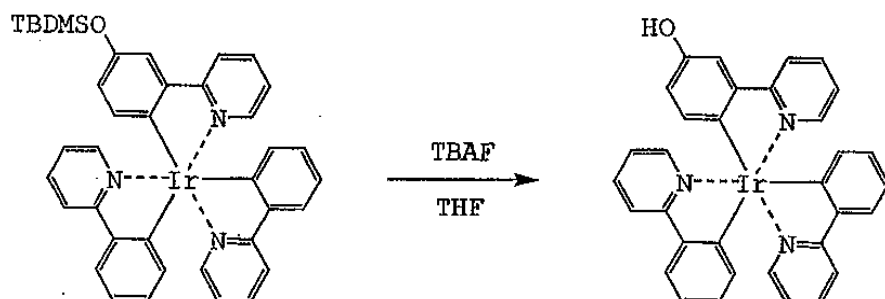
C, H N

$^1\text{H-NMR}$

$^1\text{H-NMR}(\text{CDCl}_3, \text{ppm}): \delta 7.87(\text{d}, 2\text{H}), 7.78(\text{d}, 1\text{H}), 7.6(\text{m}, 9\text{H}), 6.85(\text{m}, 10\text{H}), 6.63(\text{d}, 1\text{H}), 4.23(\text{s}, 1\text{H})$

Calcd: C 59.09, H 3.61, N 6.26

Found: C 58.64, H 3.74, N 6.17



$\text{Ir(PPy)}_2(3\text{-SiO-PPy})$

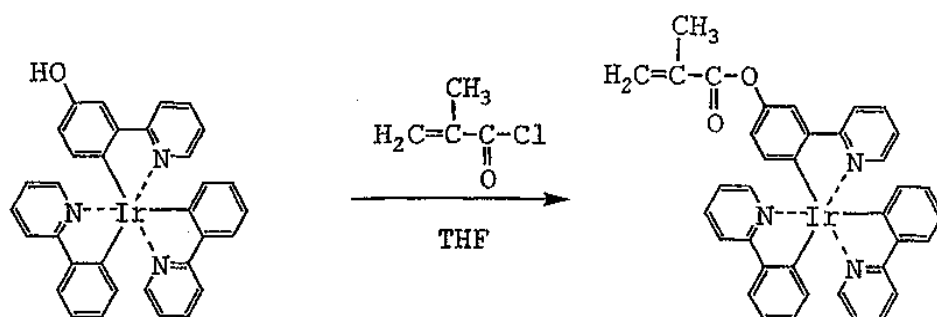
$\text{Ir(PPy)}_2(3\text{-HO-PPy})$

(5) mol) THF 20 5, $\text{Ir(PPy)}_2(3\text{-HO-PPy})$ 1.34g(2.0mmol) 0.25g(2.4mmol) 0.81g(8.0mmol)
(III) $(\text{Ir}(3\text{-MA-PPy})(\text{PPy})_2)$ 1.28g (1.73mmol) (2-(3-)) (2-)
C, H N $^1\text{H-NMR}$

$^1\text{H-NMR}(\text{CDCl}_3, \text{ppm}): \delta 7.87(\text{d}, 2\text{H}), 7.78(\text{d}, 1\text{H}), 7.6(\text{m}, 8\text{H}), 7.40(\text{s}, 1\text{H}), 6.8(\text{m}, 10\text{H}), 6.59(\text{d}, 1\text{H}), 6.35(\text{s}, 1\text{H}), 5.74(\text{s}, 1\text{H}), 2.08(\text{s}, 3\text{H})$

Calcd: C 60.15, H 3.82, N 5.69

Found: C 59.85, H 3.86, N 5.66



$\text{Ir(PPy)}_2(3\text{-HO-PPy})$

$\text{Ir(PPy)}_2(3\text{-MA-PPy})$

26: $\text{Ir}(3\text{-MOI-PPy})(\text{PPy})_2$

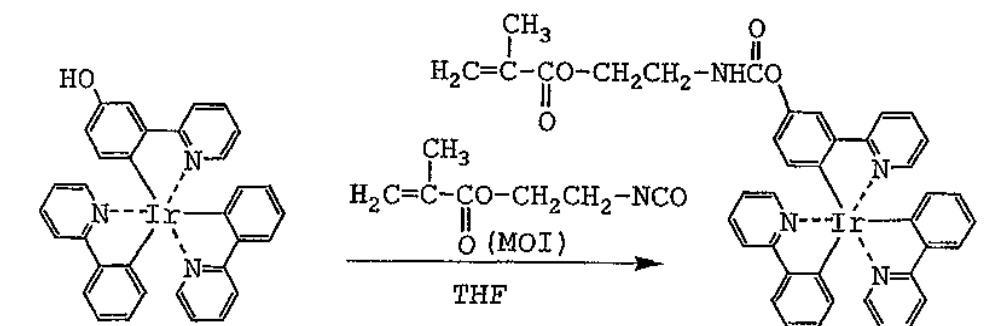
2,6-tert-butyl-4-methylphenol (BHT) 9mg (25) $\text{Ir(PPy)}_2(3\text{-HO-PPy})$ 1.34g(2.0mmol), (DBTL) 13mg THF (IV) 'Karens MOI', Showa Denko K. K. 'MOI' 50 1 (2-(3-))

))) (2-) (III)(Ir(PPy)₂(3-MOI-PPy)) 1.48g(1.79 mmol) . C
 , H N ¹H-NMR

¹H-NMR(CDCl₃, ppm): δ 7.87(d, 2H), 7.80(d, 1H), 7.6(m, 8H), 7.42(s, 1H), 6.8(m, 10H), 6.59(d, 1H), 6.14(s, 1H), 5.60(s, 1H), 5.21(br, 1H), 4.28(t, 2H), 3.57(m, 2H), 1.96(s, 3H)

Calcd: C 58.17, H 4.03, N 6.78

Found: C 57.78, H 4.02, N 6.72



Ir(PPy)₂(3-HO-PPy)

Ir(PPy)₂(3-MOI-PPy)

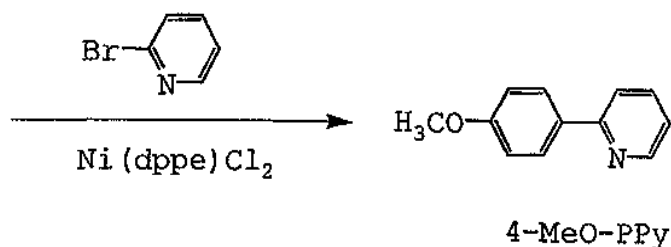
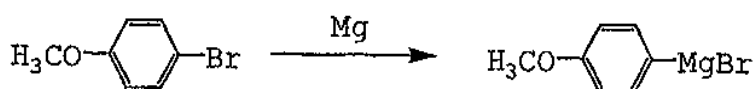
27: Ir(4-MA-PPy)₂(PPy)

THF 1.8g 가 , 2- 4- 22.4g(120mmol) 15.8g(100mmol) 가 , (1,2- 1 (4-) (THF) 3.4g , (II)(Ni(dppe)Cl₂) 250ml 5% , 2-(4- ¹H-NMR
) (4-MeO-PPy) 15.1g(81.5mmol) . C, H N

¹H-NMR(CDCl₃, ppm): δ 8.65(d, 1H), 7.95(d, 2H), 7.71(t, 1H), 7.66(d, 1H), 7.16(t, 1H), 7.00(d, 2H), 3.86(s, 3H)

Calcd: C 77.81, H 5.99, N 7.56

Found: C 77.52, H 6.10, N 7.40



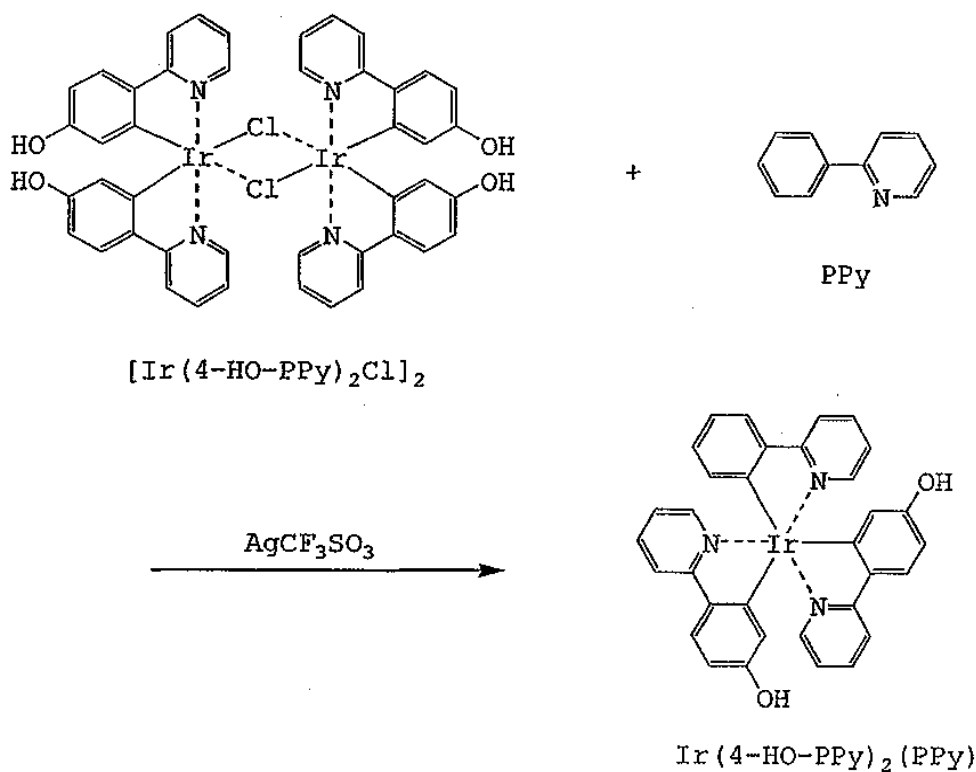
Py)

mol) AgCF_3SO_3 1.98g $[\text{Ir}(4\text{-HO-PPy})_2\text{Cl}]_2$ 3.98g(3.5mmol) PPy 15.5g(10.0mmol)
 (III)($\text{Ir}(4\text{-HO-PPy})_2(\text{PPy})$) 2.20g(3.2mmol) (2-(4-C, H N))(2- $^1\text{H-NMR}$)

$^1\text{H-NMR}(\text{CDCl}_3, \text{ppm}): \delta 7.88(\text{d}, 1\text{H}), 7.78(\text{d}, 2\text{H}), 7.6(\text{m}, 9\text{H}), 6.85(\text{m}, 8\text{H}), 6.64(\text{d}, 2\text{H})$

Calcd: C 57.71, H 3.52, N 6.12

Found: C 57.46, H 3.49, N 5.99

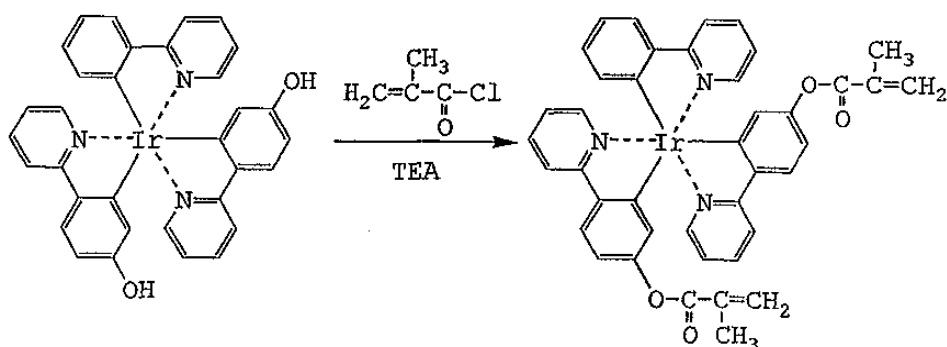


(5) mol) THF 20 5, $\text{Ir}(4\text{-HO-PPy})_2(\text{PPy})$ 1.37g(2.0mmol) 0.81g(8.0mmol)
 (III)($\text{Ir}(4\text{-MA-PPy})_2(\text{PPy})$) 1.55g (1.88mmol) (2-(4-C, H N))(2- $^1\text{H-NMR}$)

$^1\text{H-NMR}(\text{CDCl}_3, \text{ppm}): \delta 7.87(\text{d}, 1\text{H}), 7.78(\text{d}, 2\text{H}), 7.6(\text{m}, 9\text{H}), 6.8(\text{m}, 8\text{H}), 6.59(\text{s}, 2\text{H}), 6.35(\text{s}, 2\text{H}), 5.74(\text{s}, 2\text{H}), 2.08(\text{s}, 6\text{H})$

Calcd: C 59.84, H 3.92, N 5.11

Found: C 59.95, H 3.82, N 5.04



Ir(4-HO-PPy)₂(PPy)

Ir(4-MA-PPy)₂(PPy)

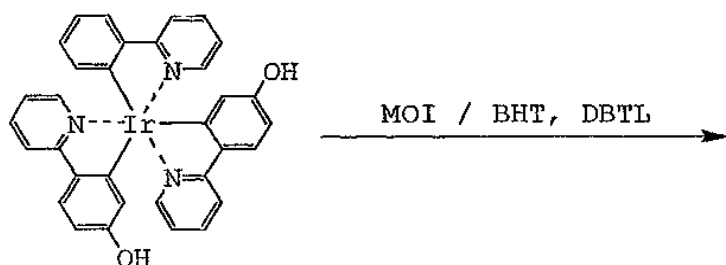
28: Ir(4-MOI-PPy)₂(PPy)

0mmol), 2,6-tert-butyl-4-methylphenol (BHT) 18mg (0.75g(4.83mmol)), THF (IV) 27, Ir(4-HO-PPy)₂(PPy) 1.37g(2.0mmol), DBTL 26mg, 'Karenc MOI', Showa Denko K. K. 'MOI' 50, 1, (2-(4-((2-))) (III) Ir(4-MOI-PPy)₂(PPy) 1.68g(1.68mmol), C, ¹H-NMR

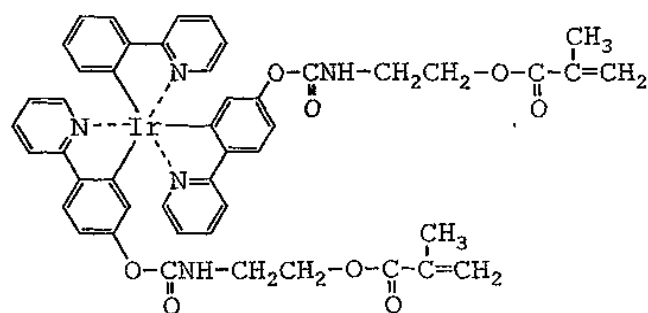
¹H-NMR(CDCl₃, ppm): δ 7.85(d, 1H), 7.81(d, 2H), 7.6(m, 9H), 6.8(m, 8H), 6.58(d, 2H), 6.12(s, 2H), 5.60(s, 2H), 5.21(br, 2H), 4.28(t, 4H), 3.58(m, 4H), 1.96(s, 6H)

Calcd: C 56.62, H 4.25, N 7.02

Found: C 56.38, H 4.02, N 6.72



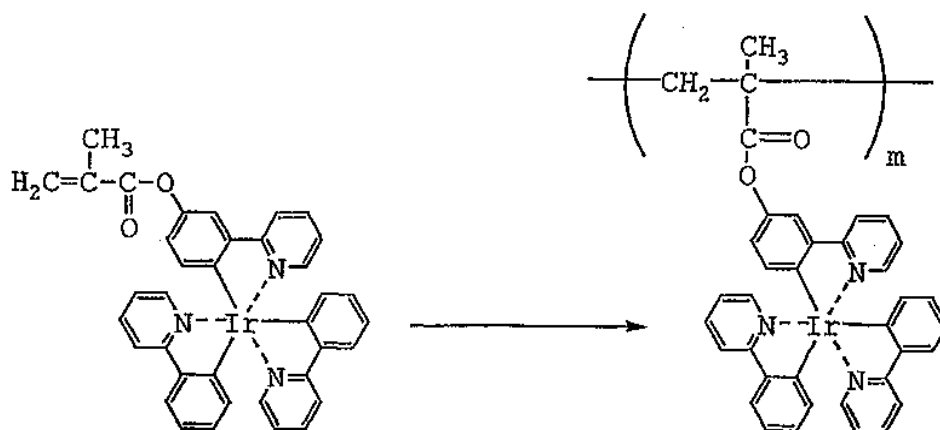
Ir(4-HO-PPy)₂(PPy)



Ir(4-MOI-PPy)₂(PPy)

29: Ir(3-MA-PPy)(PPy)₂

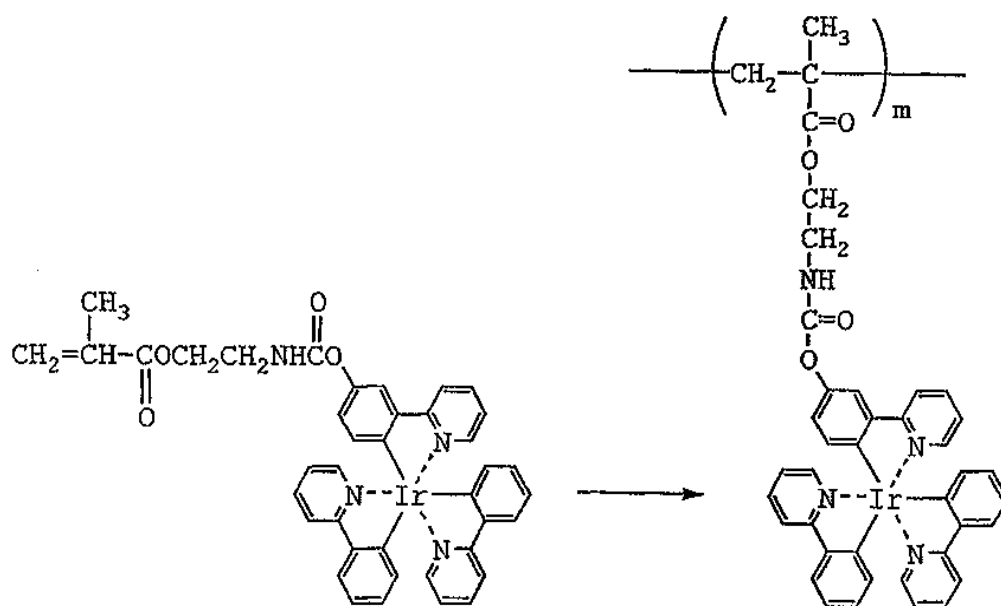
25 Ir(3-MA-PPy)(PPy)₂ 1.11g(1.5mmol), 2,2'- () (A
IBN) 0.010g(0.061mmol) 10ml , 80 10
() , , 2
C, H N Ir , Ir(3-MA-PPy)(PPy)₂ 0.92g
Ir(3-MA-PPy)(PPy)₂
(GPC , :THF) 12,000 .



Ir(3-MA-PPy)(PPy)₂

30: Ir(3-MOI-PPy)(PPy)₂

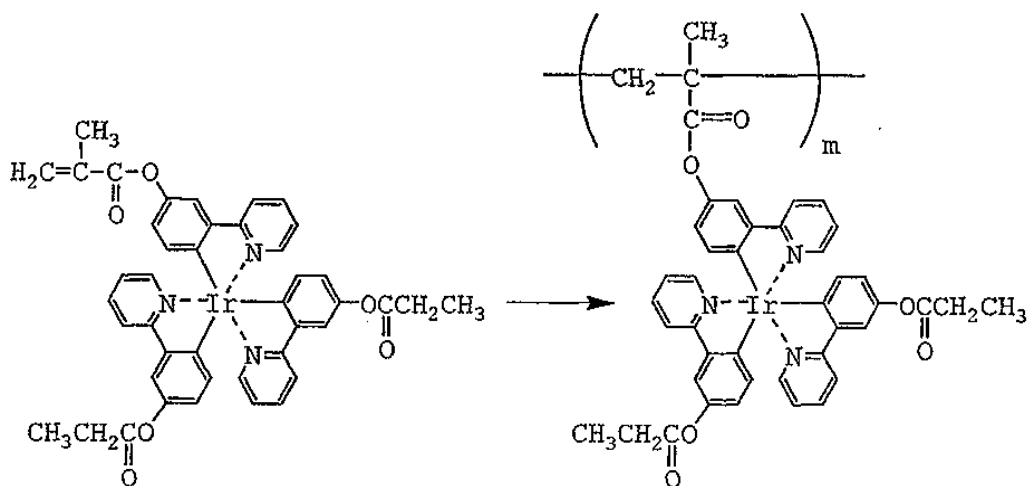
26 Ir(3-MOI-PPy)(PPy)₂ 1.11g(1.5mmol), 2,2'- () (A
AIBN) 0.010g(0.061mmol) 10ml , 80 10
() , , 2
C, H N Ir , Ir(3-MOI-PPy)(PPy)₂ 1.02g
Ir(3-MOI-PPy)(PPy)₂
(GPC , : THF) 20,000



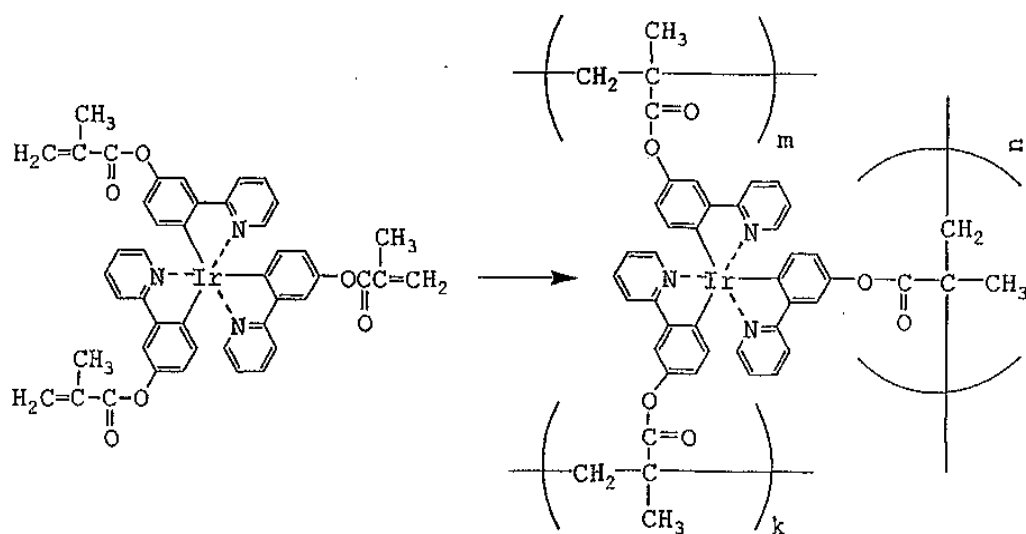
Ir(PPy)₂(3-MOI-PPy)

31: Ir(3-MA-PPy)(3-PrCO-PPy)₂

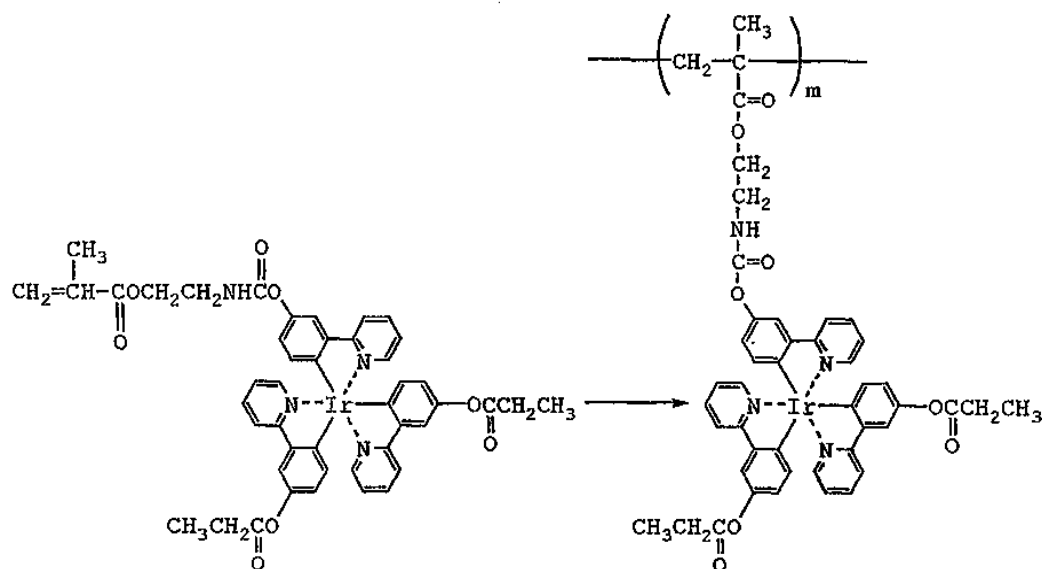
1 Ir(3-MA-PPy)(3-PrCO-PPy)₂ 2.22g(2.5mmol), 2,2'- (80
) (AIBN) 0.010g(0.061mmol) 30ml , , 2
10 (). ,
1.85g C, H N Ir Ir(3-MA-PPy)(3-PrCO-PPy)₂
8,000 Ir(3-MA-PPy)(3-PrCO-PPy)₂
(GPC , : THF)

Ir(3-MA-PPy)(3-PrCO-PPy)₂32: Ir(3-MA-PPy)₃

12 Ir(3-MA-PPy)₃ 2.28g(2.5mmol), 2,2'- (80 10
0.010g(0.061mmol) 30ml , , 100ml, (AIBN)
(). 가 , 100ml, 10
100ml Ir(3-MA-PPy)₃ 2.10g
C, H N Ir Ir(3-MA-PPy)₃
가 , GPC 가

Ir(3-MA-PPy)₃33: Ir(3-MOI-PPy)(3-PrCO-PPy)₂

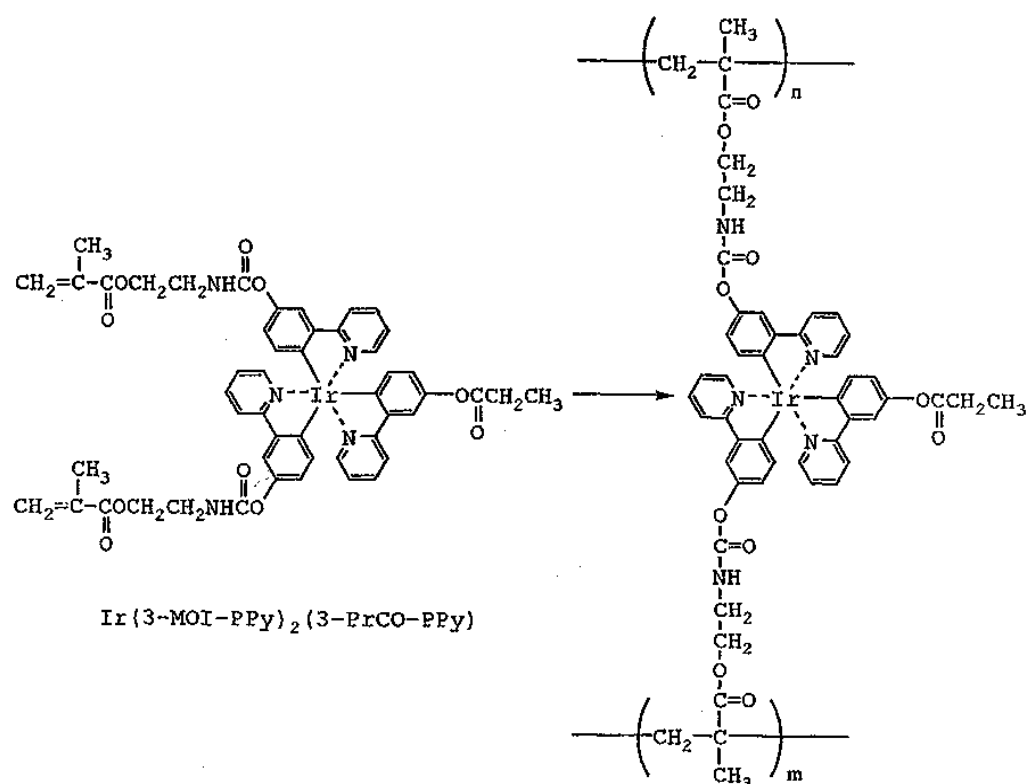
3 Ir(3-MOI-PPy)(3-PrCO-PPy)₂ 2.43g(2.5mmol), 2,2'- (80
)(AIBN) 0.010g(0.061mmol) 30ml , ,
 10 (). , ,
 2.05g , C, H N Ir Ir(3-MOI-PPy)(3-PrCO-PPy)₂
 Ir(3-MOI-PPy)(3-PrCO-PPy)₂
 (GPC , :
 THF) 18,000 .



Ir(3-MOI-PPy)(3-PrCO-PPy)₂

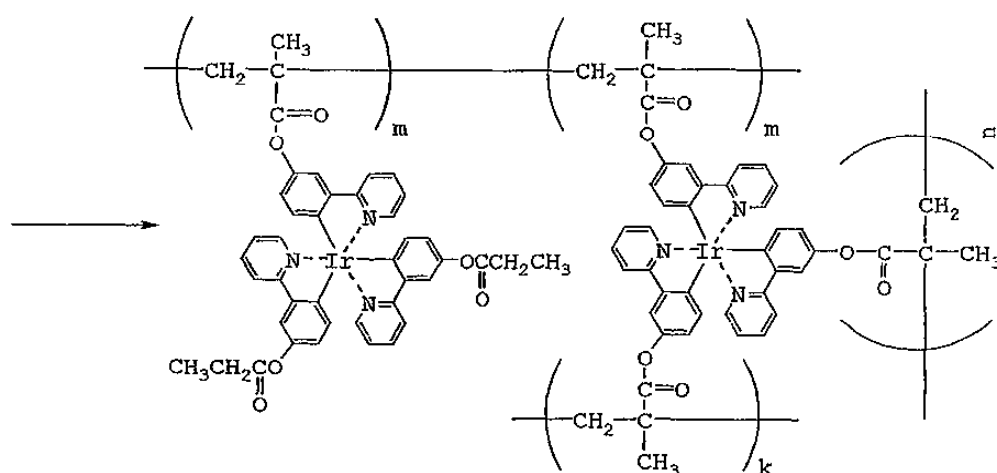
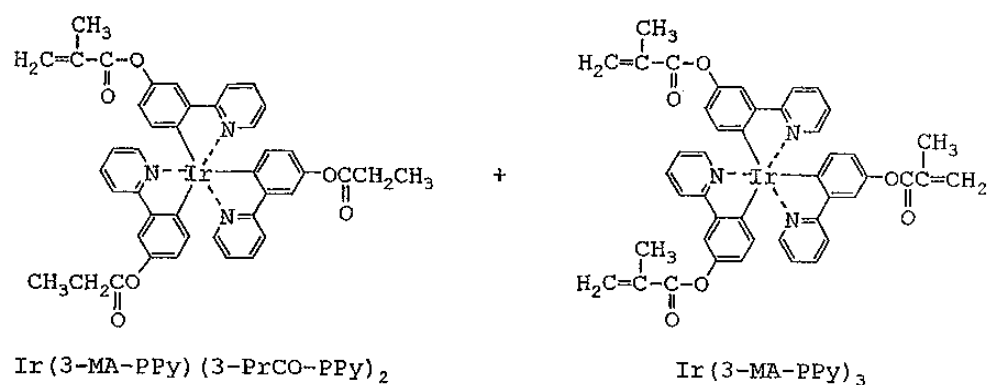
34: Ir(3-MOI-PPy)₂(3-PrCO-PPy)

13 Ir(3-MOI-PPy)₂(3-PrCO-PPy) 2.46g(2.5mmol), 2,2'- (8
)(AIBN) 0.010g(0.061mmol) 30ml , ,
 0 10 (). 가 ,
 100ml, 100ml , Ir(3-MOI-PPy)₂(3-PrCO-PPy) 2.21
 g , C, H N Ir Ir(3-MOI-PPy)₂(3-PrCO-PPy)
 , G
 PC 가 ,



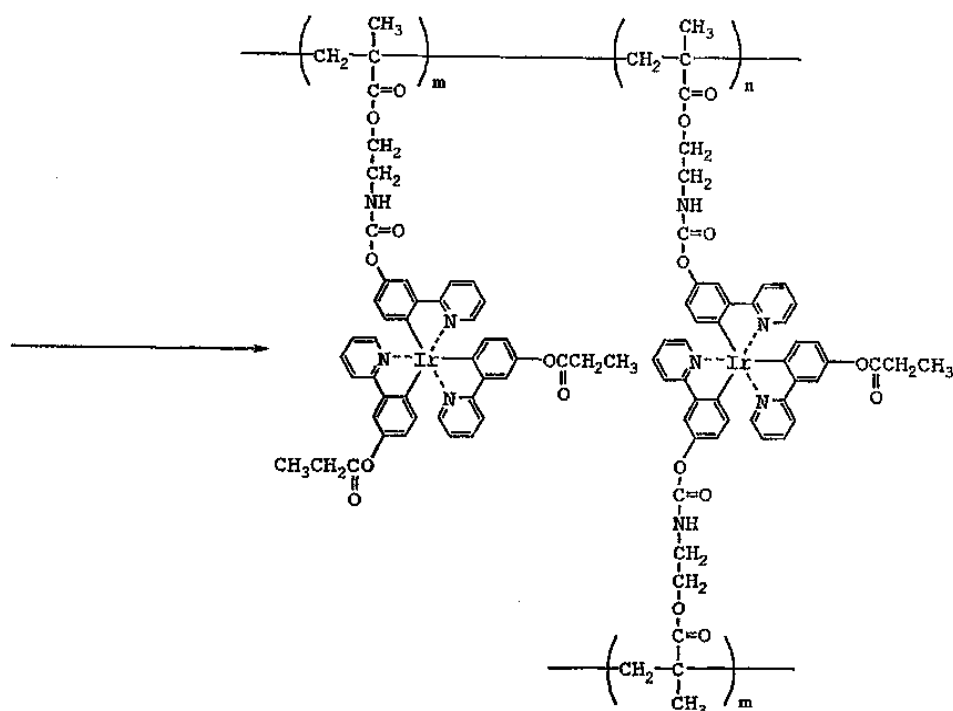
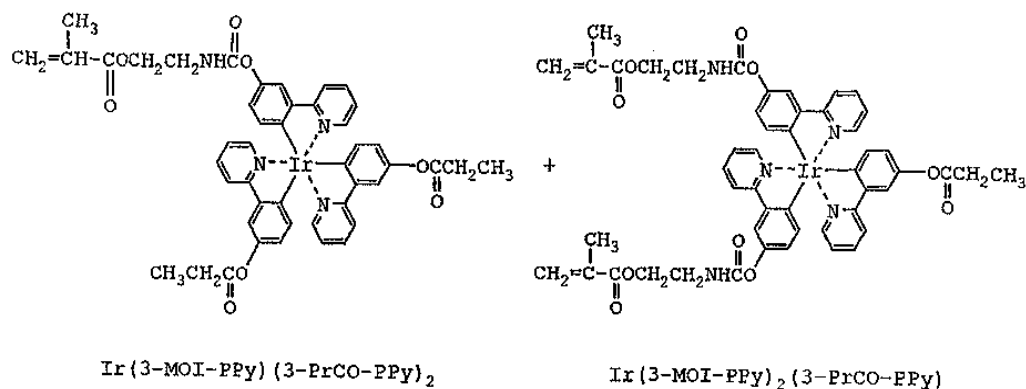
35: Ir(3-MA-PPy)(3-PrCO-PPy)₂ / Ir(3-MA-PPy)₃

1. Ir(3-MA-PPy)(3-PrCO-PPy)₂ 1.11g(1.25mmol), 12 Ir(3-MA-PPy)₃ 1.14g(1.25mmol), 2,2'-(AIBN) 0.010g(0.061mmol)
 30ml, 80 100ml, 100ml, 2.05g
 C, H N Ir Ir(3-MA-PPy)(3-PrCO-PPy)₂ / Ir(3-MA-PPy)₃ Ir(3-MA-PPy)₃ 가 1:1
 가 , GPC



36: $\text{Ir}(\text{3-MOI-PPy})(\text{3-PrCO-PPy})_2 / \text{Ir}(\text{3-MOI-PPy})_2 (\text{3-PrCO-PPy})$

3-*Ir*(3-MOI-PPy)₂(3-PrCO-PPy)₂ (1.21g(1.25mmol), 13-*Ir*(3-MOI-PPy)₂(3-PrCO-PPy)₂ (1.23g(1.25mmol), 2,2'-(AIBN) 0.010g(0.061mmol), 30ml, 80, 10, 100ml, 100ml, 2.18g, C, H, N, *Ir*, *Ir*(3-MOI-PPy)₂(3-PrCO-PPy)₂가 1:1, GPC, 가.



37: (8- -2,4-) (2-) (III)(, Ir(PPy)₂(1-Bu-acac)

(μ -) (2-) (III)(
 , [Ir(PPy)₂Cl]₂) (H. Gerlach et al., Helv. Chim. Acta, 60, 638(1977))
 8- -2,4- Ir(PPy)₂(1-Bu-acac)

, [Ir(PPy)₂Cl]₂ 261mg(0.24mmol) 가 30ml , 8- -2,4-
 87mg(0.56mmol) 76mg(0.75mmol) 가 , 3 가

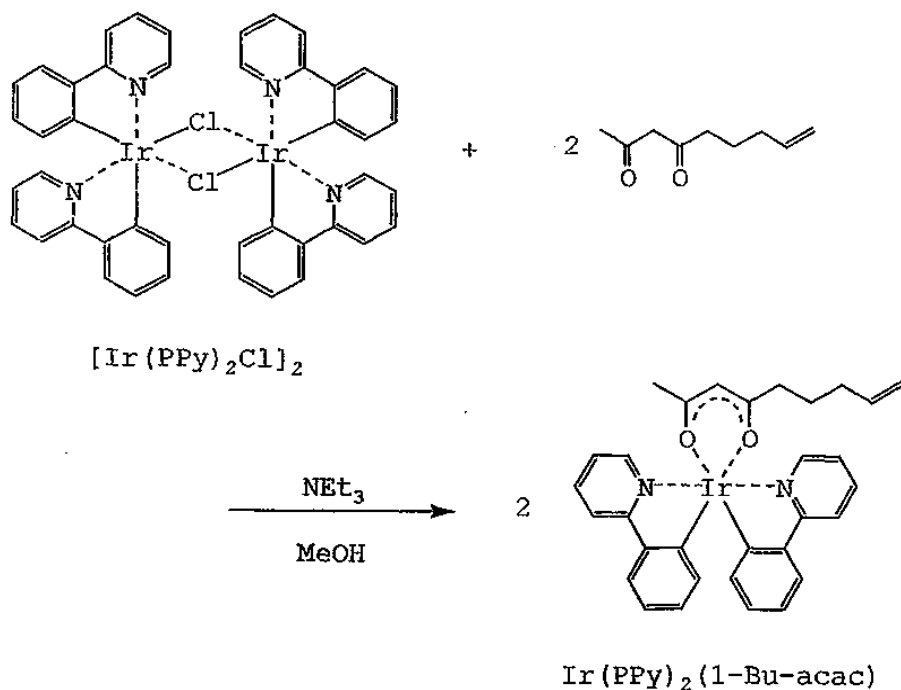
200ml 50ml 가 ,

가 , -20 Ir(PPy)
)₂(1-Bu-acac) 270mg(0.41mmol) (: 85%). C, H N ¹H-NMR

¹H-NMR(CDCl₃, ppm): δ 8.49(d, J=5.7Hz, 2H, PPy), 7.83(t, J=7.8Hz, 2H, PPy), 7.70(m, 2H, PPy), 7.54(t, J=6.8Hz, 2H, PPy), 7.10(m, 2H, PPy), 6.80(t, J=7.3Hz, 2H, PPy), 6.68(m, 2H, PPy), 6.35(d, J=6.2Hz, 1H, PPy), 6.25(d, J=6.2Hz, 1H, PPy), 5.61(m, 1H, -CH=CH₂), 5.19(s, 1H, -), 4.86(m, 2H, -CH=CH₂), 1.99(t, J=7.3Hz, 2H, -), 1.79(s, 3H, CH₃), 1.72(m, 2H, -), 1.38(m, 2H, -)

Calcd: C 56.95, H 4.47, N 4.28(C₃₁H₂₉IrN₂O₂)

Found: C 55.84, H 4.32, N 3.97



38: [6-(4-)-2,4-] (2-) (III)(, Ir(PPy)₂ [1-(St-Me)-acac]

(1) , 4- , 6-(4-)-2,4-

1.23g(60% in oil)(31mmol) (, 2.5g(2 THF 4mmol)) 60ml 가 , 0 , 0 1ml , 0 10 , n- (1.6M) 17.5ml(28mmol) , 0 20 , 4- 4.0g(26mmol) , 가 , 20 , / (1:1()) 6-(4-)-2,4- 3.0 g(14mmol) . 56% . C H , 1 H-NMR .

¹H-NMR(CDCl₃, ppm):

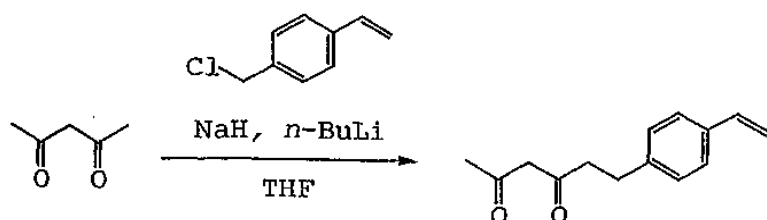
; δ 7.33(d, J=8.1Hz, 2H,), 7.14(d, J=8.4Hz, 2H,), 6.68(dd, J=8.1Hz, 1H,), 5.70(d, J=17.0 Hz, 1H,), 5.46(s, 1H, -), 5.20(d, J=11.1Hz, 1H,), 2.91(t, J=5.7Hz, 2H,), 2.58(t, J=7.3Hz, 2H,), 2.03(s, 3H,)

; δ 7.33(d, J=8.1Hz, 2H,), 7.14(d, J=8.4Hz, 2H,), 6.68(dd, J=8.1Hz, 1H,), 5.70(d, J=17.0 Hz, 1H,), 5.20(d, J=11.1Hz, 1H,), 3.53(s, 2H, C(=O)CH₂C(=O)), 2.89(m, 4H,), 2.19 (s, 3H,)

: = 6:1

Calcd: C 77.75, H 7.46 (C₁₄H₉O₂)

Found: C 77.49, H 7.52

[illegible]

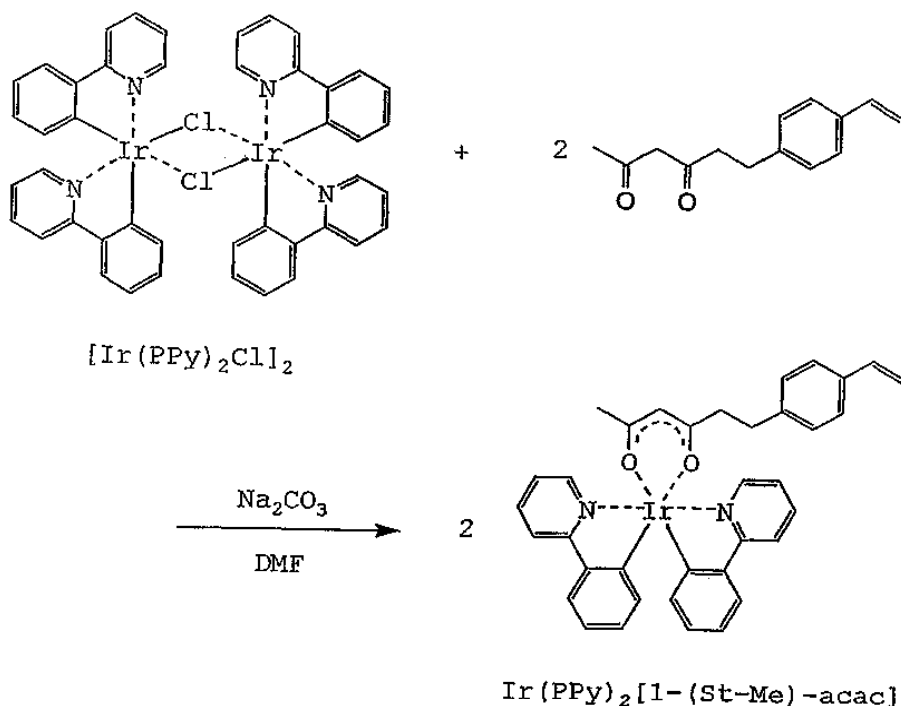
5ml N.N- (, DMF) [Ir(PPy)₂Cl]₂ 342mg(0.32mmol), 158mg(1.5mmol) 2,6-tert-4- 5mg(0.023mmol) , 6-(4-)-2,4- 210mg(0.97mmol) 가 , 65 가 . , 가 .

$\text{Ir(PPy)}_2[1-(\text{St-Me})-\text{acac}]$ 354mg(0.49mmol)

¹ H NMR(CDCl₃): δ 8.47(d, J=5.7Hz, 1H, PPy), 8.21(d, J=5.7Hz, 1H, PPy), 7.9-7.5 (m, 6H, PPy), 7.18(d, J=8.1Hz, 2H, -), 7.00(m, 2H, PPy), 6.89(d, J=8.1Hz, 2H, -), 6.75(m, 5H, PPy), 6.28 (t, J=7.3Hz, 2H, PPy), 7.67(d, J=17.6Hz, 1H, -), 5.19(d, J=9.5Hz, 1H, -), 5.17(s, 1H, -), 2.60(t, J=7.3Hz, 2H, -), 2.36(m, 2H, -), 1.75(s, 3H, -)

Calcd: C 60.40, H 4.36, N 3.91(C₃₆H₃₁IrN₂O₂)

Found: C 61.35, H 4.34, N 3.83



39: (9- -2,4-) (2-) (III)(, Ir(PPy)₂
[1-(A-Bu)-acac])

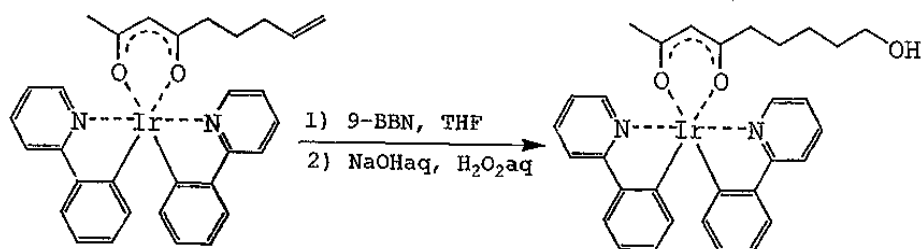
(1) $\text{Ir}(\text{PPy})_2[\text{1-(OH-Bu)-acac}]_2$, (9-2,4-) (2-) (III) (, Ir(PPy)).

, THF 10ml 37 Ir(PPy)₂ (1-Bu-acac) 167mg(0.276mmol)
 , 9- [3.3.1] (, 9-BBN) 0.5M THF 1.0ml(0.5mmol)
 25 가 , 3M NaOH 0.2ml(0.60mmol), 35% H₂O₂ 0.
 060ml(0.62mmol) 가 , 12 가 , 20ml 가 ,
 , / 1:1()
 , -20 /
 Ir(PPy)₂ [1-(OH-Bu)-acac] 23mg(0.034mmol) 13% C
 , H N , ¹H-NMR

¹H-NMR(CDCl₃): δ 8.50(d, J=5.9Hz, 2H, PPy), 7.82(t, J=7.0Hz, 2H, PPy), 7.72(t, J=7.3Hz, 2H, PPy), 7.55(t, J=7.0Hz, 2H, PPy), 7.12(t, J=5.9Hz, 2H, PPy), 6.81(t, J=7.6Hz, 2H, PPy), 6.69(t, J=7.3Hz, 2H, PPy), 6.31(d, J=5.9Hz, 1H, PPy), 6.26(d, J=5.9Hz, 1H, PPy), 5.19(s, 1H, -), 3.44(t, J=7.0Hz, 2H, CH₂OH), 1.98(t, J=7.0Hz, 2H,), 1.79(s, 3H,), 1.34(m, 4H,), 1.05(m, 2H,)

Calcd: C 55.42, H 4.65, N 4.17 (C₃₁H₃₁IrN₂O₃)

Found: C 55.76, H 4.71, N 4.19



Ir(PPy)₂ (1-Bu-acac)

Ir(PPy)₂ (1-(OH-Bu)-acac)

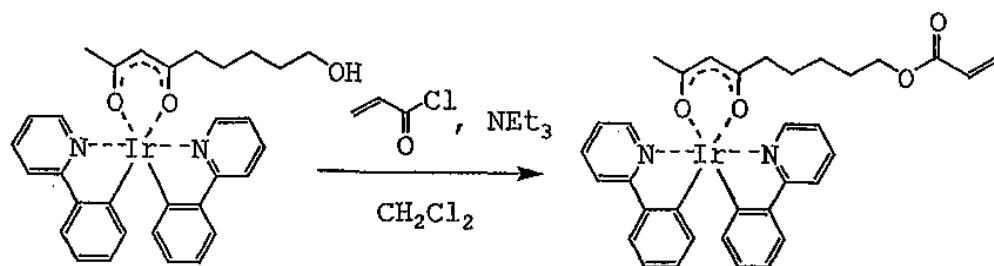
(2) , Ir(PPy)₂ [1-(OH-Bu)-acac] Ir(PPy)₂
 [1-(A-Bu)-acac]

, 10ml Ir(PPy)₂ [1-(OH-Bu)-acac] 95mg(0.14mmol) 0.10m
 l(0.72mmol) 가 , 0.060ml(0.74mmol) 가 , 3
 0 , 1ml 가 ,
 (:) ,
 20 / Ir(PPy)₂ [1-(A-Bu)-aca
 c] 99mg(0.14mmol) 96% C, H N , ¹H-NMR

¹H-NMR(CDCl₃): δ 8.50(d, J=5.9Hz, 2H, PPy), 7.80(m, 4H, PPy), 7.51(t, J=7.3Hz, 2H, PPy), 7.18(t, J=5.9Hz, 2H, PPy), 6.84(t, J=7.3Hz, 2H, PPy), 6.70(t, J=7.6Hz, 2H, PPy), 6.25(m, 3H, PPy+), 6.12(dd, J=15.6, 9.3Hz, 1H,), 5.75(d, J=9.3Hz, 1H,), 5.17(s, 1H, -), 4.05(t, J=7.0Hz, 2H, -COOCH₂-), 1.84(t, J=7.0Hz, 2H,), 1.80(s, 3H,), 1.34(m, 4H,), 1.06(m, 2H,)

Calcd: C 56.26, H 4.58, N 3.86 (C₃₄H₃₃IrN₂O₄)

Found: C 56.55, H 4.53, N 3.60



$\text{Ir}(\text{PPy})_2[1-(\text{OH-Bu})-\text{acac}]$

$\text{Ir}(\text{PPy})_2[1-(\text{A-Bu})-\text{acac}]$

40: { (2-) } { 1-[4-(2-) (III)(, Ir(PPy)₂(MOI-Ph-acac))]-3- -1,3- -

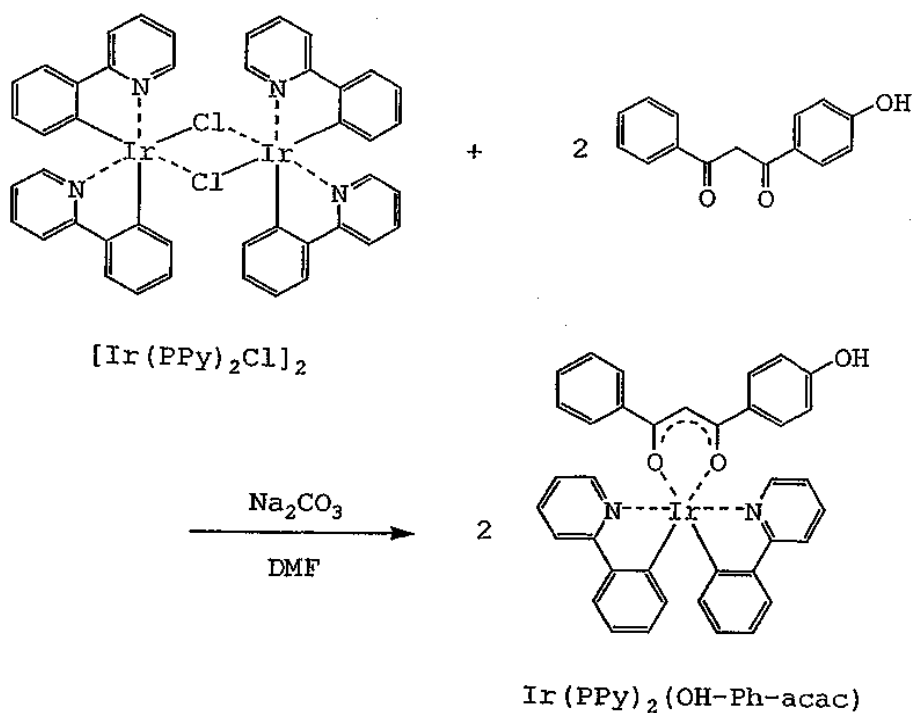
(1) Ir(PPy)₂Cl]₂) (M. Cushman et al., Tetrahedron Lett., 31, 6497(1990)) (μ-) (2-) (III)([p-
[1-(4-)-3- -1,3- -] (2-)
(III)(, Ir(PPy)₂(OH-Ph-acac))

, [Ir(PPy)₂Cl]₂ 112mg(0.10mmol), 64mg(0.60mmol) p- 10ml DMF
60 0.5 가 100ml
/ 30:10()
가
-acac) 111mg(0.15mmol) 72% . C, H N Ir(PPy)₂(OH-Ph
, ¹H-NMR

¹H-NMR (CDCl₃): δ 8.58(d, 2H, PPy), 7.9-6.7(m, 21H, PPy+), 6.52(s, 1H, -), 6.37(d, 2H, PPy), 4.91(s, 1H, OH)

Calcd: C 60.07, H 3.68, N 3.79 (C₃₇H₂₇IrN₂O₃)

Found: C 60.77, H 3.75, N 3.62



(2) , Ir(PPy)₂(OH-Ph-acac)₂- ('Karenz MOI', Showa Denko K. K. , 'MOI') , Ir(PPy)₂(MOI-Ph-acac)₂-

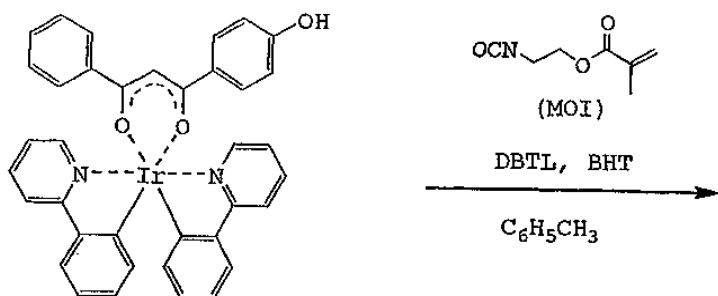
50ml Ir(PPy)₂(OH-Ph-acac) 110mg(0.15mmol) , 2,6- -tert- -4-
(, BHT) 5mg(0.023mmol), (IV) (, DBTL) 32mg(0.051mmol)
) MOI 121mg(0.78mmol) 가 , 70 6 가 .
, / 20:1()

Ir(PPy)₂(MOI-Ph-acac) 100mg(0.11mmol)
75% . C, H N , ¹H-NMR .

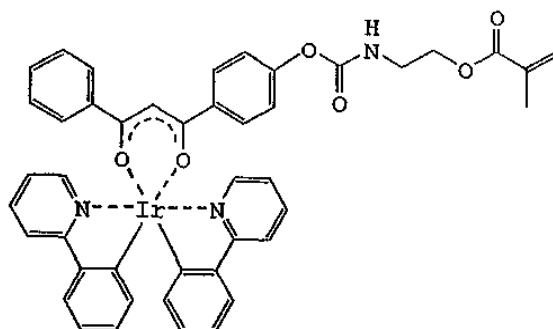
¹H-NMR (CDCl₃): δ 8.60(d, 2H, PPy), 7.9-6.7(m, 21H, PPy), 6.56(s, 1H, -), 6.39(d, 2H, PPy), 6.18(s, 1H,), 5.65(s, 1H,), 5.29(s, 1H, NH), 4.31(t, 2H,), 3.59(t, 2H,), 2.00(s, 3H,)

Calcd: C 59.05, H 4.05, N 4.70 (C₄₄H₃₆IrN₃O₆)

Found: C 59.79, H 4.05, N 4.64



Ir(PPy)₂(OH-Ph-acac)



Ir(PPy)₂(MOI-Ph-acac)

41: [6-(4-)]-2,4-] (2-) (III)(,
Ir(PPy)₂[1-(MA-Ph-Me)-acac])

(1) (C. Cativiela et al., J. Org. Chem., 60, 3074 (19
95)) 4- , 6-(4-)-2,4-

0.30g(60% in oil)(7.5mmol) , THF 20ml 가 ,
0 0.75g(7.5mmol)
0.5ml 0 10 , n-
(1.6M) 4.6ml(7.5mmol) , 0 20
THF 10ml 4- 2.28g(7.0mmol)

1, 0 가
 (: / 1:1())
 6-(4-)-2,4- 1.31g(4.4mmol)
 63% . C H , ¹H-NMR

¹H-NMR(CDCl₃, ppm):

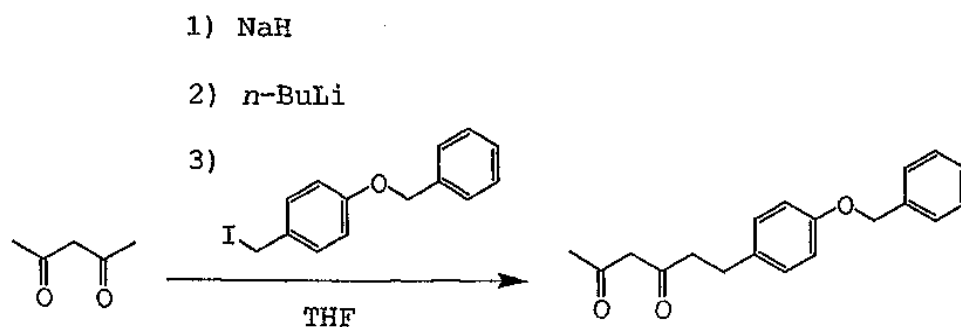
; δ 7.5-6.8(m, 9H,), 5.46(s, 1H, -), 5.04(s, 2H, -O-CH₂-), 2.88(t, J=7.6Hz, 2H,),
 2.55(t, J=8.4Hz, 2H,), 2.04(s, 3H,)

; δ 7.5-6.8(m, 9H,), 5.04(s, 2H, -O-CH₂-), 3.53(s, 2H, C(=O)CH₂C(=O)), 2.84(m, 4H,),
 2.19(s, 3H,)

: = 5:1

Calcd: C 77.00, H 6.86 (C₁₉H₂₀O₃)

Found: C 77.46, H 6.77



(2) 6-(4-)-2,4- 6-(4-)-

, Pd- (10%) 1.5g 20ml 6-(4-)-2,
 4- 1.31g(4.4mmol) 가 1atm 11

1:1() /
)-2,4- 0.70g(3.4mmol) 6-(4-)
 -NMR 77% . C H , ¹H

¹H-NMR(CDCl₃, ppm):

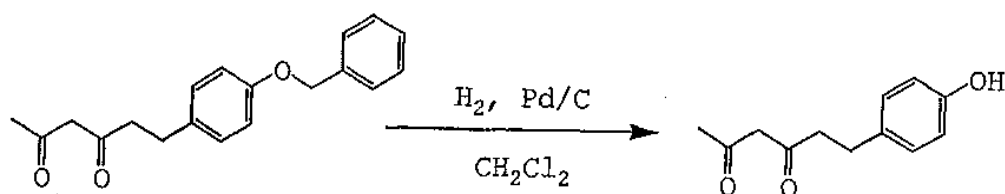
; δ 7.04 (d, J=8.4Hz, 2H,), 6.65(d, J=8.4Hz, 2H,), 5.55(br, 1H, OH), 5.47(s, 1H, -),
 2.86(t, J=7.3Hz, 2H,), 2.55(t, J=7.3Hz, 2H,), 2.04(s, 3H,)

; δ 7.04 (d, J=8.4Hz, 2H,), 6.65(d, J=8.4Hz, 2H,), 5.55(br, 1H, OH), 3.55(s, 2H, C(=O)CH₂C(=O)),
 2.83(m, 4H,), 2.19(s, 3H,)

: = 5:1

Calcd: C 69.88, H 6.84 (C₁₂H₁₄O₃)

Found: C 69.67, H 6.79

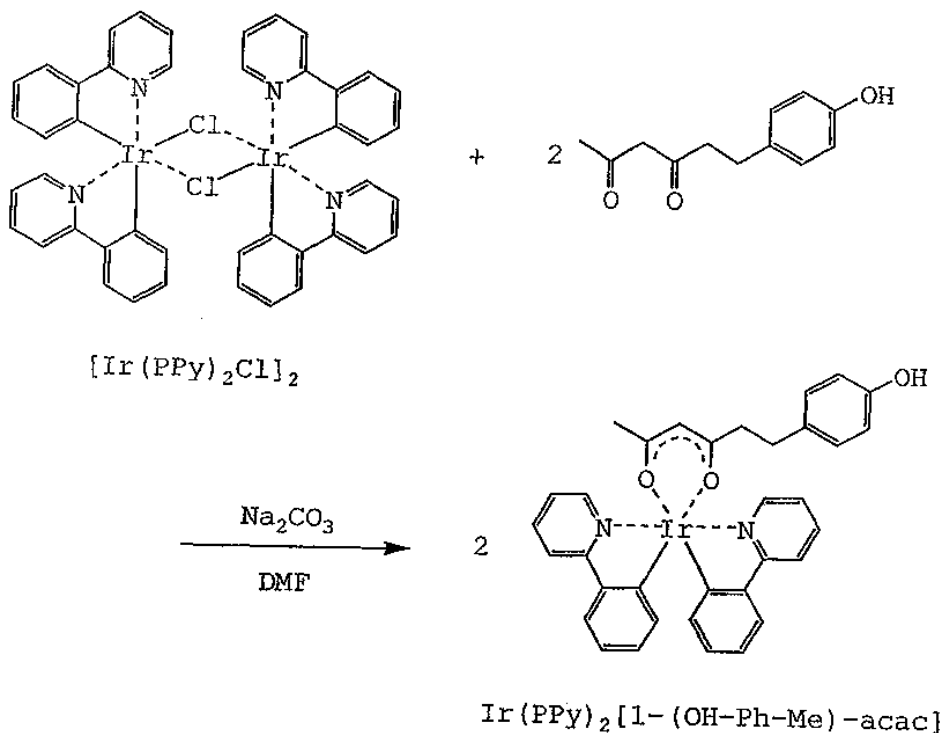


(3) , 6-(4-)-2,4- (μ -
) (2-) (III) ([Ir(PPy)₂Cl]₂) [6-(4-)-2,4-
] (2-) (III)(, Ir(PPy)₂[1-(OH-Ph-Me)-acac])
 , [Ir(PPy)₂Cl]₂ 71mg(0.066mmol) 47mg(0.44mmol) 6-(4-)-2,4-
 41mg(0.20mmol) DMF 5ml 가 , 65 1 가
 가 , (: / 1:1()
) , 가 , -20
 , Ir(PPy)₂[1-(OH-Ph-Me)-acac] 86mg(0.12mmol) 92%
 . C, H N , ¹H-NMR

¹H-NMR(CDCl₃, ppm): δ 8.48(d, J=6.2Hz, 1H, PPy), 8.23(d, J=5.9Hz, 1H, PPy), 7.9-7.6(m, 4H, PPy), 7.53(t, J=7.3Hz, 2H, PPy), 7.11(t, J=7.0Hz, 1H, PPy), 6.99(t, J=7.0Hz, 1H, PPy), 6.8-6.4(m, 8H, PPy + C₆H₄OH), 6.27(t, J=8.1Hz, 2H, PPy), 5.18(s, 1H, -), 5.10(br, 1H, OH), 2.54(t, J=7.0Hz, 2H,), 2.31(m, 2H,), 1.75(s, 3H,)

Calcd: C 57.86, H 4.14, N 3.97 (C₃₄H₂₉IrN₂O₃)

Found: C 58.03, H 4.11, N 3.86



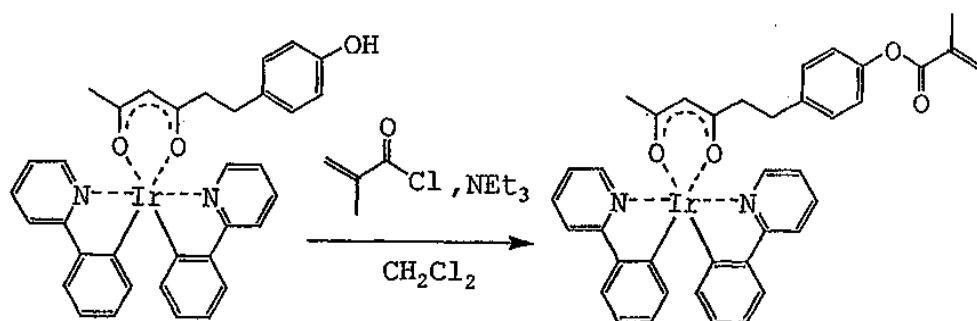
(4) , Ir(PPy)₂[1-(OH-Ph-Me)acac] Ir(PP
 y)₂[1-(Me-Ph-Me)acac]
 , Ir(PPy)₂[1-(OH-Ph-Me)acac] 169mg(0.24mmol) 10ml ,
 0.30ml(2.2mmol) 가 0.060ml(0.61m

mol) 가 / / (10:10:1()) 가 ,
 Ir(PPy)₂ [1-(MA-Ph-Me)acac] 141mg(0.18mmol) 76% C, H
 N, ¹H-NMR

¹H-NMR(CDCl₃): δ 8.48(d, J=5.1Hz, 1H, PPy), 8.27(d, J=5.9Hz, 1H, PPy), 7.9-7.5(m, 6H, PPy), 7.12(t, J=7.0Hz, 1H, PPy), 7.04(t, J=7.0Hz, 1H, PPy), 6.9-6.6(m, 8H,), 6.33(s, 1H,), 6.27(d, J=7.6Hz, 2H, PPy), 5.74(s, 1H,), 5.17(s, 1H, -), 2.61(t, J=7.0Hz, 2H,), 2.34(m, 2H,), 2.07(s, 3H, -), 1.76 (s, 3H, -)

Calcd: C 58.98, H 4.30, N 3.62 (C₃₈H₃₃IrN₂O₄)

Found: C 58.69, H 4.17, N 3.81



Ir(PPy)₂[1-(OH-Ph-Me)-acac] Ir(PPy)₂[1-(MA-Ph-Me)-acac]

42: (1- -2,4-) (2-) (III) (, Ir(PPy)
)₂ (1-MA-acac)

(1) (μ -) (2-) (III) (
 [Ir(PPy)₂Cl]₂) (0514217) (1-tert-)-2,4-
 (1- -2,4-) (2-) (III)(, Ir(PPy)₂ (1-OH-aca
 c))

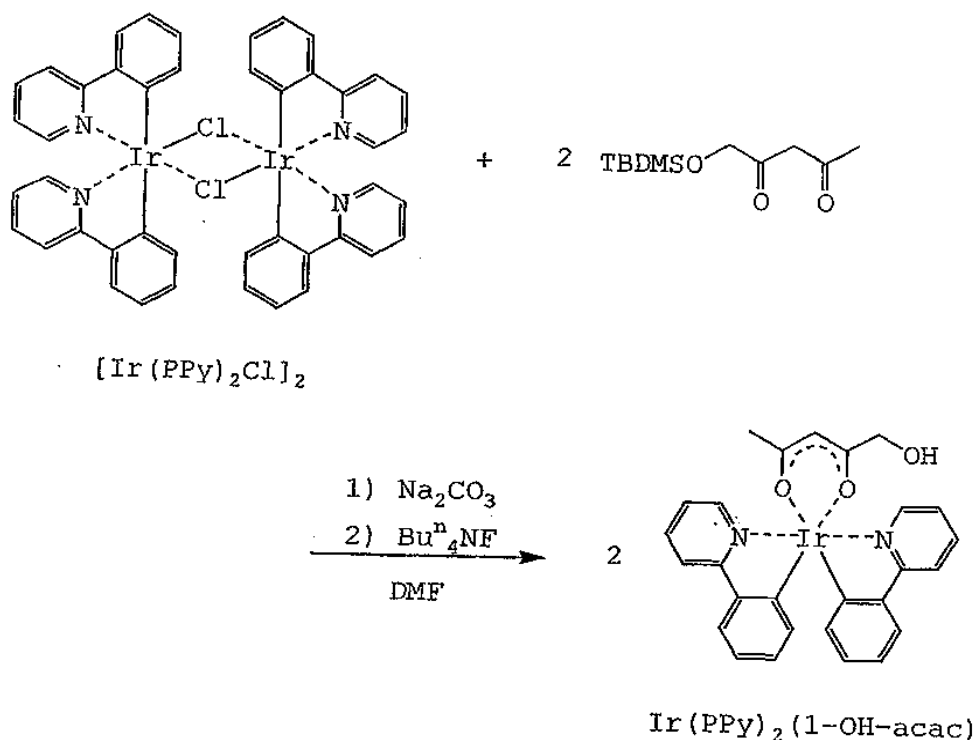
, DMF 10ml [Ir(PPy)₂Cl]₂ 492mg(0.46mmol) 139mg (1.31mmol) 1-(te
 rt-)-2,4- (1-TBDMSO-2,4-) 321mg(1.39mmol) 가 , 70
 l 가 , 100ml 50m

THF 20ml -n- (, Buⁿ
 4 NF) 1.0M THF 0.46ml(0.46mmol) (: / / (1:3:1(
))
 /
 Ir(PPy)₂(1-OH-acac) 389mg(0.63mmol)
 69% C, H N, ¹H-NMR

¹H-NMR(CDCl₃): δ 8.48(d, J=5.7Hz, 1H, PPy), 8.42(d, J=5.7Hz, 1H, PPy), 7.86(m, 2H, PPy), 7.74(t, J=7.6Hz, 2H, PPy), 7.54(t, J=5.9Hz, 2H, PPy), 7.14(t, J=5.9Hz, 2H, PPy), 6.82(t, J=7.3Hz, 2H, PPy), 6.69(m, 2H, PPy), 6.28(d, J=6.8Hz, 1H, PPy), 6.23 (d, J=6.5Hz, 1H, PPy), 5.17(s, 1H, -), 3.88(dd, J=8.1, 5.4Hz, 1H, -CHH'-O-), 3.78(dd, J=8.1, 4.3Hz, 1H, -CHH'-O-), 3.10(t, J=4.6Hz, 1H, OH), 1.82 (s, 3H,)

Calcd: C 52.67, H 3.77, N 4.55 (C₂₇H₂₃IrN₂O₃)

Found: C 52.45, H 3.68, N 4.79

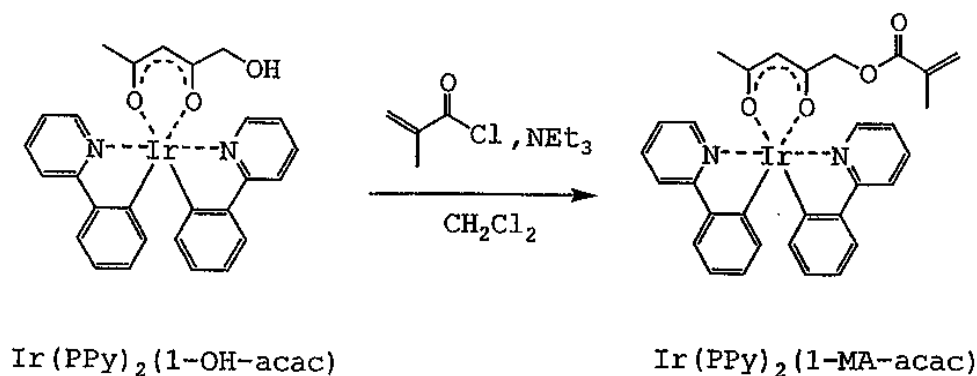


(2) $Ir(PPy)_2(1\text{-OH-acac})$ $Ir(PPy)_2(1\text{-MA-acac})$ $Ir(PPy)_2$
 $2(1\text{-MA-acac})$
 15ml $Ir(PPy)_2(1\text{-OH-acac})$ 200mg(0.32mmol) 0.25ml(1.8
 mmol) 0.20ml(2.0mmol) 20ml 1
 165mg(0.24mmol) 74% C, H N $Ir(PPy)_2(1\text{-MA-acac})$
 $^1\text{H-NMR}$

$^1\text{H-NMR}(\text{CDCl}_3)$: δ 8.53(d, $J=5.7\text{Hz}$, 1H, PPy), 8.48(d, $J=5.4\text{Hz}$, 1H, PPy), 7.84(d, $J=7.8\text{Hz}$, 2H, PPy), 7.73(t, $J=7.0\text{Hz}$, 2H, PPy), 7.53(t, $J=6.8\text{Hz}$, 2H, PPy), 5.14(m, 2H, PPy), 6.79(m, 2H, PPy), 6.69(m, 2H, PPy), 6.29(d, $J=7.6\text{Hz}$, 1H, PPy), 6.23(d, $J=7.6\text{Hz}$, 1H, PPy), 6.04(s, 1H,), 5.51(s, 1H,), 5.31(s, 1H,), 4.38(d, $J=15.4\text{Hz}$, 1H, -CHH'-OC(=O)-), 4.27(d, $J=14.9\text{Hz}$, 1H, -CHH'-OC(=O)-), 1.87(s, 3H,), 1.82(s, 3H,)

Calcd: C 54.45, H 3.98, N 4.10 ($\text{C}_{31}\text{H}_{27}\text{IrN}_2\text{O}_4$)

Found: C 54.18, H 3.96, N 4.33



43: [6-(4-)-2,4-] [2-(2,4-)] (III)(

, Ir(2,4-F-PPy)₂ [1-(St-Me)-acac])

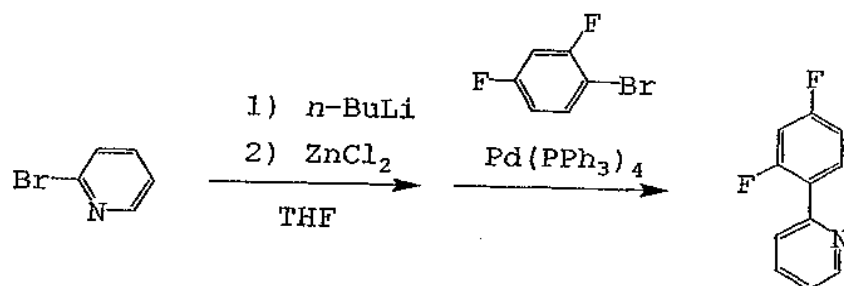
(1) , 2-(2,4-)

, 200ml 8.69g(55.0mmol) -78
 n- 1.6M 38.7ml(61.9mmol) 30
 50ml 7.5g(55.0mmol) 30
 0 , 1- -2,4- 9.65g(55.0mmol) ((0) 2.31g(2.0mmol) 가
 200ml 가 (; / (1/1:)) , 2-(2,4-) 6.00g(31.4mmol)
 63% . C, H N , ¹H-NMR

¹H-NMR(CDCl₃): δ 8.71(d, 1H, J=4.6Hz), 8.00(td, 1H, J=8.9, 6.5Hz), 7.8-7.7(m, 2H), 7.3-7.2(CHCl₃, 1H), 7.1-6.8(m, 2H).

Calcd: C 69.11, H 3.69, N 7.33

Found: C 68.98, H 3.80, N 7.31



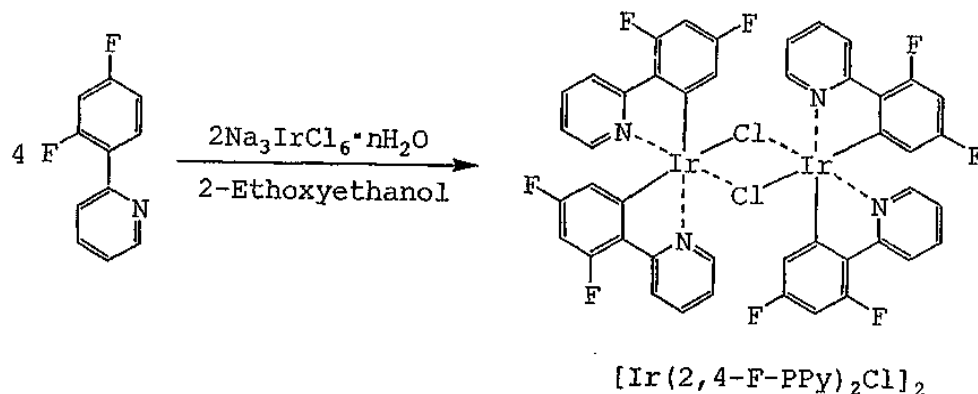
(2) , 2-(2,4-) n-
 , (μ -) [2-(2,4-)] (III)(, [Ir(2,4-F-
 -PPy)₂Cl]₂)

, 2-(2,4-) 0.96g(5.0mmol) n- 1.00 g 2- 5
 3:1() 40ml , 가 30 , 5
 [Ir(2,4-F-PPy)₂Cl]₂ 0.79g(0.65mmol) . 86% . C, H N ,
 , ¹H-NMR

¹H-NMR(CDCl₃, ppm): δ 9.12(d, 4H, J=5.7Hz), 8.31(d, 4H, J=8.6Hz), 7.83(dd, 4H, J=7.6, 7.6Hz), 6.82(dd, 4H, J=7.3, 7.3Hz), 6.34(ddd, 4H, J=11.6, 10.0, 2.4Hz), 5.29(dd, 4H, J=9.5, 2.4Hz).

Calcd: C 43.46, H 1.99, N 4.61

Found: C 43.39, H 2.03, N 4.55



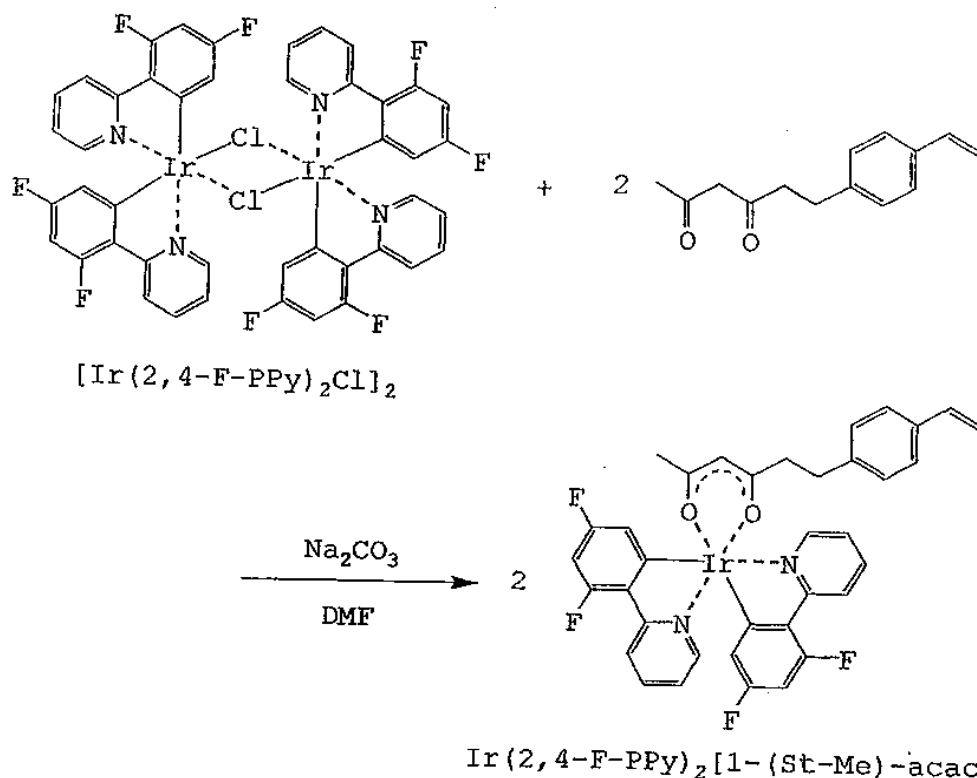
(3) , $[\text{Ir}(2,4\text{-F-PPy})_2\text{Cl}]_2$ 6-(4-)-2,4- , $\text{Ir}(2,4\text{-F-PPy})[1\text{-(St-Me)-acac}]$

DMF 20ml $[\text{Ir}(2,4\text{-F-PPy})_2\text{Cl}]_2$ 243mg(0.20mmol), 212mg(2.00mmol), 2,6- -tert-
4- 1.3mg, 38 6-(4-)-2,4- 130mg(0.60mmol)
, 80 2 가 ,
(;) /
, $\text{Ir}(2,4\text{-F-PPy})[1\text{-(St-Me)-acac}]$ 261mg(0.33mmol) 83% C, H
N , $^1\text{H-NMR}$

$^1\text{H-NMR}(\text{CDCl}_3, \text{ppm}): \delta$ 8.39(d, 1H, $J=5.7\text{Hz}$), 8.3-8.2(m, 2H), 8.04(d, 1H, $J=5.7\text{Hz}$), 7.8-7.7(m, 2H), 7.19(d, 2H, $J=7.8\text{Hz}$), 7.15(dd, 1H, $J=6.6, 6.6\text{Hz}$), 6.97(dd, 1H, $J=6.6, 6.6\text{Hz}$), 6.89(d, 2H, $J=7.8\text{Hz}$), 6.67(dd, 1H, $J=17.6, 10.8\text{Hz}$), 6.4- 6.2(m, 2H), 5.7-5.6(m, 3H), 5.22(s, 1H), 5.21(d, 1H, $J=11.1\text{Hz}$), 2.62(t, 2H, $J=7.0\text{Hz}$), 2.39(m, 2H), 1.78(s, 3H)

Calcd: C 54.88, H 3.45, N 3.56

Found: C 54.82, H 3.50, N 3.49



44: {3-[4-(2-)]-2,4- } (2)

(III) (, Ir(PPy)₂ [3-(MOI-Ph-Me)acac])

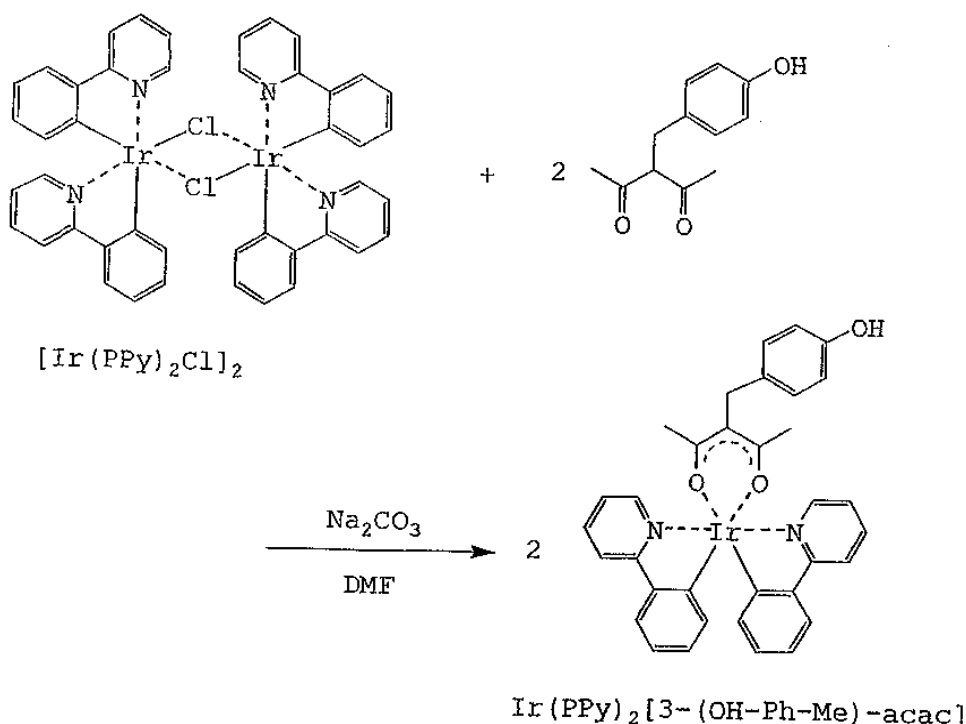
(1) , (μ -) (2-) (III) ([Ir(PPy)₂Cl]₂) 3-(4-)-2,4- , [3-(4-)-2,4-] (2-) (III) (, Ir(PPy)₂ [3-(OH-Ph-Me)acac]) .

, [Ir(PPy)₂Cl]₂ 56mg(0.052mmol) 44mg(0.42mmol) DMF 5ml .
(C. Cativiela et al., J. Org. Chem., 60 , 3074 (1995)) 3-(4-)-2,4-
30mg(0.15mmol) DMF 5ml 가 , 80 1.5 가 .
, 가 , / 1:1()
mmol) , / , Ir(PPy)₂ [3-(OH-Ph-Me)acac] 34mg(0.048
mmol) . 46% . C, H N , ¹H-NMR

¹H-NMR(CDCl₃, ppm): δ 8.58(d, J=5.9Hz, 2H, PPy), 7.84(d, J=7.8Hz, 2H, PPy), 7.73(t, J=6.5Hz, 2H, PPy), 7.55(d, J=7.6Hz, 2H, PPy), 7.1-6.6(m, 10H,), 6.27(d, J=7.6Hz, 2H, PPy), 4.86(br-s, 1H, OH), 3.62(s, 2H,), 1.80(s, 6H,)

Calcd: C 57.86, H 4.14, N 3.97 (C₃₄H₂₉IrN₂O₃)

Found: C 57.97, H 4.22, N 4.15



(2) , Ir(PPy)₂ [3-(OH-Ph-Me)acac] 2-
('Karenz MOI', Showa Denko K. K. , 'MOI') , Ir(PPy₃)[
3-(MOI-Ph-Me)-acac] .

, THF 10ml Ir(PPy)₂ [3-(OH-Ph-Me)acac] 71mg(0.10mmol), 2,6- -tert- -4- 3mg(0.014
mmol), (IV) (DBTL) 27mg(0.12mmol) MOI 55mg(0.35mmol) 70
2 가 ,

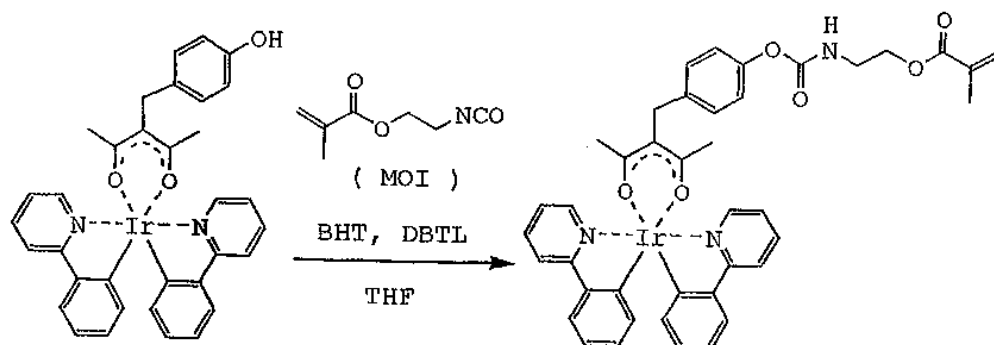
/ 1:1()

가 , , Ir(
PPy₃)[3-(MOI-Ph-Me)-acac] 59mg(0.069mmol) . 68% . C, H N
, ¹H-NMR

$^1\text{H-NMR}$ (CDCl_3 , ppm): δ 8.58(d, $J=5.9\text{Hz}$, 2H, PPy), 7.88(d, $J=7.8\text{Hz}$, 2H, PPy), 7.76(t, $J=6.5\text{Hz}$, 2H, PPy), 7.57(d, $J=7.6\text{Hz}$, 2H, PPy), 7.2-6.6(m, 10H,), 6.27(d, $J=7.6\text{Hz}$, 2H, PPy), 6.16(s, 1H,), 5.63(s, 1H,), 5.31(br-s, 1H, NH), 4.31(m, 2H,), 3.69(s, 2H,), 3.59(m, 2H,), 1.98(s, 3H, -), 1.80(s, 6H, -)

Calcd: C 57.20, H 4.45, N 4.88 ($\text{C}_{41}\text{H}_{38}\text{IrN}_3\text{O}_6$)

Found: C 57.36, H 4.43, N 4.91



$\text{Ir}(\text{PPy})_2[3-(\text{OH-Ph-Me})-\text{acac}]$

$\text{Ir}(\text{PPy})_2[3-(\text{MOI-Ph-Me})-\text{acac}]$

45: (2-(2,4-)) (3-) (III)
(, $\text{Ir}(2,4-\text{F-PPy})_2(3-\text{MA-pic})$)

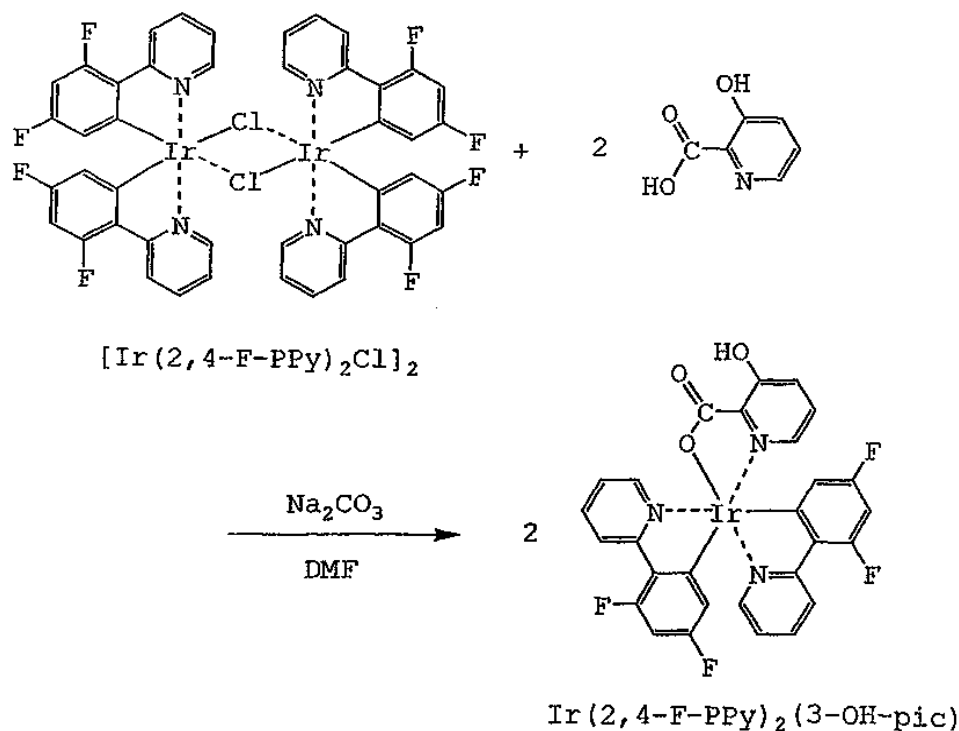
(1) (2-(2,4-)) (3-) (III)
(, $\text{Ir}(2,4-\text{F-PPy})_2(3-\text{OH-pic})$)

, N,N- (DMF) 10ml 43(1) (2) $[\text{Ir}(2,4-\text{F-PPy})_2\text{Cl}]_2$ 121.6mg(0.1mmol), 3- 41.7mg(0.3mmol) 106.0mg(1.0mmol)
가 , 80 2 . 50ml 가 ,
7()) . / , $\text{Ir}(2,4-\text{F-PPy})_2(3-\text{OH-pic})$ 101.0mg
71% . C, H N , $^1\text{H-NMR}$. =3:9

$^1\text{H-NMR}$ ($\text{DMSO}-d_6$, ppm): δ 13.6(br, 1H), 8.50(d, 1H, $J=5.9\text{Hz}$), 8.25(d, 2H, $J=11.1\text{Hz}$), 8.1-8.0(m, 2H), 7.69(d, 1H, $J=5.7\text{Hz}$), 7.62(d, 1H, $J=8.1\text{Hz}$), 7.53(d, 1H, $J=4.6\text{Hz}$), 7.50(d, 1H, $J=5.7\text{Hz}$), 7.36(t, 1H, $J=4.5\text{Hz}$), 7.24(d, 1H, $J=5.1\text{Hz}$) 6.9-6.7(m, 2H), 5.66(dd, 1H, $J=8.6, 2.4\text{Hz}$), 5.48(dd, $J=8.6, 2.4\text{Hz}$)

Calcd: C 49.32, H 2.27, N 5.91

Found: C 49.29, H 2.33, N 5.86



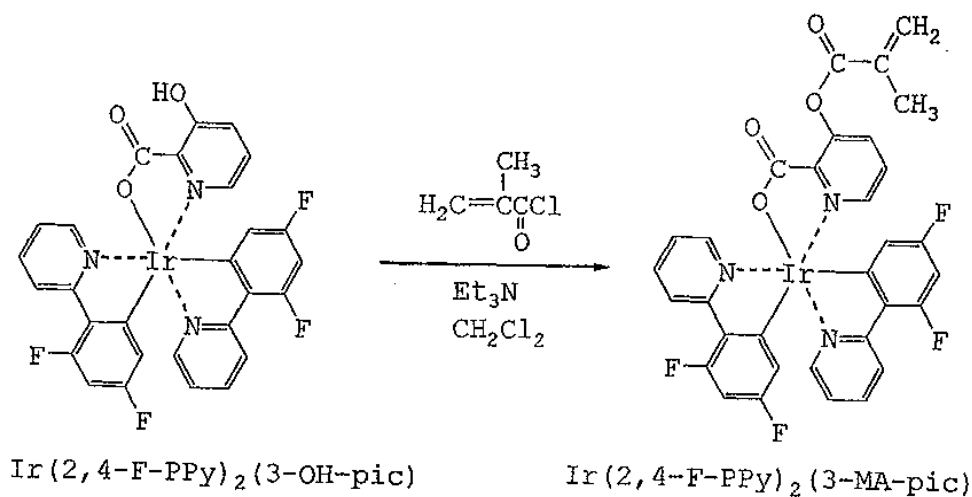
(2) , Ir(2,4-F-PPy)₂(3-MA-pic)

10ml Ir(2,4-F-PPy)₂(3-OH-pic) 71.1mg(0.10mmol) 2,6-tert-4-
 0.2mg , 101.2mg(1.0mmol)
 52.3mg(0.50mmol) 가 , 2 50ml 가 ,
 : =1:24 () , / ,
 Ir(2,4-F-PPy)₂(3-MA-pic) 63.1mg . 81% . C, H N , ¹H-NMR

¹H-NMR(DMSO-d₆, ppm): δ 8.51(d, 1H, J=5.4Hz), 8.3-8.2(m, 2H), 8.1-7.9(m, 3H), 7.8-7.6(m, 3H), 7.52(dd, 1H, J=6.6, 6.6Hz), 7.35(dd, 1H, J=6.6, 6.6Hz), 6.9-6.7(m, 2H), 6.26(s, 1H), 5.88(s, 1H), 5.68(dd, 1H, J=8.4, 2.4Hz), 5.44(dd, 1H, J=8.4, 2.4Hz), 2.00(s, 3H)

Calcd: C 49.36, H 2.59, N 5.40

Found: C 49.33, H 2.60, N 5.41



46: (2-(2,4-)) (5-)
 (III)(, Ir(2,4-F-PPy)₂(5-CH₂MA-pic))

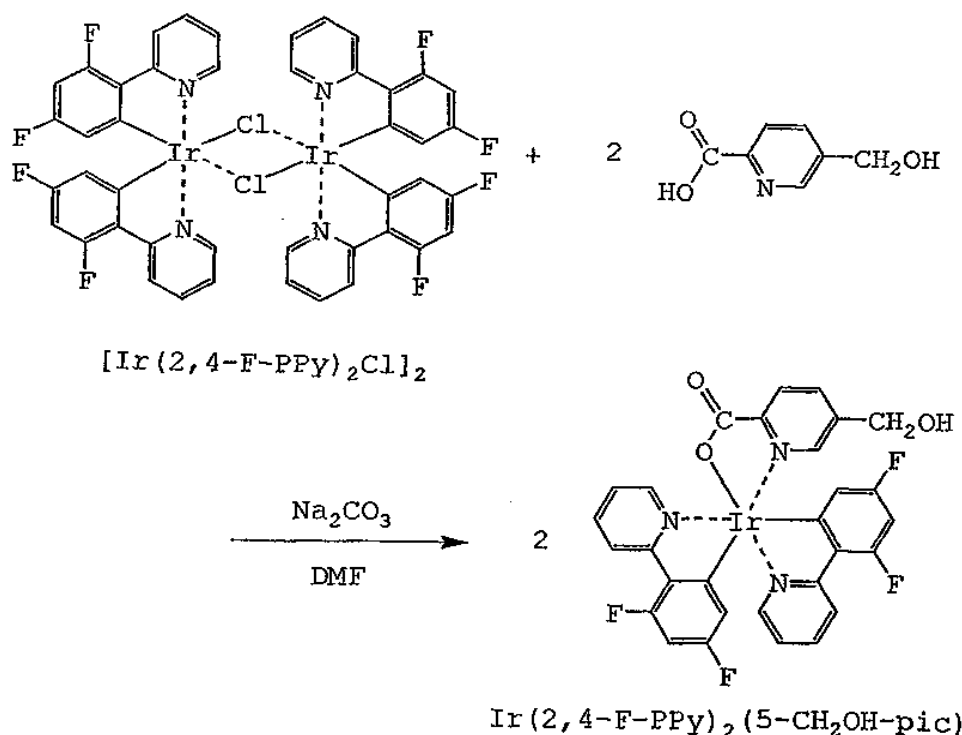
(1) (2-(2,4-)) (5-())
 (III)(, Ir(2,4-F-PPy)₂(5-CH₂OH-pic))

, N,N- (DMF) 10ml [Ir(2,4-F-PPy)₂Cl]₂ 121.6mg(0.1mmol), 5-
 45.9mg(0.3mmol) 106.0mg(1.0mmol) 가 , 80 2
 , 50ml 가 , : =1:19()) /
 , Ir(2,4-F-PPy)₂(5-CH₂OH-pic) 108.7mg 75% . C, H
 N , ¹H-NMR

¹H-NMR(DMSO-d₆, ppm): δ 8.54(d, 1H, J=4.6Hz), 8.3-8.2(m, 2H), 8.1-8.0(m, 4H), 7.70(s, 1H), 7.61(d, 1H, J=4.9Hz), 7.49(dd, 1H, J=6.6Hz, 6.6Hz), 7.32(dd, 1H, J=6.6Hz, 6.6Hz), 6.9-6.7(m, 2H), 5.71(dd, 1H, J=8.9Hz, 2.4Hz), 5.46(dd, 1H, J=8.5Hz, 2.3Hz), 5.42(t, 1H, J=4.6Hz), 4.49(d, 2H, J=4.6Hz)

Calcd: C 48.06, H 2.50, N 5.80

Found: C 48.05, H 2.54, N 5.86



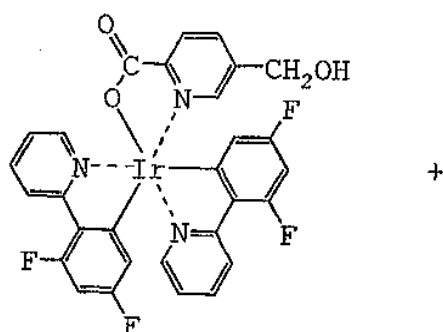
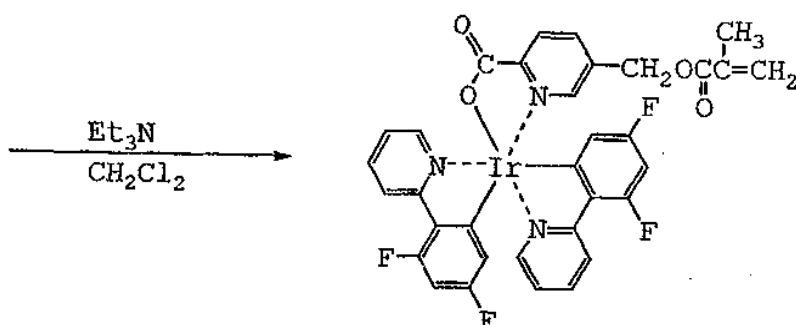
(2) , Ir(2,4-F-PPy)₂(5-CH₂MA-pic)

, 10ml Ir(2,4-F-PPy)₂(5-CH₂OH-pic) 72.5mg(0.1mmol) 2,6- -t- -4-
 0.2mg 101.2mg(1.0mmol)
 52.3mg(0.50mmol) 가 , 2 50ml 가 ,
 : =3:97()) /
 Ir(2,4-F-PPy)₂(3-CH₂MA-pic) 70.6mg 89% . C, H N , ¹H-NMR

¹H-NMR(DMSO-d₆, ppm): δ 8.53(d, 1H, J=5.1Hz), 8.28(d, 1H, J=8.4Hz), 8.22(d, 1H, J=8.6Hz), 8.1-8.0(m, 4H), 7.70(s, 1H), 7.66(d, 1H, J=4.9Hz), 7.48(dd, 1H, J=6.5Hz, 6.5Hz), 7.31(dd, 1H, J=6.5Hz, 6.5Hz), 6.9-6.7(m, 2H), 5.84(s, 1H), 5.7-5.6(m, 2H), 5.47(dd, 1H, J=8.8Hz, 2.6Hz), 5.24(d, 2H, J=2.7Hz), 1.78(s, 3H)

Calcd: C 50.00, H 2.80, N 5.30

Found: C 49.92, H 2.87, N 5.28


 $\text{Ir}(2,4\text{-F-PPy})_2(5\text{-CH}_2\text{OH-pic})$

 $\text{Ir}(2,4\text{-F-PPy})_2(5\text{-CH}_2\text{MA-pic})$

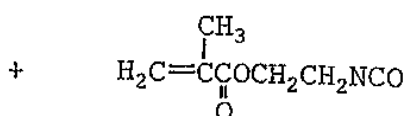
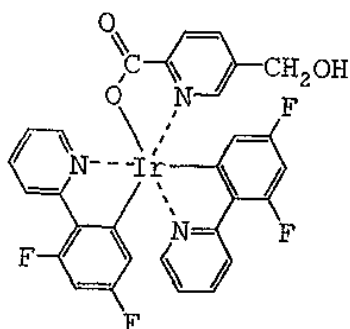
47: (2-(2,4-)) (5-(2- ()))
 (III)(, Ir(2,4-F-PPy)₂(5-CH₂MOI-pic))
 , Ir(2,4-F-PPy)₂(5-CH₂MOI-pic))

, 10ml 46 Ir(2,4-F-PPy)₂(5-CH₂OH-pic) 72.5
 mg(0.1mmol), 2,6- -tert- -4- (BHT) 0.2mg (IV) (DBTL) 1.3mg
 . K. 'MOI') 가 , 31.0mg(0.2mmol)('Karenz MOI', Showa Denko K
 0ml 가 , 50 1 5
 (, =3:97()) /
 , Ir(2,4-F-PPy)₂(3-CH₂MOI-pic) 76.4mg . 87% . C, H N
 , ¹H-NMR

¹H-NMR(DMSO-d₆, ppm): δ 8.53(d, 1H, J=5.1Hz), 8.32(dd, 2H, J=8.0, 1.8Hz), 8.25(d, 1H, J=8.9Hz), 8.22(d, 1H, J=9.2Hz), 8.1-8.0(m, 3H), 7.60(d, 1H, J=4.6Hz), 7.51(dd, 1H, J=6.5, 6.5Hz), 7.35(dd, 1H, J=6.5, 6.5Hz), 6.9-6.7(m, 2H), 6.10(s, 1H), 5.87(s, 1H), 5.71(dd, 1H, J=8.4, 2.2Hz), 5.46(dd, 1H, J=8.8, 2.6Hz), 4.90(s, 2H), 4.23(t, 2H, J=1.9Hz), 3.47(m, 2H), 1.90(s, 3H)

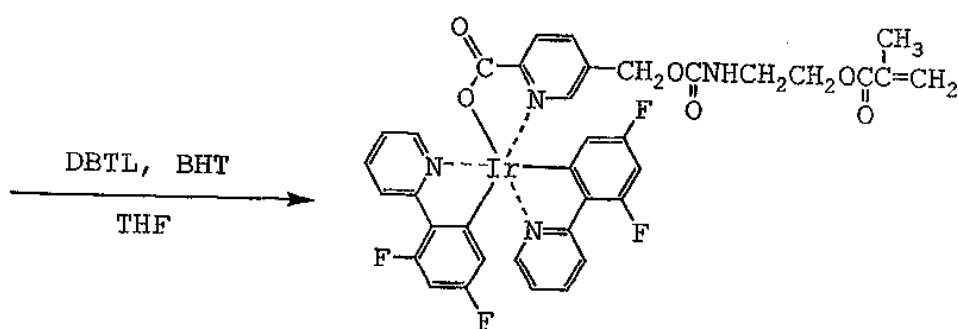
Calcd: C 50.62, H 3.33, N 6.38

Found: C 50.59, H 3.35, N 6.32



Ir(2,4-F-PPy)₂(5-CH₂OH-pic)

MOI



DBTL, BHT

THF

Ir(2,4-F-PPy)₂(5-CH₂MOI-pic)

48: (2-(2,4-)) (5-(2-()))
(III)(, Ir(2,4-F-PPy)₂(5-COHEMA-pic))

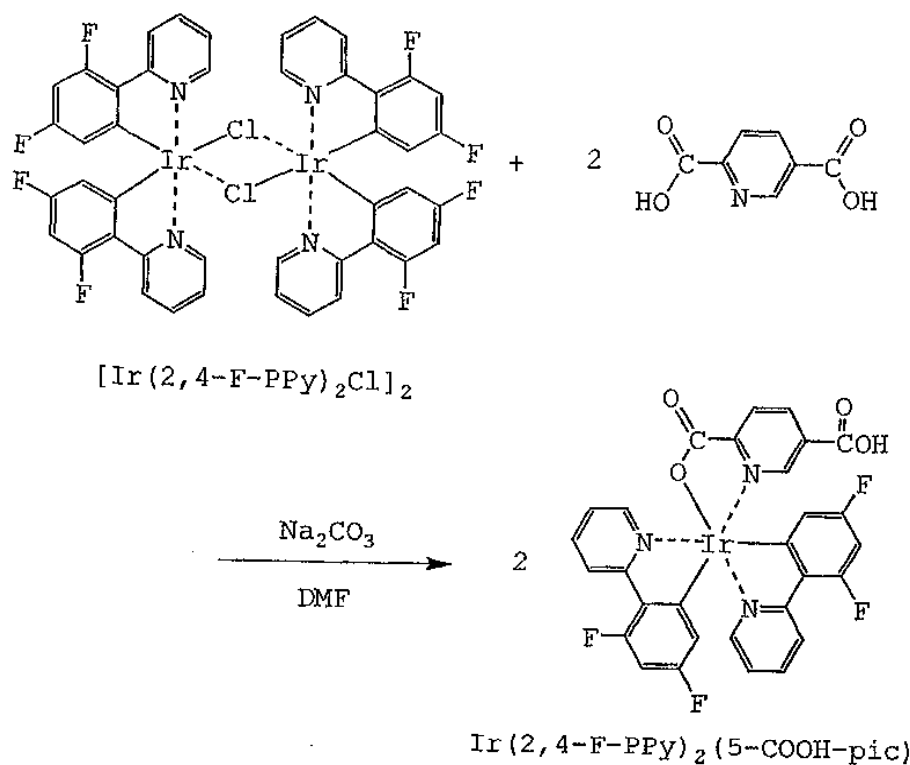
(1) (2-(2,4-)) (5-) (III)
(, Ir(2,4-F-PPy)₂(5-COOH-pic))

, N,N- (DMF) 10ml Ir(2,4-F-PPy)₂Cl]₂ 243.2mg(0.2mmol), 2,5-
100.3mg(0.6mmol) 212.0mg(2.0mmol) 가 , 80 2
1N 50ml 가
(, : =1:4())
, Ir(2,4-F-PPy)₂(5-COOH-pic) 204.0mg 69% . C, H N
, ¹H-NMR

¹H-NMR(DMSO-d₆, ppm): δ 10.7(s, 1H), 8.53(d, 1H, J=5.1Hz), 8.37(dd, 2H, J=8.0, 1.8Hz), 8.28(d, 1H, J=8.9Hz), 8.25(d, 1H, J=9.2Hz), 8.1-8.0(m, 3H), 7.59(d, 1H, J=4.6Hz), 7.47(dd, 1H, J=6.5, 6.5Hz), 7.32(dd, 1H, J=6.5, 6.5Hz), 6.9-6.7(m, 2H), 5.70(dd, 1H, J=8.4, 2.2Hz), 5.48(dd, 1H, J=8.8, 2.6Hz)

Calcd: C 47.15, H 2.18, N 5.69

Found: C 47.10, H 2.28, N 5.66



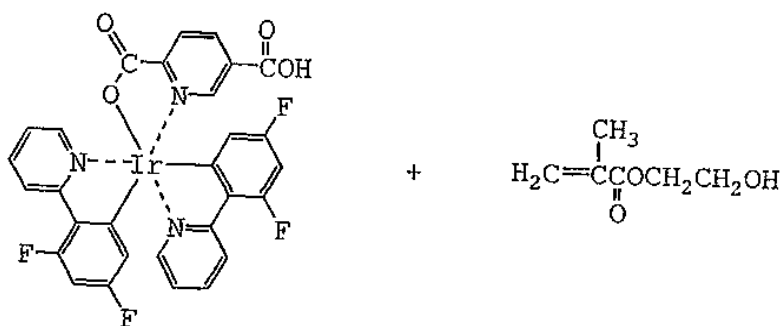
(2) , Ir(2,4-F-PPy)₂(5-COHEMA-pic)

THF 10ml Ir(2,4-F-PPy)₂(5-COOH-pic) 73.9mg(0.1mmol), (PPh₃) 52.5mg(0.2mmol), 2-
 mol), 2- 19.5mg(0.15mmol), -20
 (DEAD) 40%
 , 2
 (=1:19())
 , Ir(2,4-F-PPy)₂(5-COHEMA-pic) 61.5mg
 72% C, H N , ¹H-NMR

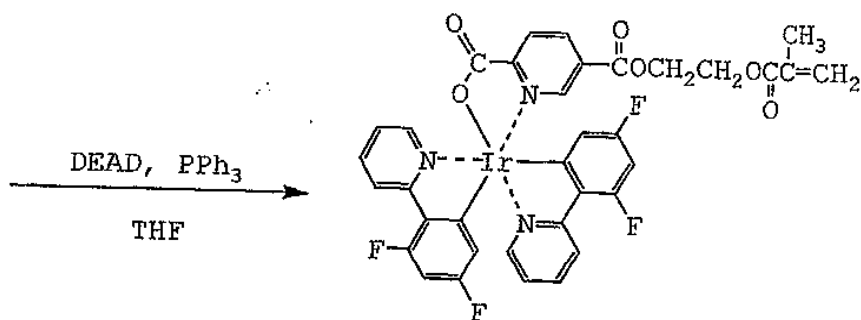
¹H-NMR(DMSO-d₆, ppm): δ 8.54(d, 1H, J=5.1Hz), 8.37(dd, 2H, J=8.0, 1.8Hz), 8.31(d, 1H, J=8.9Hz), 8.27(d, 1H, J=9.2Hz), 8.1-8.0(m, 3H), 7.57(d, 1H, J=4.6Hz), 7.46(dd, 1H, J=6.5, 6.5Hz), 7.32(dd, 1H, J=6.5, 6.5Hz), 6.9-6.7(m, 2H), 6.10(s, 1H), 5.87(s, 1H), 5.71(dd, 1H, J=8.4, 2.2Hz), 5.51(dd, 1H, J=8.8, 2.6Hz), 4.64(t, 2H, J=2.0Hz), 4.55(t, 2H, J=2.0Hz), 1.93(s, 3H)

Calcd: C 49.41, H 2.84, N 4.94

Found: C 49.38, H 2.88, N 4.95



$\text{Ir}(2,4\text{-F-PPy})_2(5\text{-CH}_2\text{OH-pic})$



$\text{Ir}(2,4\text{-F-PPy})_2(5\text{-COHEMA-pic})$

49: (2-(2,4-)) (3-(4-()))
(III)(, $\text{Ir}(2,4\text{-F-PPy})_2(3\text{-ST-pic})$)

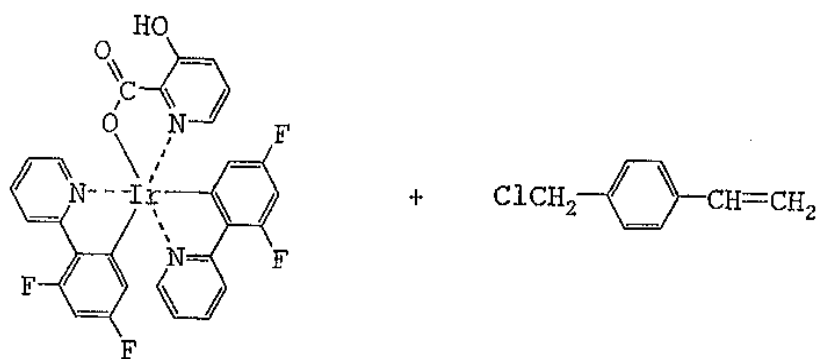
, $\text{Ir}(2,4\text{-F-PPy})_2(3\text{-ST-pic})$

, N,N- 5ml 45 $\text{Ir}(2,4\text{-F-PPy})_2(3\text{-OH-pic})$ 35.5mg(0.05mmol), 69.1mg(0.5mmol) 2,6- -tert- -4- 0.1mg 가 , 4- 30.5mg(0.2mmol) 가 . 80 4 . =3:97() 50ml 가 (, : =3:97()) , $\text{Ir}(2,4\text{-F-PPy})_2(3\text{-ST-pic})$ 24.0mg . 58% . C, H N , $^1\text{H-NMR}$

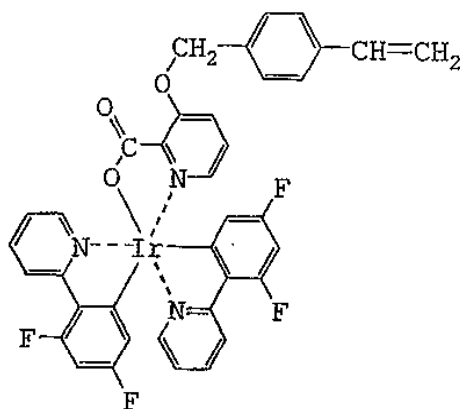
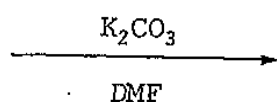
$^1\text{H-NMR}$ (DMSO- d_6 , ppm): δ 8.59(d, 1H, J=5.1Hz), 8.3-8.2(m, 2H), 8.1-8.0(m, 2H), 7.9(d, 1H, J=8.6Hz), 7.67(d, 1H, J=5.1Hz), 7.6-7.3(m, 7H), 6.9-6.7(m, 3H), 5.85(d, 1H, J=17.8Hz), 5.67(dd, 1H, J=8.9, 2.4Hz), 5.45(dd, 1H, J=8.9, 2.4Hz), 5.29(s, 2H), 5.27(d, 1H, J=11.1Hz)

Calcd: C 53.75, H 2.93, N 5.08

Found: C 53.71, H 2.90, N 5.03



$\text{Ir}(2,4\text{-F-PPy})_2(5\text{-CH}_2\text{OH-pic})$



$\text{Ir}(2,4\text{-F-PPy})_2(3\text{-ST-pic})$

50: (3-MA-pic) (2-) (3-) (III)(, $\text{Ir}(\text{PPy})_2$)

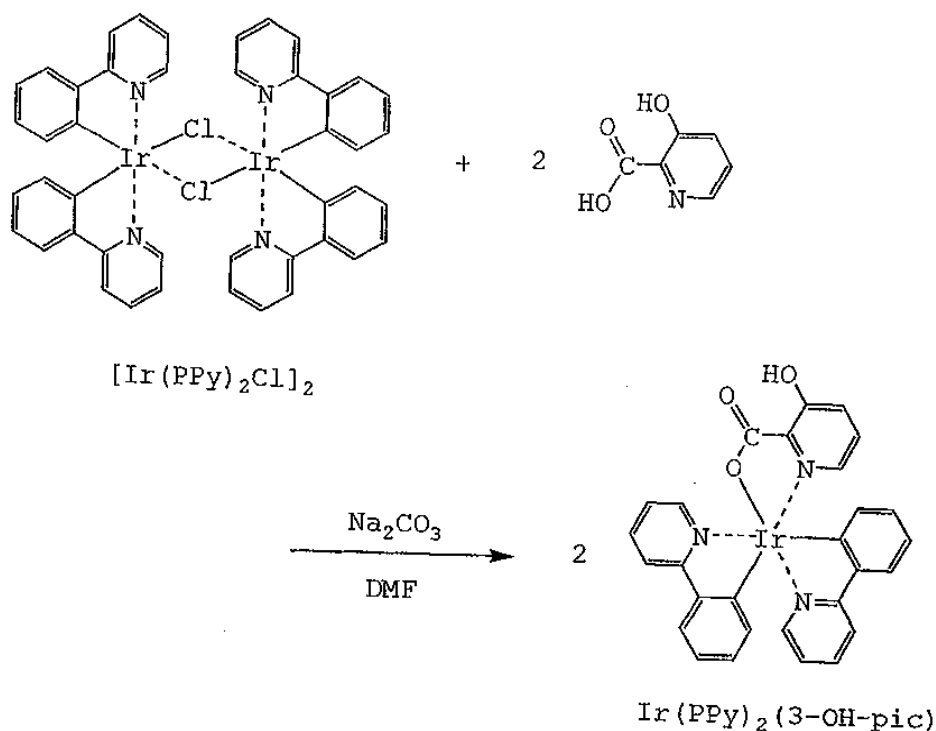
(1) (3-OH-pic) (2-) (3-) (III)(, $\text{Ir}(\text{PPy})_2$)

, N,N- (DMF) 10ml (μ -) (2-)
 (III)(, $[\text{Ir}(\text{PPy})_2\text{Cl}]_2$) 107.2mg(0.1mmol), 3- 41.7mg(0.3mmol)
 106.0mg(1.0mmol) 가 , 80 2 . 50ml 가
 , : =1:19()) , $\text{Ir}(\text{PPy})_2(3\text{-OH-pic})$ 106.0mg
 83% . C, H N , $^1\text{H-NMR}$.

$^1\text{H-NMR}(\text{DMSO-d}_6, \text{ppm})$: δ 8.46(d, 1H, $J=4.9\text{Hz}$), 8.23(d, 1H, $J=8.1\text{Hz}$), 8.20(d, 1H, $J=8.6\text{Hz}$), 8.0-7.9(m, 2H), 7.80(m, 2H), 7.60(dd, 1H, $J=5.9, 5.9\text{Hz}$), 7.55(d, 1H, $J=1.4\text{Hz}$), 7.47(dd, 1H, $J=8.5, 5.0\text{Hz}$), 7.40(dd, 1H, $J=5.9, 5.9\text{Hz}$), 7.26(dd, 1H, $J=5.9, 5.9\text{Hz}$), 7.16(dd, 1H, $J=4.9, 1.4\text{Hz}$), 6.90(dd, 1H, $J=7.6, 7.6\text{Hz}$), 6.87(dd, 1H, $J=7.6, 7.6\text{Hz}$), 6.8-6.7(m, 2H), 6.20(d, 1H, $J=7.6\text{Hz}$), 6.05(d, 1H, $J=7.6\text{Hz}$)

Calcd: C 52.65, H 3.16, N 6.58

Found: C 52.62, H 3.21, N 6.57



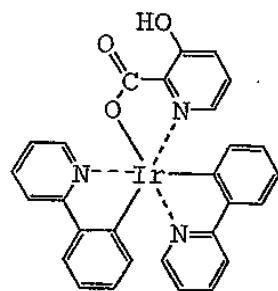
(2) , Ir(PPy)₂(3-MA-pic)

5ml Ir(PPy)₂(3-OH-pic) 31.9mg(0.05mmol) 2,6- -t- -4- 0.1mg
 50.6mg(0.5mmol) 26.1mg(0.25mmol) 가 , 2 50ml 가 , :
 =1:19()) , Ir(PPy)
 2(3-MA-pic) 23.0mg 65% C, H N , ¹H-NMR

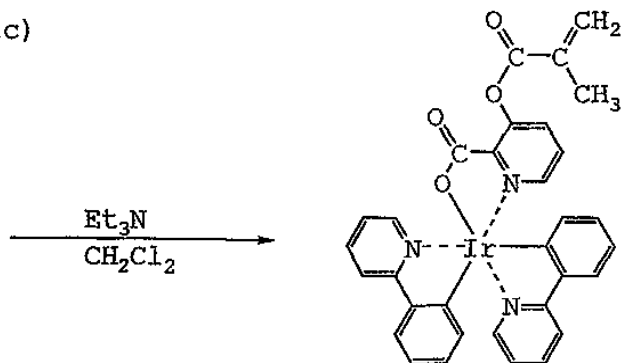
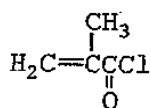
¹H-NMR(DMSO-d₆, ppm): δ 8.50(d, 1H, J=5.7Hz), 8.23(d, 1H, J=4.9Hz), 8.21(d, 1H, J=5.7Hz), 8.0-7.9(m, 3H), 7.81(t, 2H, J=8.9Hz), 7.7-7.5(m, 3H), 7.42(dd, 1H, J=6.6, 6.6Hz), 7.25(dd, 1H, J=6.3, 6.3Hz), 6.91(dd, 1H, J=7.6, 7.6Hz), 6.86(dd, 1H, J=7.6, 7.6Hz), 6.25(s, 1H), 6.22(d, 1H, J=7.8Hz), 6.01(d, 1H, J=7.3Hz), 5.87(s, 1H), 2.01(s, 3H)

Calcd: C 54.38, H 3.42, N 5.95

Found: C 54.29, H 3.51, N 5.94

Ir(PPy)₂(3-OH-pic)

+

Ir(PPy)₂(3-MA-pic)

51: N- /Ir(2,4-F-PPy)₂(3-MA-pic) (, VCz-co-Ir(2,4-F-PPy)₂(3-MA-pic)

N- Ir(2,4-F-PPy)₂(3-MA-pic) N-
/Ir(2,4-F-PPy)₂(3-MA-pic)

25ml N- 966mg(5.0mmol), Ir(2,4-F-PPy)₂(3-MA-pic) 38.9mg(0.05mmol) AIB
N 8.2mg(0.05mmol) , 1 가 80
250ml
50ml , 60 12 25ml 2
-PPy)₂(3-MA-pic) 673mg , 5 , GPC ICP VCz-co-Ir(2,4-F
Ir

52~56

Ir(2,4-F-PPy)₂(3-MA-pic) 46~50 51
5 , GPC ICP Ir

[5]

		(%)	GPC			Ir (mol%)
			Mn	Mw	Mw/Mn	
51	VCz-co-Ir(2,4-F-PPy) ₂ (3-MA-pic)	67	4500	12800	2.84	1.07
52	VCz-co-Ir(2,4-F-PPy) ₂ (5-CH ₂ MA-pic)	79	4300	13600	3.16	1.04
53	VCz-co-Ir(2,4-F-PPy) ₂ (5-CH ₂ MOI-pic)	63	5100	14800	2.90	1.02
54	VCz-co-Ir(2,4-F-PPy) ₂ (5-COHEMA-pic)	61	4100	13700	3.34	0.98
55	VCz-co-Ir(2,4-F-PPy) ₂ (3-ST-pic)	72	4600	11400	2.48	1.04

56	VCz-co-Ir(PPy) ₂ (3-MA-pic)	74	4400	13000	2.95	1.01
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Mn:

Mw:

57~62: 가

25mm×25mm ITO- (Nippon Electric Co., Ltd.) 2 ITO() 4mm

ITO- ITO() (3,4-)/ (Bayer AG , 2

'Baytron P') 3,500rpm, 40 50nm 60

21.0mg 2-(4-)-5-(4-tert-)-1,3,4- (PBD)(Tokyo Kasei Kogyo Co., Lt

d.) 9.0mg (Wako Pure Chemical Industries, Ltd. ,) 2970mg

0.2μm

3,000rpm, 30

(25) 30 100nm

1:10 3mm 2

50nm

EL Adventest 가 4mm()×3mm() 4

Topcon BM-8 TR6143

20V (4).

6

[6]

			(V)	20V (cd/m ²)
57	VCz-co-Ir(2,4-F-PPy) ₂ (3-MA-pic)	54	8	790
58	VCz-co-Ir(2,4-F-PPy) ₂ (5-CH ₂ MA-pic)	55	8	500
59	VCz-co-Ir(2,4-F-PPy) ₂ (5-CH ₂ MOI-pic)	56	9	640
60	VCz-co-Ir(2,4-F-PPy) ₂ (5-COHEMA-pic)	57	8	740
61	VCz-co-Ir(2,4-F-PPy) ₂ (3-ST-pic)	58	9	800
62	VCz-co-Ir(PPy) ₂ (3-MA-pic)	59	8	910

63 : [6-(4-)-2,4-] [2-(2-)] (III)(,

Ir(btp)₂ [1-(StMe)-acac])

38(1) 6-(4-)-2,4-

(S. Lamansky, et al., Inorganic Chemistry, 40, 1704 (2001)) (μ -)
 (2-(2-)-)- (III)(, [Ir(btp)₂Cl]₂) Ir(btp)₂[1-(StMe)-acac]

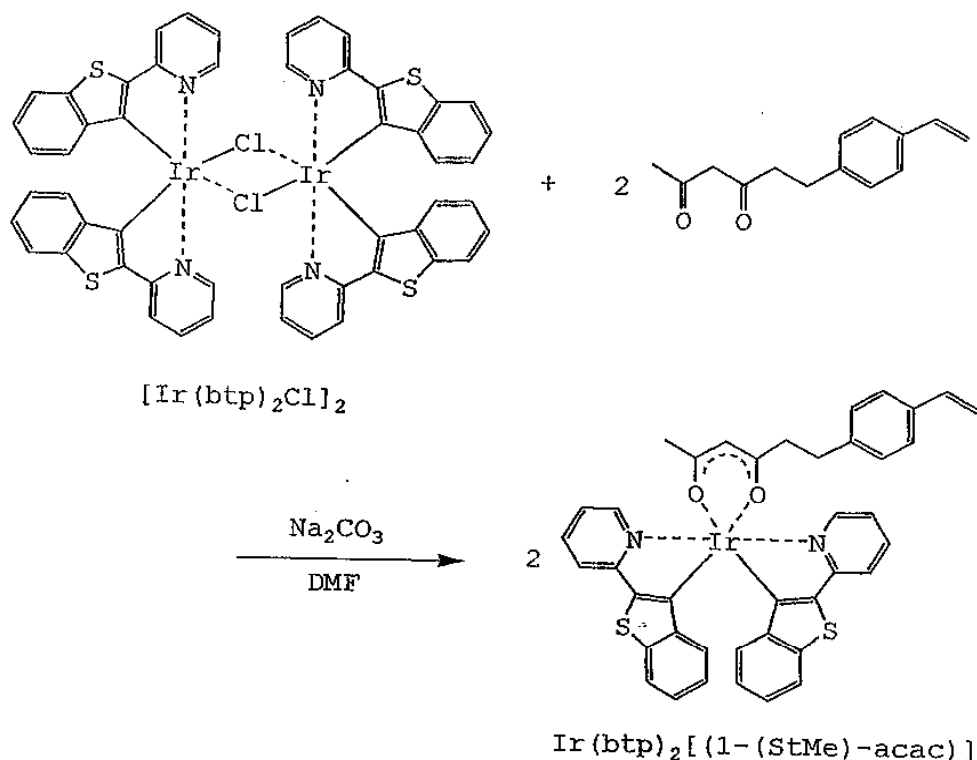
, N,N- (, DMF) 10ml [Ir(btp)₂Cl]₂ 253mg(0.20mmol)
 6-(4-)-2,4- 161mg(0.74mmol), 64mg 2,6- -tert- -4- (, B
 HT) 1.9mg(0.0086mmol) 가 , 80 1 가 . 100m
 I 50ml 가 , ,

20 Ir(btp)₂[1-(StMe)-acac] 153mg(0.18mg)
 47% . C, H N , ¹H-NMR

¹H-NMR(CDCl₃, ppm): δ 8.40(d, J=5.4Hz, 1H, btp), 7.97(d, J=5.4Hz, 1H, btp), 7.65(m, 6H, btp), 7.1-6.7(m, 10H,), 6.63(dd, J=17.8, 11.1Hz, 1H,), 6.24(d, J=8.1Hz, 1H, btp), 6.16(d, J=7.8Hz, 1H, btp), 5.65(d, J=17.8Hz, 1H,), 5.22(s, 1H, -), 5.18(d, J=11.1Hz, 1H,), 2.56(m, 2H,), 2.37(m, 2H,), 1.75(s, 3H,)

Calcd: C 58.02, H 3.77, N 3.38 (C₄₀H₃₁IrN₂O₂S₂)

Found: C 57.79, H 3.81, N 3.55



64: [6-(4-)-2,4-] [2-(2-)]
 (III)(, Ir(btp)₂[1-(MA-Ph-Me)-acac])

(1) 41(1) (2) 6-(4-)-2,4-
 [Ir(btp)₂Cl]₂ Ir(btp)₂[1-(OH-Ph-Me)-acac]

, DMF 10ml 6-(4-)-2,4- 141mg(0.680mmol) [Ir(btp)₂Cl]₂ 24
 5mg(0.19mmol) 111mg(1.06mmol) , 80 1.5 가 .

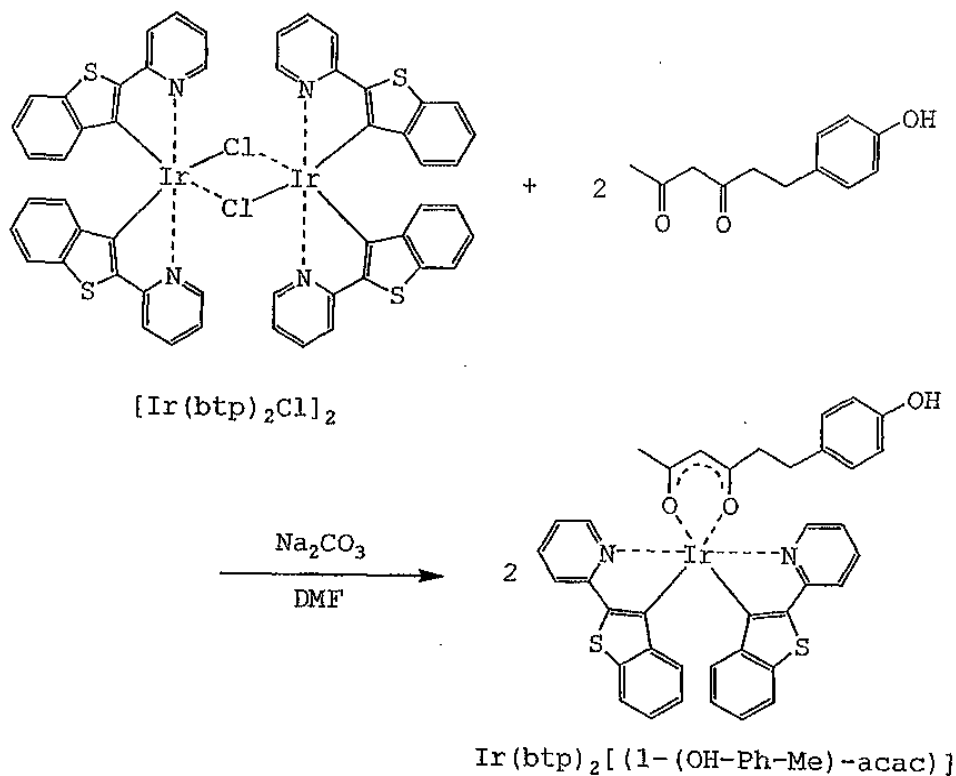
: / / =5:10:1()
 , Ir(btp)₂[1-(OH-Ph-Me)-acac] 215mg(0.26mmol)

70% . C, H N , $^1\text{H-NMR}$

$^1\text{H-NMR}(\text{CDCl}_3, \text{ppm})$: δ 8.40(d, $J=5.4\text{Hz}$, 1H, btp), 8.06(d, $J=5.4\text{Hz}$, 1H, btp), 7.63(m, 6H, btp), 7.04(m, 3H, btp), 6.81(m, 3H, btp), 6.66(d, $J=8.4\text{Hz}$, 2H, $-\text{C}_6\text{H}_4-\text{OH}$), 6.38(d, $J=8.4\text{Hz}$, 2H, $-\text{C}_6\text{H}_4-\text{OH}$), 5.22(s, 1H, -), 5.20(br, 1H, OH), 2.48(m, 2H, -), 2.31(m, 2H, -), 1.75(s, 3H, -)

Calcd: C 55.80, H 3.57, N 3.42 ($\text{C}_{38}\text{H}_{29}\text{IrN}_2\text{O}_3\text{S}_2$)

Found: C 56.19, H 3.57, N 3.31



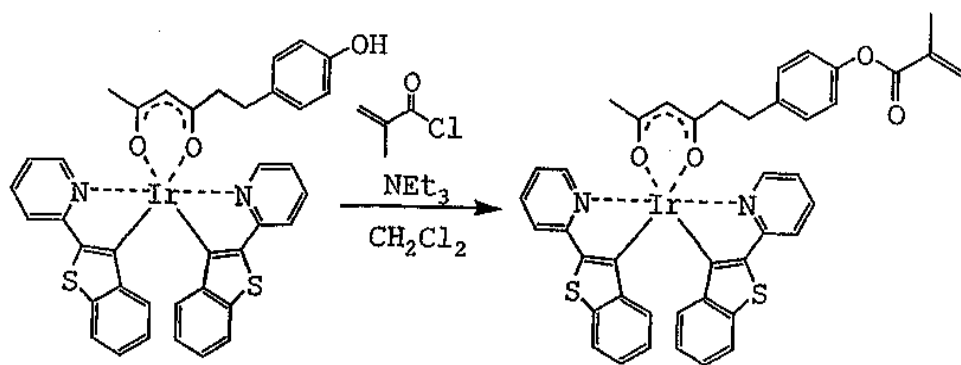
(2) $\text{Ir}(\text{btp})_2[1-(\text{OH-Ph-Me})-\text{acac}]$
 $\text{Ir}(\text{btp})_2[1-(\text{MA-Ph-Me})-\text{acac}]$

20ml $\text{Ir}(\text{btp})_2[1-(\text{OH-Ph-Me})-\text{acac}]$ 248mg(0.32mmol)
 0.25ml(1.8mmol) 0.20ml(2.0mmol) 가 , 1
 20ml
 (: / / =2:4:1())
 $\text{Ir}(\text{btp})_2[1-(\text{MA-Ph-Me})-\text{acac}]$ 180mg(0.20mmol)
 64% . C, H N , $^1\text{H-NMR}$

$^1\text{H-NMR}(\text{CDCl}_3, \text{ppm})$: δ 8.42(d, $J=5.4\text{Hz}$, 1H, btp), 8.10(d, $J=5.4\text{Hz}$, 1H, btp), 7.65(m, 6H, btp), 7.1-6.7(m, 10H, -), 6.40(d, $J=8.1\text{Hz}$, 1H, btp), 6.27(d, $J=8.1\text{Hz}$, 1H, btp), 6.12(s, 1H, -), 5.71(s, 1H, -), 5.19(s, 1H, -), 2.51(m, 2H, C_2H_4), 2.39(m, 2H, C_2H_4), 1.89(s, 3H, -), 1.80(s, 3H, -)

Calcd: C 56.93, H 3.75, N 3.16 ($\text{C}_{42}\text{H}_{33}\text{IrN}_2\text{O}_4\text{S}_2$)

Found: C 57.09, H 3.77, N 4.18



65 : {6-[4-(2-)]-2,4- } [2-(
2-)] (III) (, $\text{Ir}(\text{btp})_2[1-(\text{MOI-Ph-Me})\text{-acac}]$)

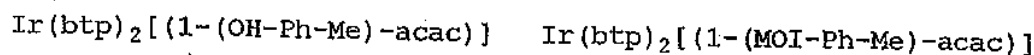
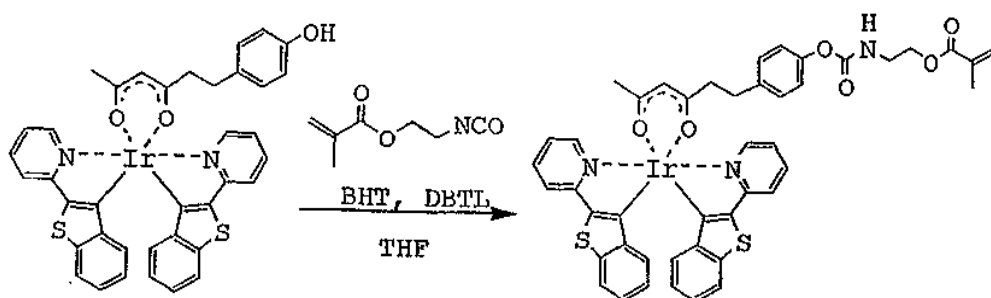
64 $\text{Ir}(\text{btp})_2[1-(\text{OH-Ph-Me})\text{-acac}]$ 2-
('Karens MOI', Showa Denko K. K. , 'MOI')
 $\text{Ir}(\text{btp})_2[1-(\text{MOI-Ph-Me})\text{-acac}]$.

, THF 10ml $\text{Ir}(\text{btp})_2[1-(\text{OH-Ph-Me})\text{-acac}]$ 215mg(0.26mmol) BHT 4.0mg(0.18mmol)
, (IV) (, DBTL) 35mg MOI 401mg(2.58mmol) ,
3 가 , ,
(: / / =5:10:1()) .
223mg(0.23mmol) . 87% . C, H N , $^1\text{H-NMR}$.

$^1\text{H-NMR}(\text{CDCl}_3, \text{ppm})$: δ 8.40(d, $J=5.7\text{Hz}$, 1H, btp), 8.12(d, $J=5.1\text{Hz}$, 1H, btp), 7.65(m, 6H, btp), 7.1-6.7(m, 10H,), 6.25(d, $J=8.4\text{Hz}$, 1H, btp), 6.20(d, $J=8.1\text{Hz}$, 1H, btp), 6.16(s, 1H,), 5.63(s, 1H,), 5.26(br-s, 1H, NH), 5.21(s, 1H, -), 4.31(t, $J=5.4\text{Hz}$, 2H, N-C₂H₄-O), 3.59(t, $J=5.4\text{Hz}$, 2H, N-C₂H₄-O), 2.55(m, 2H, C-C₂H₄-C), 2.34(m, 2H, C-C₂H₄-C), 1.98(s, 3H, -), 1.76(s, 3H, -)

Calcd: C 55.54, H 3.94, N 4.32 (C₄₅H₃₈IrN₃O₆S₂)

Found: C 55.13, H 3.89, N 4.58



66 : [1-(2-) -2,4-] [2-(2-)]
(III) (, $\text{Ir}(\text{btp})_2[1-\text{MOI-Ph-Me})\text{-acac}]$)

(1) , [Ir(btp)₂Cl]₂ (0514217
) (1-tert-)-2,4- (1-TBDMSO-2,4-) , Ir(btp)

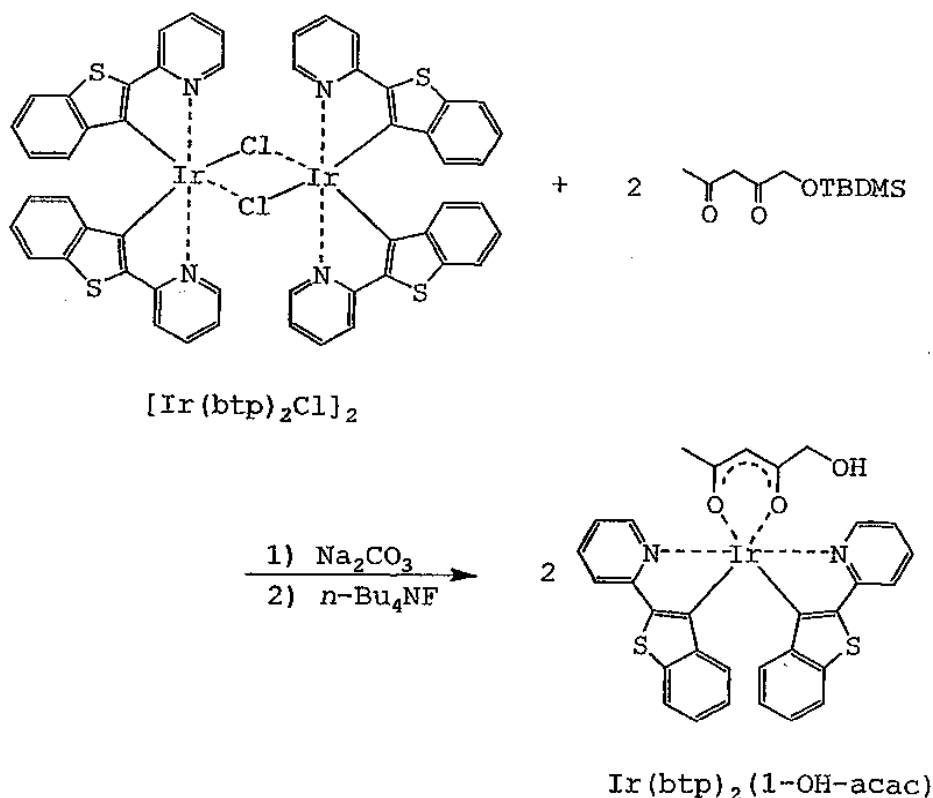
) $_2$ [1-OH-acac]

, DMF 15ml 1-TBDMSO-2,4- 310mg(1.35mmol) 80 1 [Ir(btp) $_2$ Cl] $_2$ 449mg(0.35mmol)
 137mg(1.29mmol) 가 (: /)
 , -n- (n-Bu $_4$ NF) 1.0M THF 0.60ml(0.60mmol)
 0.5 5:10:2()
 Ir(btp) $_2$ [1-OH-acac] 360mg(0.49mmol)
 71% C, H N , 1 H-NMR

1 H-NMR(CDCl $_3$, ppm): δ 8.40(d, J=5.4Hz, 1H, btp), 8.35(d, J=5.1Hz, 1H, btp), 7.79(m, 2H, btp), 7.63(m, 4H, btp), 7.04(m, 4H, btp), 6.81(t, J=7.3Hz, 2H, btp), 6.20(t, J=6.8Hz, 2H, btp), 5.24(s, 1H, -CHH'-OH), 3.89(dd, J=8.1, 5.1Hz, 1H, -CHH'-OH), 3.80(dd, J=8.1, 5.1Hz, 1H, -CHH'-OH), 2.92(t, J=5.1Hz, 1H, OH), 1.83(s, 3H, -CH $_3$)

Calcd: C 51.15, H 3.18, N 3.85 (C $_{31}$ H $_{23}$ IrN $_2$ O $_3$ S $_3$)

Found: C 51.41, H 3.36, N 3.49



(2) , Ir(btp) $_2$ [1-OH-acac] MOI 가 Ir(btp) $_2$ [1-MOI-ac

, Ir(btp) $_2$ [1-OH-acac] 177mg, BHT 3.0mg(0.086mmol) DBTL 20mg(0.032mmol) THF 10ml
 MOI 100mg(0.64mmol) 가 2 가 (: /)
 / 10:20:3() / . 2 -20
 Ir(btp) $_2$ [1-MOI-acac] 173mg(0.20mmol) 81% C, H N
 , 1 H-NMR

71~74: 가 가

8 57~62 ,

, 8 , 20V (4).

[8]

			(V)	20V (cd/m ²)
71	VCz-co-Ir(btp) ₂ [1-(StMe)-acac]	70	9	420
72	VCz-co-Ir(btp) ₂ [1-(MA-Ph-Me)-acac]	71	9	400
73	VCz-co-Ir(btp) ₂ [1-(MOI-Ph-Me)-acac]	72	9	360
74	VCz-co-Ir(btp) ₂ [1-MOI-acac]	73	9	390

75 : (2-(4-)) () (III)(, I
r(4-MA-PPy)₂ (acac))

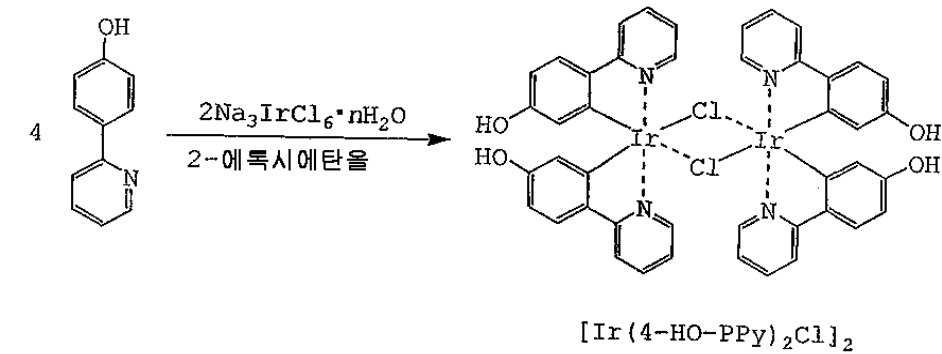
(1) (III)(, [Ir(4-HO-PPy)₂Cl]₂) (μ -) (2-(4-))

, 27(1) (2) 4-HO-PPy 0.86g(5.0mmol) (III)
1.00g 2- : =3:1() 40ml , 30 가
6
, 5 [Ir(4-HO-PPy)₂Cl]₂ 0.63g 74%
. C, H N , ¹H-NMR .

¹H-NMR(DMSO-d₆, ppm): δ 9.66(d, 2H, J=5.9Hz), 9.38(d, 2H, J=5.7Hz), 8.0-7.9(m, 8H), 7.61(d, 2H, J=8.1 Hz), 7.54(d, 2H, J=8.4Hz), 7.38(dd, 2H, J=6.2, 6.2Hz), 7.26(dd, 2H, J=5.7, 5.7Hz), 6.33(dd, 2H, J=8.6, 2.4Hz), 6.28(dd, 2H, J=8.4, 2.4Hz), 5.67(d, 2H, J=2.2Hz), 5.12(d, 2H, J=2.4Hz)

Calcd: C 46.52, H 2.84, N 4.93

Found: C 46.66, H 2.89, N 4.90



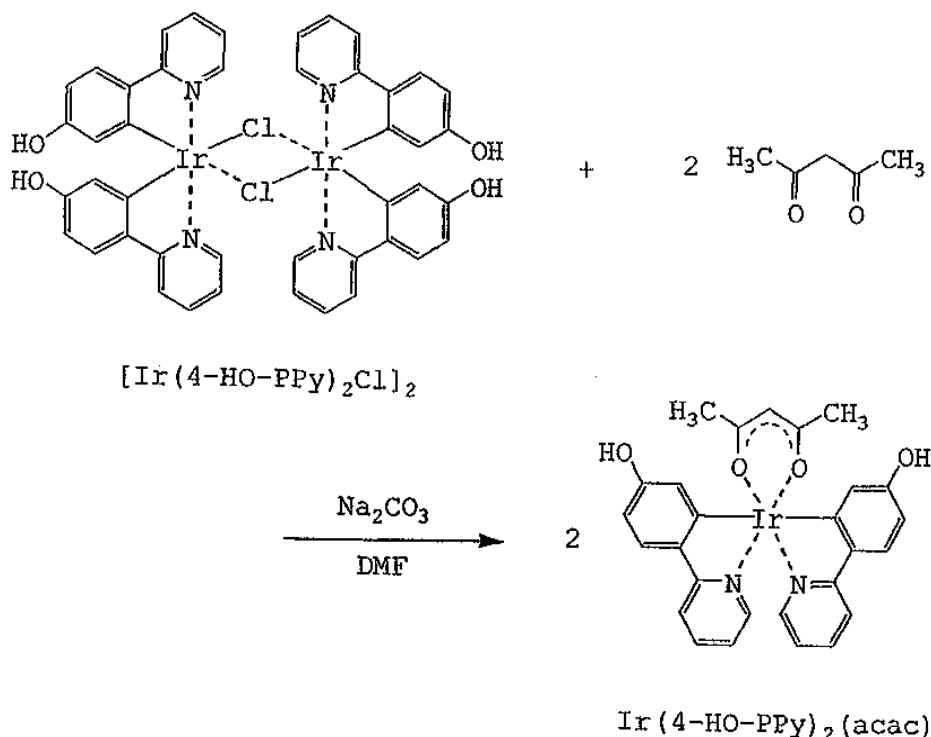
(2) (2-(4-)) () (III)(, Ir
(4-HO-PPy)₂ (acac))

, [Ir(4-HO-PPy)₂Cl]₂ 227.2g(0.2mmol) 212.0g(2.0mmol) N,N- (,
 , DMF) 20ml 2,4- 60.0mg(0.6mmol) 가 , 80
 2 50ml 가 , (, : =5:95())
 Ir(4-HO-PPy)₂(acac)
 152.0mg 60% . C, H N , ¹H-NMR .

¹H-NMR(CDCl₃, ppm): δ 8.35(d, 2H, J=5.7Hz), 7.7-7.6(m, 4H), 7.41(d, 2H, J=10.6Hz), 7.04(ddd, 2H, J=5.8, 5.8, 2.4Hz), 6.33(dd, 2H, J=8.4, 2.4Hz), 5.70(d, 2H, J=2.7Hz), 5.24(s, 1H), 1.78(s, 6H)

Calcd: C 51.34, H 3.67, N 4.43

Found: C 51.31, H 3.76, N 4.40



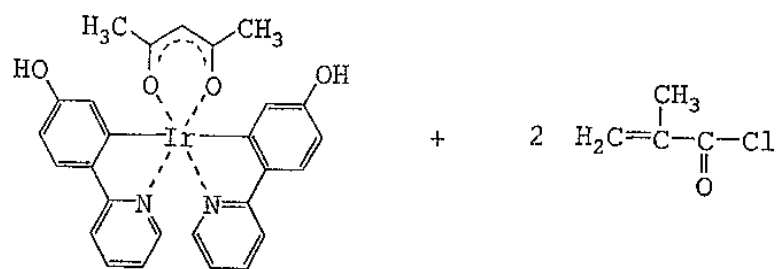
(3) , Ir(4-MA-PPy)₂(acac) .

, THF 10ml Ir(4-HO-PPy)₂(acac) 63.2mg(0.1mmol) 2,6- -tert- -4- (, BHT
) 0.1mg 81.0mg(0.8mmol)
 41.8mg(0.4mmol) 가 , 2 100ml 가 ,
 (, : =2:98())
 Ir(4-MA-PPy)₂(acac) 65.3mg 85% . C, H
 N , ¹H-NMR .

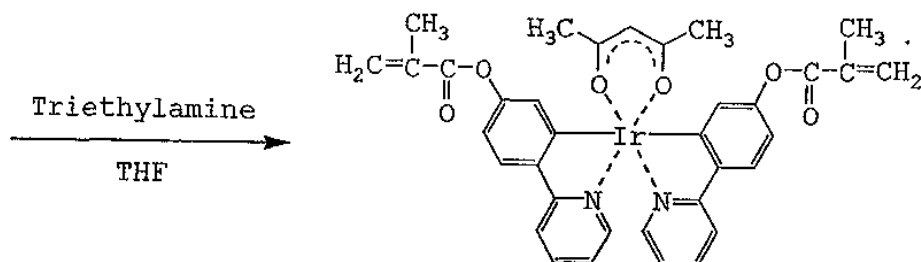
¹H-NMR(DMSO-d₆, ppm): δ 8.38(d, 2H, J=5.7Hz), 8.15(d, 2H, J=8.6Hz), 7.95(m, 2H), 7.78(d, 2H, J=8.9Hz), 7.39(m, 2H), 6.61(dd, 2H, J=8.4, 2.4Hz), 6.09(s, 2H), 5.76(s, 2H), 5.71(d, 2H, J=2.4Hz), 5.27(s, 1H), 1.86(s, 3H), 1.73(s, 3H)

Calcd: C 54.75, H 4.07, N 3.65

Found: C 54.68, H 4.13, N 3.61



$\text{Ir}(4\text{-HO-PPy})_2(\text{acac})$



$\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$

76 : (2-(4-((2-)))) (III)(, $\text{Ir}(4\text{-MOI-PPy})_2(\text{acac})$)

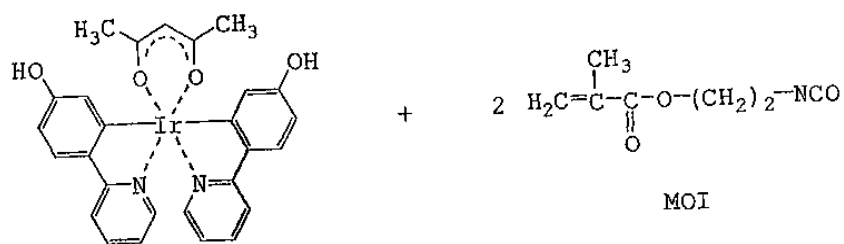
, $\text{Ir}(4\text{-MOI-PPy})_2(\text{acac})$.

, THF 10ml 75 $\text{Ir}(4\text{-HO-PPy})_2(\text{acac})$ 63.2mg(0.1mmol), BHT 0.2mg
(IV) (, DBTL) 1.3mg 2-
('Karezn MOI', Showa Denko K. K. , 'MOI'
) 62.0mg(0.4mmol) 가 , 50 1 . 50ml 가
, (, =5:95())
C, H N $^1\text{H-NMR}$, $\text{Ir}(4\text{-MOI-PPy})_2(\text{acac})$ 73.5mg . 78% .

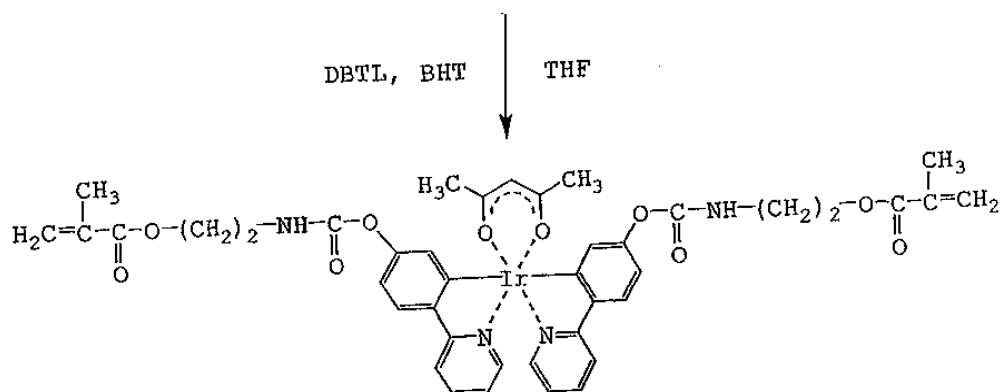
$^1\text{H-NMR}(\text{DMSO-d}_6, \text{ppm})$: δ 8.37(d, 2H, $J=5.9\text{Hz}$), 8.1(d, 2H, $J=7.8\text{Hz}$), 7.93(dd, 2H, $J=8.0, 8.0\text{Hz}$), 7.70(d, 2H, $J=8.6\text{Hz}$), 7.64(t, 2H), 7.4(dd, 2H, $J=6.3, 6.3\text{Hz}$), 6.56(dd, 2H, $J=8.2, 2.3\text{Hz}$), 6.02(s, 2H), 5.7-5.6(m, 4H), 5.26(s, 1H), 4.06(t, 4H, $J=5.4\text{Hz}$), 3.3(m, 4H, H_2O), 1.85(s, 6H), 1.73(s, 6H)

Calcd: C 52.28, H 4.39, N 5.95

Found: C 52.22, H 4.47, N 5.86



$\text{Ir(4-HO-PPy)}_2(\text{acac})$



$\text{Ir(4-MOI-PPy)}_2(\text{acac})$

77 : $\text{Ir(4-ST-PPy)}_2(\text{acac})$ (2-(4-(4-))) () (III)(, I

, $\text{Ir(4-ST-PPy)}_2(\text{acac})$.

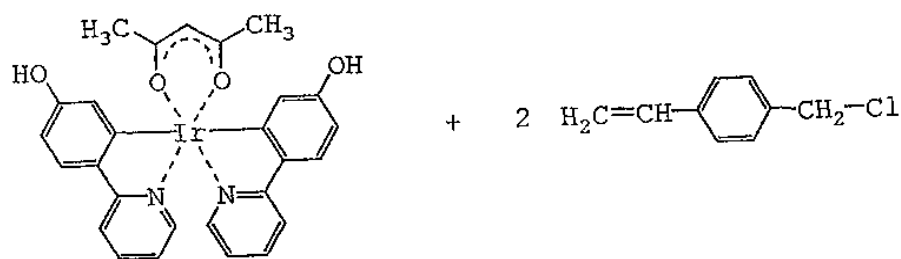
, DMF 10ml 75 $\text{Ir(4-HO-PPy)}_2(\text{acac})$ 63.2mg(0.1mmol), BHT 0.2mg
138.2mg(1.0mmol) 4- 61.0mg(0.4
mmol) 가 , 80 6 50ml 가 ,

(, : =5:95())
 $\text{Ir(4-ST-PPy)}_2(\text{acac})$ 62.2mg 72% . C, H N /
¹H-NMR

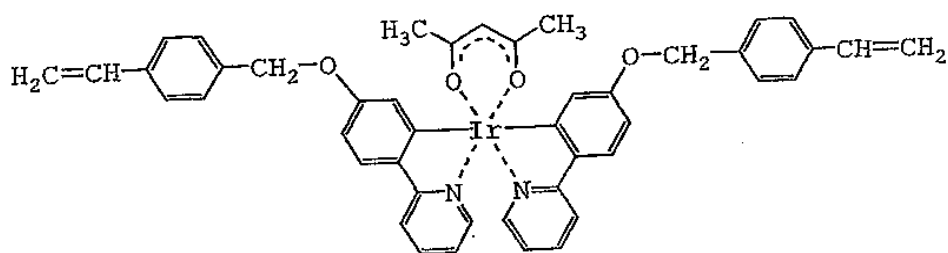
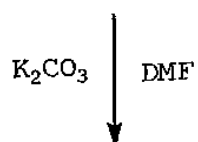
¹H-NMR(DMSO-d₆, ppm): δ 8.37(d, 2H, J=5.9Hz), 8.13(d, 2H, J=8.4Hz), 8.0-7.9(m, 2H), 7.75(d, 2H, J=8.9Hz), 7.5-7.3(m, 10H), 6.73(m, 2H), 6.59(dd, 2H, J=8.2, 2.4Hz), 5.88(d, 2H, J=17.8Hz), 5.73(d, 2H, J=2.4Hz), 5.3-5.2(m, 7H), 1.78(s, 3H)

Calcd: C 62.55, H 4.55, N 3.24

Found: C 62.58, H 4.65, N 3.20



$\text{Ir}(4\text{-HO-PPy})_2(\text{acac})$



$\text{Ir}(4\text{-ST-PPy})_2(\text{acac})$

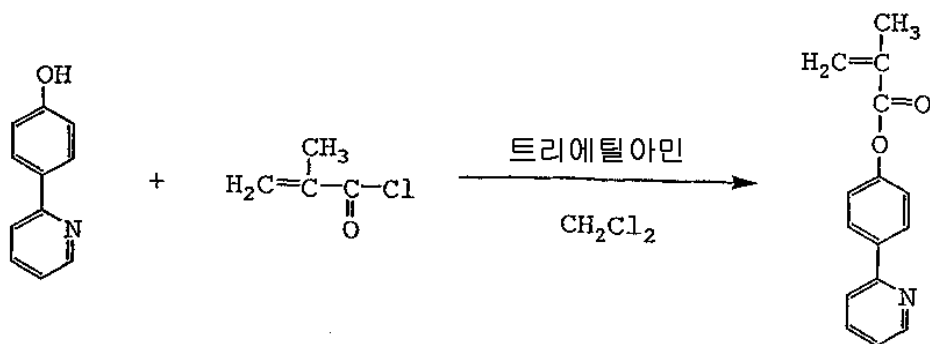
78 : $\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$ 2

(1) , 2-(4-) (, 4-MA-PPy) .
 , 20ml 75 4-HO-PPy 3.42g(20.0mmol)
 0.0mmol) , 6.07g(60.0mmol) 가 , 3.14g(3
 100ml 가 ,
 , (,) /
 , 4-MA-PPy 4.16g . 87% . C, H N , $^1\text{H-NMR}$.

$^1\text{H-NMR}(\text{CDCl}_3, \text{ppm}): \delta$ 8.63(d, 1H, $J=4.9\text{Hz}$), 7.98(d, 2H, $J=8.6\text{Hz}$), 7.5-7.6(m, 2H), 7.2-7.1(m, 3H), 6.01(s, 1H), 5.53(s, 1H), 1.83(s, 3H)

Calcd: C 75.30, H 5.48, N 5.85

Found: C 75.26, H 5.53, N 5.79



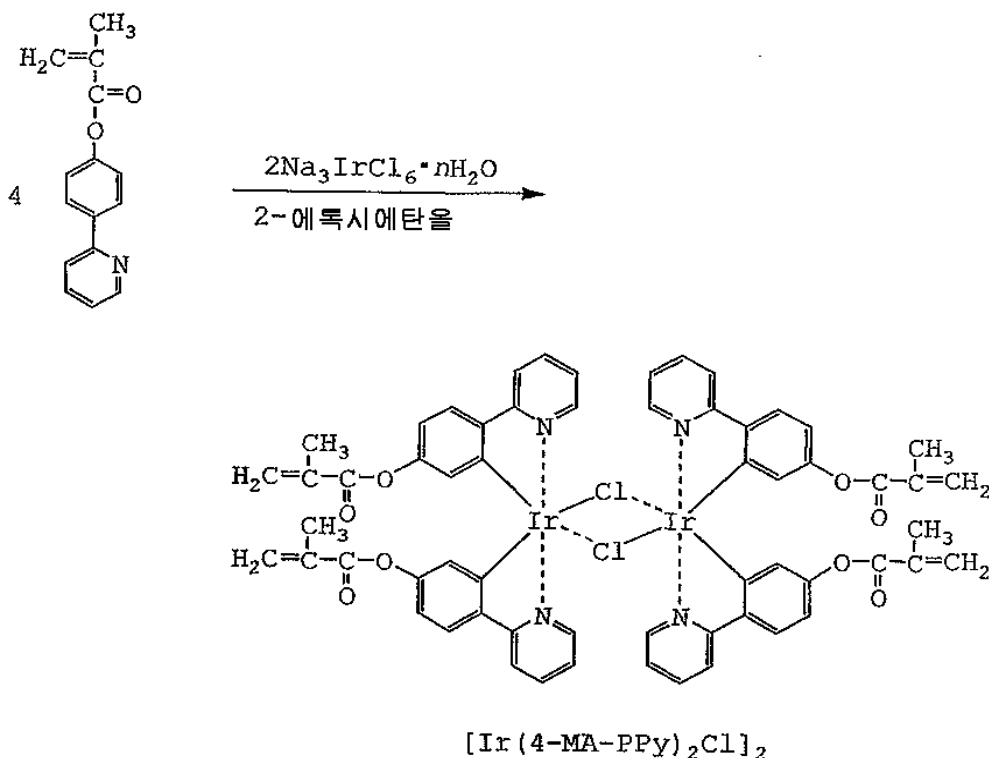
(2)) (III)(, $[\text{Ir}(4\text{-MA-PPy})_2\text{Cl}]_2$) (μ -) (2-(4-))

, 4-MA-PPy 1.20g(5.0mmol) (III) 1.00g 2- : =3:1()
 40ml 30 가 6
 4-MA-PPy) ₂ Cl] ₂ 0.87g 82% C, H N 5, 1 H-NMR [Ir(

¹ H-NMR(DMSO-d₆, ppm): δ 9.64(d, 2H, J=5.7Hz), 9.37(d, 2H, J=5.7Hz), 8.2-8.1(m, 4H), 7.75(m, 4H), 7.6-7.5(m, 8H), 6.56(m, 4H), 5.87(d, 2H, J=2.4Hz), 5.38(d, 2H, J=2.4Hz), 6.09(s, 2H), 6.03(s, 2H), 5.79(s, 2H), 5.74(s, 2H), 1.89(s, 6H), 1.87(s, 6H)

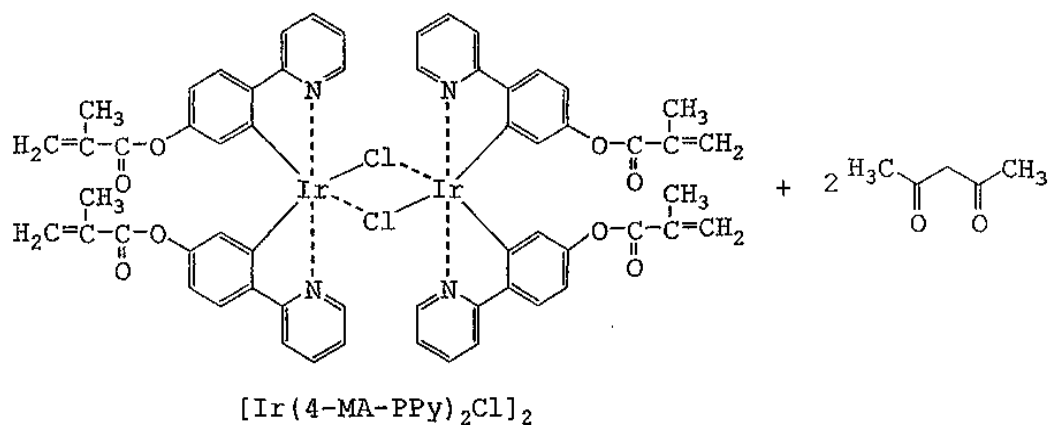
Calcd: C 51.17, H 3.44, N 3.98

Found: C 51.13, H 3.51, N 3.97



(3) , Ir(4-MA-PPy)₂(acac)

, [Ir(4-MA-PPy)₂Cl]₂ 281.7mg(0.2mmol) 212.0mg(2.0mmol) DMF 20ml 2,4-
 60.0mg(0.6mmol) 가 80 2 100ml 가 ,
 (, : =2:98())
 Ir(4-MA-PPy)₂(acac) 221.1mg 72%
 C, H N , ¹ H-NMR 75



79 : N- $\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$ (, VCz-co- $\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$)

N- $\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$ N- $\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$

N- 25ml 966mg(5.0mmol), $\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$ 38.4(0.05mmol) AIBN 8.2mg(0.05mmol)
 , 1 가 , 80
 , 8 250ml
 , 60 12 25ml
 -PPy) $_2$ (acac) 755mg 9 , GPC ICP VCz-co- $\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$
 . $\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$, N- Ir 가 가

80~81

$\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$ 76~77
 79 , 9 , GPC ICP Ir

[9]

		(%)	GPC			Ir (mol%)
			Mn	Mw	Mw/Mn	
79	VCz-co- $\text{Ir}(4\text{-MA-PPy})_2(\text{acac})$	75	7100	29100	4.10	1.09
80	VCz-co- $\text{Ir}(4\text{-MOI-PPy})_2(\text{acac})$	72	6500	28300	4.35	1.07
81	VCz-co- $\text{Ir}(4\text{-ST-PPy})_2(\text{acac})$	77	6600	30600	4.64	1.06

Mn:

Mw:

82~84: 가

10 57~62 ,

15V 15V 240 10

(4).

4

(N-)(Tokyo Kasei Kogyo Co., Ltd.) 19.5mg, (S. Lamansky, et al. Inorganic Chemistry, 40 , 1704 (2001)) 1.5m

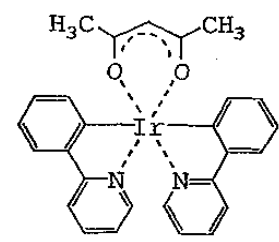
g 2-(4-)-5-(4-tert-)-1,3,4- (PBD)(Tokyo Kasei Kogyo Co., Ltd.) 9.0mg

(Wako Pure Chemical Industries, Ltd. ,) 2970mg 0.2

μm 82~84

15V 15V 240

10 (4).



[10]

	(V)	15V (cd/m ²)	
			200
85	7	370	330
86	7	330	290
87	7	410	350
4	7	360	120

가

가 / 가

(C-1), (D-1), (E-1), (F-1) (G-1)

(57)

1.

2.

1

3.

2

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12.

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17.
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18.
16 , 1 2 가
가

19.
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20.
19 , 1

21.
19 , 1 2 가

22.
15 , .

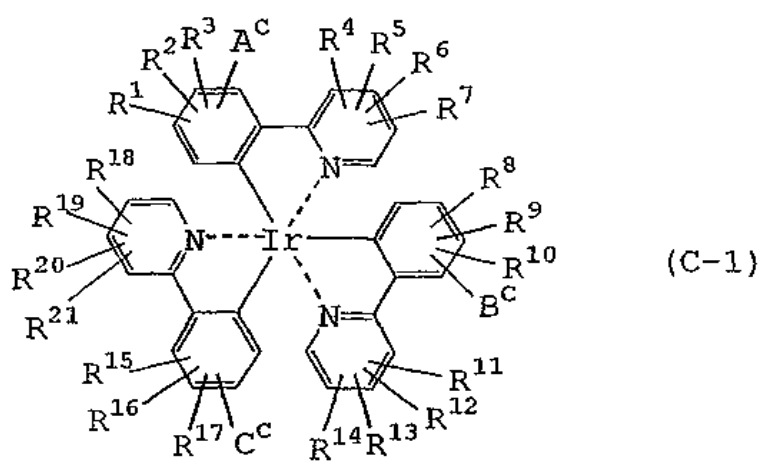
23.
22 , .

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22 24 , .

26.
25 , ,
/ .

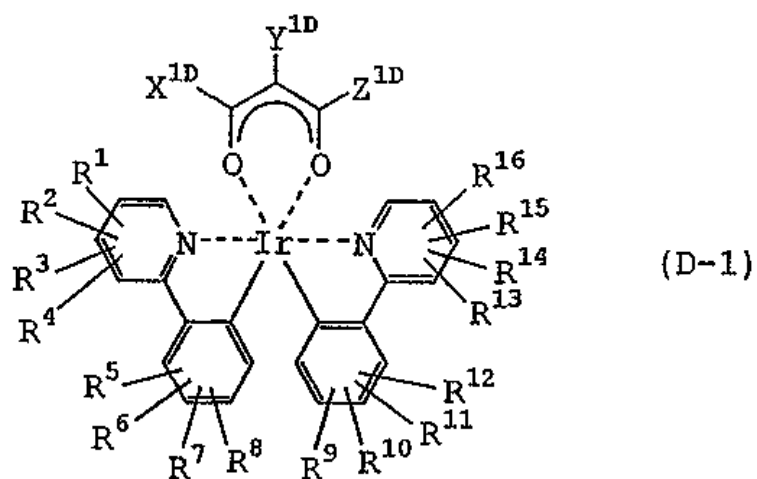
27.
16 , (C-1)
.



(, A^C, B^C, C^C 1
1~20 ; R¹~R²¹
1
1~20
)

28.

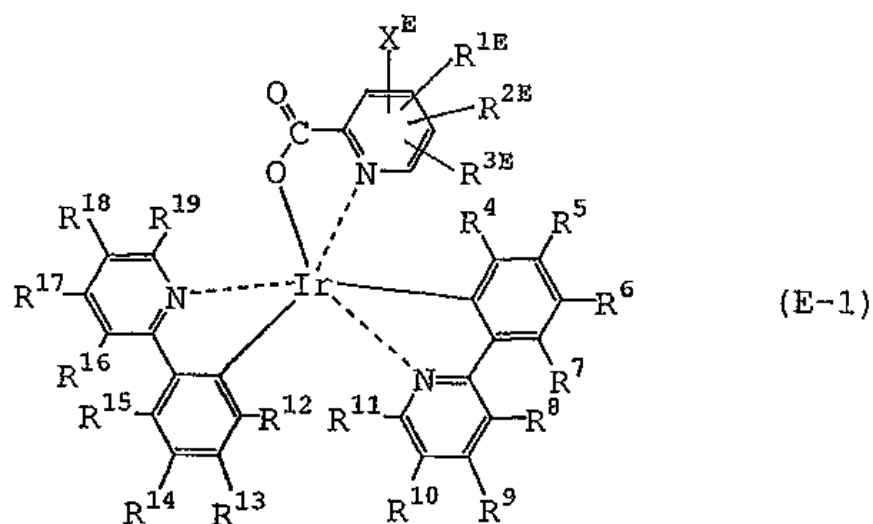
16 (D-1)



(, X^{1D}, Y^{1D}, Z^{1D} 1
1~20 ; R¹~R¹⁶
1
1~20
)

29.

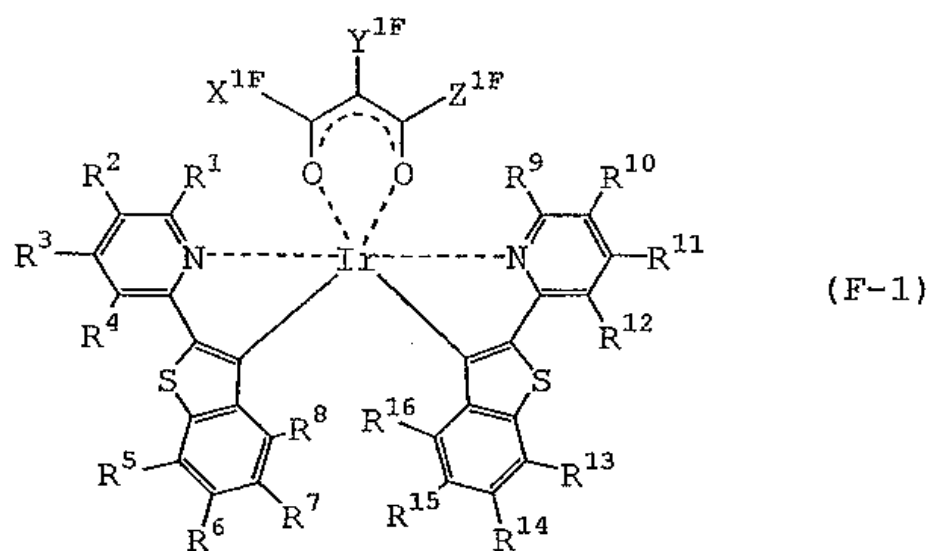
16 (E-1)



(, X^E ; R^{1E}, R^{2E}, R^{3E} , , ,
 1~20 ; $R^4 \sim R^{19}$, 1~20 , ,)
 , 1

30.

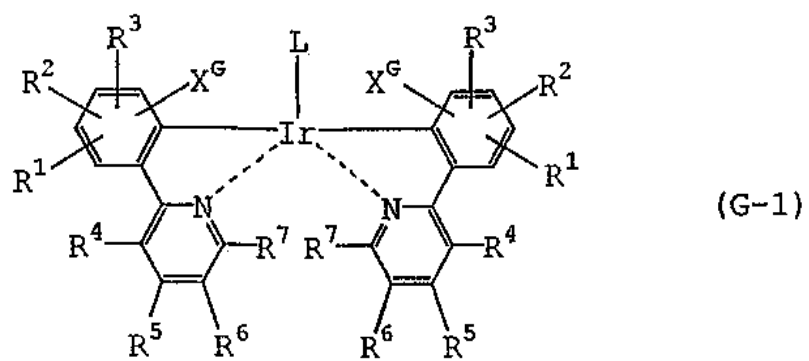
16 , (F-1)



(, X^{1F}, Y^{1F}, Z^{1F} 1 , X^{1F}, Y^{1F}, Z^{1F}
 ; $R^1 \sim R^{16}$, 1 1~20 , , ,)
 , 1

31.

16 , (G-1)



(, L 17가 ; X^G ; R¹ ~ R⁷ 1
1~20)

32.

1 31

33.

32 ,

34.

32 ,

35.

1 31

36.

35 ,

37.

35 ,

38.

1

39.

38 , 1

40.

39 , 가

41.

38 , 1

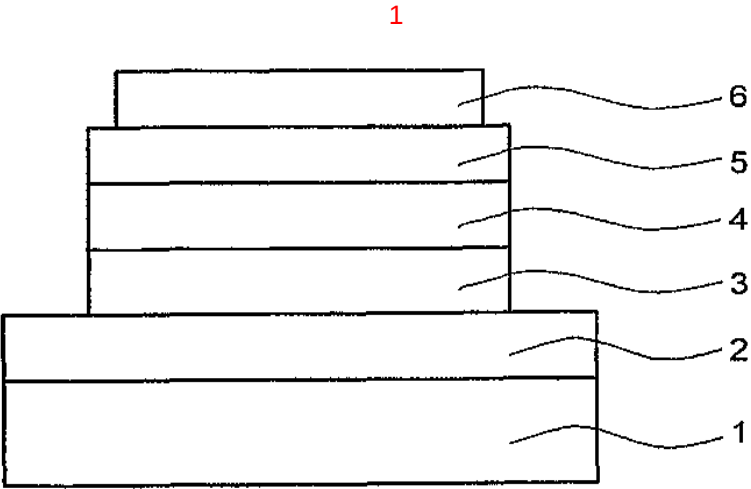
42.

41 , 가

43. 41 , 가

44. 1 31

45. 44 , 1 31 ,
/



专利名称(译)	发光材料和有机发光器件		
公开(公告)号	KR1020040014568A	公开(公告)日	2004-02-14
申请号	KR1020037016625	申请日	2002-06-20
[标]申请(专利权)人(译)	昭和电工株式会社		
申请(专利权)人(译)	昭和电工有限公司		
[标]发明人	TAKEUCHI MASATAKA 다케우치 마사타카 NAIJO SHUICHI ITO NAOKO 이토나오코 SHIRANE KORO 시라네고로 IGARASHI TAKESHI 이가라시 다케시 TAKAHASHI YOSHIKI 다카하시 요시아키 KAMACHI MOTOAKI 가마치 모토아키		
发明人	다케우치 마사타카 나이조 슈이치 이토나오코 시라네고로 이가라시 다케시 다카하시 요시아키 가마치 모토아키		
IPC分类号	H05B33/14 C07F15/00 C09K11/06 H01L51/30 H01L51/50		
CPC分类号	C09K11/06 H01L51/004 H01L51/0085 H01L51/5016 H05B33/14 C08G61/02 C08G2261/1526 C09K2211/1029 C09K2211/185 Y10S428/917		
代理人(译)	床9 Hayounguk		
优先权	2001186120 2001-06-20 JP 2001188183 2001-06-21 JP 2001241647 2001-08-09 JP 2001263525 2001-08-31 JP 2001306282 2001-10-02 JP 2001345136 2001-11-09 JP 2001350076 2001-11-15 JP 2001369529 2001-12-04 JP 2002080456 2002-03-22 JP 2002090590 2002-03-28 JP		
其他公开文献	KR100925409B1		
外部链接	Espacenet		
摘要(译)			

一种聚合物发光材料，其中所述材料具有基于从激发三重态到基态的转变或通过激发三重态转变为电子能级的基态的发光机制，并且所述材料包括非离子光发射部分，其构成聚合物的一部分或与聚合物结合。聚合物发光材料显示出高于5%的高发光效率，这是荧光的外量子效率的限制，并且可以设计成具有大面积，因此适合于有机发光器件的大规模生产。©KIPO和WIPO 2007

