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(43) 2020.08.25

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(74)

(51) Int.Cl.

*C07D 209/36* (2006.01)

权利要求书1页 说明书8页 附图1页

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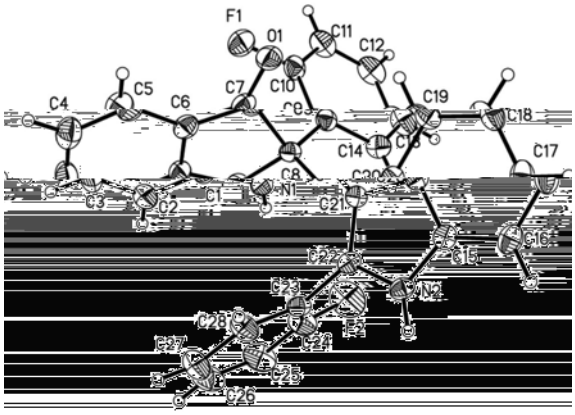
2 3

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1. 2 3 2
1 2 3
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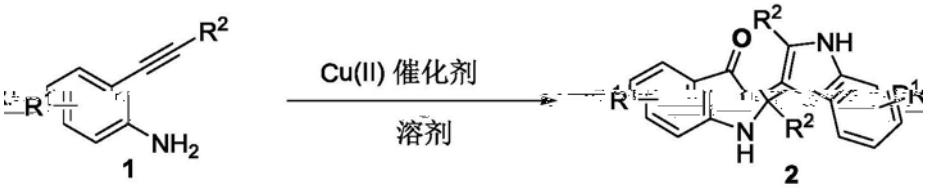



$R^1$ $C_{1\ 4}$ $C_{1\ 4}$ $R^2$
$C_{1\ 4}$ $C_{1\ 4}$
1,2

2. 1 2 3

3. 1 2 3
2 3 2

4. 1 2 3
2 1 1:0.025 0.1

5. 1 4 2 3
60 100

# 2 3

[0001] 2 3

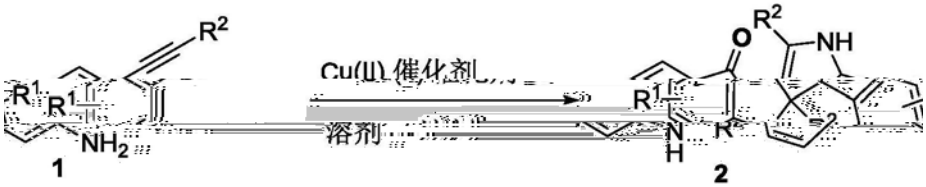
[0002] 2 ,2 3
2 ,2
3 2 3

[0003] 2 3

[0004] 2 3

[0005] 2 3
2 2 3

[0006] 2 3
2 1
2 3 2

[0007] 


[0008] $R^1$ $C_{1\ 4}$ $C_{1\ 4}$ $R^2$
$C_{1\ 4}$ $C_{1\ 4}$

[0009] (HFIP) 1 ,2 (DCE) (TFE) (HFIP)
2 3 2

[0010] $\{Cu(OAc)_2\}$
$\{Cu(OAc)_2 \cdot H_2O\}$) $(CuCl_2 \cdot 2H_2O)$

[0011] (m CPBA) (TBHP)

[0012] 2

3 2

[0013] 2 1

1:0 .025 0 .1

[0014] 60 100

[0015]

[0016] 1) 2

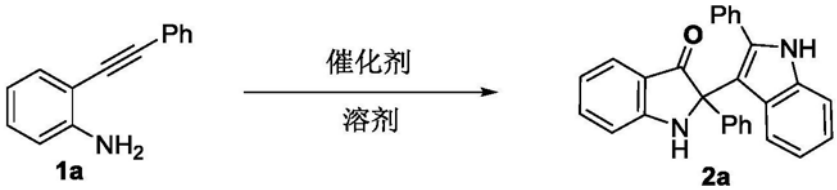
2 3 2)

2 3

[0017] 1 3 2o X ( 30 )

[0018]

[0019] 1

[0020] 


[0021] 15mL 1a

( /

5/1) 2a

[0022]

1

[0023] 1 2a [a]

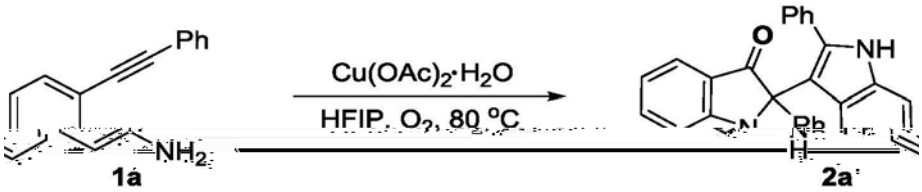
[0024]

| 序号 | 催化剂 | 额外条件 | 温度(℃) | 溶剂 | 产率(%)[b] |
|---|---|---|---|---|---|
| 1 | $Cu(OAc)_2$ | | 80 | HFIP | 42 |
| 2 | $Cu(OAc)_2$ | | 80 | TFE | 32 |
| 3 | $Cu(OAc)_2$ | | 80 | MeOH | trace |
| 4 | $Cu(OAc)_2$ | | 80 | DCE | 15 |
| 5 | $Cu(OAc)_2$ | | 80 | THF | trace |
| 6 | $Cu(OAc)_2$ | | 80 | dioxane | trace |
| 7 | $Cu(OAc)_2·H_2O$ | | 80 | HFIP | 53 |
| 8 | $CuCl_2·2H_2O$ | | 80 | HFIP | 22 |
| 9 | $CuBr_2$ | | 80 | HFIP | trace |
| 10 | $Cu(OTf)_2$ | | 80 | HFIP | trace |
| 11 | $CuSO_4$ | | 80 | HFIP | trace |
| 12 | $Cu(OAc)_2·H_2O$ | *m*-CPBA[c] | 80 | HFIP | 28 |
| 13 | $Cu(OAc)_2·H_2O$ | TBHP[c] | 80 | HFIP | 24 |
| 14[d] | $Cu(OAc)_2·H_2O$ | | 80 | HFIP | 26 |
| 15[e] | $Cu(OAc)_2·H_2O$ | | 80 | HFIP | 36 |
| 16 | $Cu(OAc)_2·H_2O$ | $O_2$ | 80 | HFIP | 61 |
| 17 | $Cu(OAc)_2·H_2O$ | $O_2$ | 60 | HFIP | 23 |
| 18 | $Cu(OAc)_2·H_2O$ | $O_2$ | 100 | HFIP | 41 |

[a]反应条件：1a(0.3 mmol)，催化剂(0.015 mmol)，溶剂(2 mL)，空气，80 ℃，20 h。[b]分离产率；[c]0.3 mmol；[d]催化剂(0.0075 mmol)；[e]催化剂(0.03 mmol)。

[0025] 2

[0026]



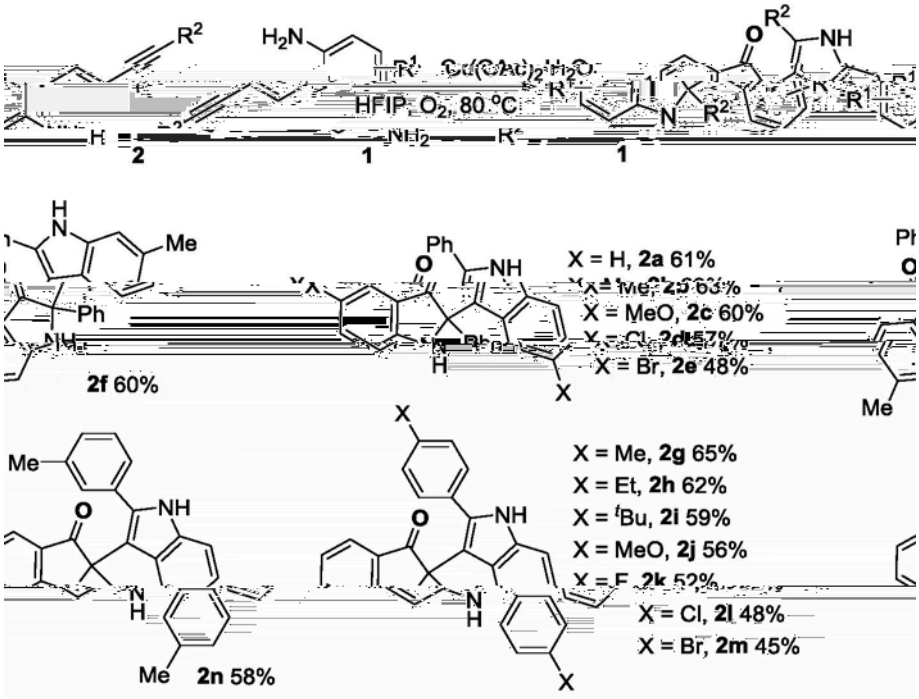

[0027] 15mL 1a(57.9mg,0.3mmol) (3.0mg, 0.015mmol) (2mL) 80 20h ( / 5/1) 2a(36.6mg,61 ) $^1$H NMR(400MHz,DMSO $d_6$):δ6.61 (d,J 8.0Hz,1H),6.70 6.77(m,2H),6.98(d,J 8.4Hz,1H),7.01 7.07(m,6H),7.12 7.17 (m,3H),7.25(d,J 7.6Hz,1H),7.34(d,J 8.4Hz,1H),7.38 7.40(m,2H),7.51(t,J 7.6Hz,1H),8.33(s,1H),11.34(s,1H). $^{13}$C NMR(150MHz,DMSO $d_6$):δ71.6,111.5,111.7, 112.4,118.0,118.9,119.1,120.8,121.6,124.9,127.46,127.51,127.6,127.8,127.9, 128.1,130.0,133.7,136.3,138.0,138.5,140.3,160.6,201.0.HRMS calcd for $C_{28}H_{20}N_2NaO$:423.1468[M+Na]$^+$,found:423.1466.

[0028] 3

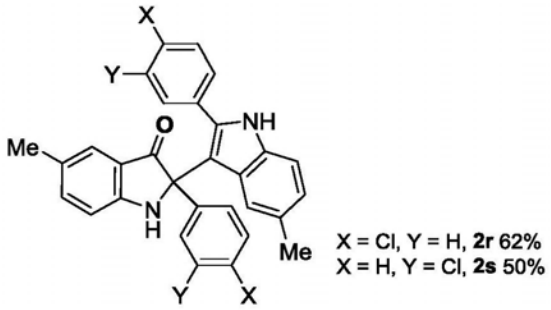
[0029] 2 1 2 3 2 2

[0030] 2 2 3 2 [a,b]

[0031]




[0032]




[a] 反应条件：**1** (0.3 mmol), $Cu(OAc)_2 \cdot H_2O$ (0.015 mmol), HFIP (2 mL), 80 °C, $O_2$, 20 h; [b] 分离收率。

[0033]

[0034] 5 Methyl 2 (5 methyl 2 phenyl 1H indol 3 yl) 2 phenylindolin 3 one (2b)

[0035] Yellow solid(40 .5mg ,63 ) .$^1$H NMR(600MHz ,DMSO $d_6$):δ2 .11(s ,3H) ,2 .22(s , 3H) ,6 .40(s ,1H) ,6 .86(d ,J 7 .8Hz ,1H) ,6 .91(d ,J 7 .8Hz ,1H) ,7 .03 7 .06(m ,6H) ,7 .11 7 .15(m ,3H) ,7 .22(d ,J 8 .4Hz ,1H) ,7 .35 7 .37(m ,3H) ,8 .06(s ,1H) ,11 .18(s ,1H) .$^{13}$C NMR (150MHz ,DMSO $d_6$):δ20 .6 ,22 .0 ,72 .1 ,111 .2 ,111 .4 ,112 .4 ,119 .2 ,120 .6 ,123 .1 ,124 .0 , 126 .9 ,127 .2 ,127 .3 ,127 .5 ,127 .7 ,128 .0 ,128 .2 ,130 .0 ,133 .9 ,134 .7 ,138 .4 ,139 .3 , 140 .7 ,159 .1 ,201 .0 .HRMS calcd for $C_{30}H_{24}N_2NaO$:451 .1781[M+Na]$^+$ ,found:451 .1776 .

[0036] 5 Methoxy 2 (5 methoxy 2 phenyl 1H indol 3 yl) 2 phenylindolin 3 one (2c)

[0037] Yellow solid(41 .4mg ,60 ) .$^{1}$H NMR(600MHz ,DMSO $d_6$) :δ3 .38(s ,3H) ,3 .67(s , 3H) ,6 .01(d ,J 1 .8Hz ,1H) ,6 .67 6 .70(m ,2H) ,6 .97(d ,J 9 .0Hz ,1H) ,7 .05(t ,J 7 .8Hz , 2H) ,7 .08 7 .10(m ,3H) ,7 .13 7 .15(m ,3H) ,7 .22(dd ,$J_1$ 9 .0Hz ,$J_2$ 3 .6Hz ,2H) ,7 .43 7 .44 (m ,2H) ,7 .94(s ,1H) ,11 .18(s ,1H) .$^{13}$C NMR(150MHz ,DMSO $d_6$) :δ55 .2 ,56 .1 ,72 .5 ,103 .2 , 105 .0 ,111 .2 ,111 .6 ,112 .2 ,114 .1 ,119 .3 ,127 .4 ,127 .57 ,127 .62 ,127 .8 ,128 .0 ,128 .1 , 128 .4 ,129 .9 ,131 .5 ,133 .8 ,138 .8 ,140 .7 ,152 .7 ,153 .1 ,156 .5 ,201 .1 .HRMS calcd for $C_{30}H_{24}N_2NaO$:483 .1679[M+Na]$^+$ ,found:483 .1676 .

[0038] 5 Chloro 2 (5 chloro 2 phenyl 1H indol 3 yl) 2 phenylindolin 3 one (2d)

[0039] Yellow solid(40 .0mg ,57 ) .$^{1}$H NMR(600MHz ,DMSO $d_6$) :δ6 .42(s ,1H) ,6 .99(d ,J 8 .4Hz ,1H) ,7 .05(dd ,$J_1$ 8 .4Hz ,$J_2$ 1 .2Hz ,1H) ,7 .11(t ,J 7 .2Hz ,2H) ,7 .16 7 .19(m , 6H) ,7 .22(t ,J 7 .2Hz ,1H) ,7 .36(d ,J 8 .4Hz ,1H) ,7 .39 7 .40(m ,2H) ,7 .53(dd ,$J_1$ 9 .0Hz ,$J_2$ 1 .8Hz ,1H) ,8 .60(s ,1H) ,11 .66(s ,1H) .$^{13}$C NMR(150MHz ,DMSO $d_6$) :δ72 .2 , 111 .0 ,113 .3 ,114 .1 ,119 .8 ,121 .7 ,121 .8 ,123 .8 ,127 .4 ,127 .8 ,128 .0 ,128 .4 ,128 .5 , 128 .9 ,130 .0 ,133 .1 ,134 .7 ,137 .8 ,139 .7 ,140 .0 ,158 .8 ,199 .5 .HRMS calcd for $C_{28}H_{18}Cl_2N_2NaO$:491 .0688[M+Na]$^+$ ,found:491 .0680 .

[0040] 6 Methyl 2 (6 methyl 2 phenyl 1H indol 3 yl) 2 phenylindolin 3 one (2f)

[0041] Yellow solid(38 .5mg ,60 ) .$^{1}$H NMR(400MHz ,DMSO $d_6$) :δ2 .33(s ,3H) ,2 .35(s , 3H) ,6 .49(d ,J 8 .4Hz ,1H) ,6 .54(d ,J 8 .0Hz ,1H) ,6 .58(d ,J 8 .0Hz ,1H) ,6 .77(s ,1H) , 7 .02 7 .06(m ,5H) ,7 .10 7 .15(m ,5H) ,7 .34 7 .36(m ,2H) ,8 .23(s ,1H) ,11 .15(s ,1H) .$^{13}$C NMR (100MHz ,DMSO $d_6$) :δ21 .7 ,22 .6 ,71 .8 ,111 .39 ,111 .43 ,112 .1 ,116 .8 ,119 .7 ,120 .6 ,120 .8 , 124 .7 ,125 .9 ,127 .3 ,127 .48 ,127 .53 ,127 .6 ,127 .9 ,130 .0 ,130 .6 ,133 .8 ,136 .7 ,137 .7 , 140 .6 ,148 .8 ,160 .9 ,200 .1 .HRMS calcd for $C_{30}H_{24}N_2NaO$:451 .1781[M+Na]$^+$ ,found: 451 .1781 .

[0042] 2 (4 Ethylphenyl) 2 (2 (4 ethylphenyl) 1H indol 3 yl)indolin 3 one (2h)

[0043] Yellow solid(42 .4mg ,62 ) .$^{1}$H NMR(600MHz ,DMSO $d_6$) :δ1 .04(t ,J 7 .8Hz ,3H) , 1 .11(t ,J 7 .8Hz ,3H) ,2 .42(q ,J 7 .8Hz ,2H) ,2 .49(q ,J 7 .8Hz ,2H) ,6 .63(d ,J 8 .4Hz , 1H) ,6 .70(t ,J 7 .2Hz ,1H) ,6 .75(t ,J 7 .8Hz ,1H) ,6 .84 6 .87(m ,4H) ,6 .96(d ,J 8 .4Hz , 1H) ,7 .00 7 .04(m ,3H) ,7 .26(d ,J 8 .4Hz ,3H) ,7 .32(d ,J 8 .4Hz ,1H) ,7 .50(t ,J 7 .2Hz , 1H) ,8 .28(s ,1H) ,11 .25(s ,1H) .$^{13}$C NMR(150MHz ,DMSO $d_6$) :δ16 .10 ,16 .11 ,28 .2 ,28 .4 , 71 .5 ,111 .4 ,111 .6 ,112 .3 ,117 .8 ,118 .9 ,119 .1 ,120 .7 ,121 .5 ,124 .9 ,126 .9 ,127 .3 ,127 .6 , 127 .9 ,130 .0 ,131 .0 ,136 .1 ,137 .3 ,137 .9 ,138 .7 ,142 .8 ,143 .2 ,160 .5 ,201 .3 .HRMS calcd for $C_{32}H_{28}N_2NaO$:479 .2094[M+Na]$^+$ ,found:479 .2094 .

[0044] 2 (4 (tert Butyl)phenyl) 2 (2 (4 (tert butyl)phenyl) 1H indol 3 yl) indolin 3 one(2i)

[0045] Yellow solid(45.3mg,59 ).$^{1}$H NMR(400MHz,DMSO $d_6$):δ1.14(s,9H),1.20(s,9H),6.65 6.71(m,2H),6.75(t,J 7.6Hz,1H),6.95(d,J 8.4Hz,1H),7.00 7.06(m,5H),7.10(d,J 8.0Hz,2H),7.26 7.33(m,4H),7.49(t,J 7.2Hz,1H),8.25(s,1H),11.25(s,1H).$^{13}$C NMR(150MHz,DMSO $d_6$):δ31.5,31.6,34.4,34.6,71.5,111.5,111.6,112.3,117.8,118.9,119.1,120.7,121.4,124.1,124.6,124.9,127.2,127.8,129.9,130.7,136.1,136.9,137.9,138.9,149.7,149.9,160.8,201.5.HRMScalcd for $C_{36}H_{36}N_2NaO$:535.2720[M+Na]$^{+}$,found:535.2704.

[0046] 2 (4 Fluorophenyl) 2 (2 (4 fluorophenyl) 1H indol 3 yl)indolin 3 one (2k)

[0047] Yellow solid(34.0mg,52 ).$^{1}$H NMR(600MHz,DMSO $d_6$):δ6.68(d,J 8.4Hz,1H),6.75(t,J 7.2Hz,1H),6.80(t,J 7.8Hz,1H),6.87(t,J 9.0Hz,2H),6.92(t,J 8.4Hz,2H),6.98(d,J 8.4Hz,1H),7.06(t,J 7.8Hz,1H),7.17 7.20(m,2H),7.33(d,J 7.8Hz,1H),7.35(d,J 8.4Hz,1H),7.37 7.40(m,2H),7.53(t,J 7.8Hz,1H),8.38(s,1H),11.40(s,1H).$^{13}$C NMR(150MHz,DMSO $d_6$):δ71.0,111.76,111.81,112.5,114.4(d,$^{2}J_{C\ F}$ 21.9Hz),114.8(d,$^{2}J_{C\ F}$ 20.7Hz),118.3,118.7,119.4,120.5,121.9,125.0,127.5,129.5(d,$^{3}J_{C\ F}$ 7.7Hz),130.0(d,$^{4}J_{C\ F}$ 3.3Hz),132.2(d,$^{3}J_{C\ F}$ 8.7Hz),136.1,137.6,138.3,160.7,161.9(d,$^{1}J_{C\ F}$ 242.9Hz),162.0(d,$^{1}J_{C\ F}$ 243.9Hz),201.2.$^{19}$F NMR(376MHz,DMSO $d_6$)δ: 114.4 114.5(m), 116.1 116.2(m).HRMS calcd for $C_{28}H_{19}F_2N_2O$:437.1460[M+H]$^{+}$, found:437.1451.

[0048] 2 (4 Bromophenyl) 2 (2 (4 bromophenyl) 1H indol 3 yl)indolin 3 one (2m)

[0049] Yellow solid(37.5mg,45 ).$^{1}$H NMR(600MHz,DMSO $d_6$):δ6.69(d,J 7.8Hz,1H),6.77(t,J 7.8Hz,1H),6.82(t,J 7.8Hz,1H),6.99(d,J 8.4Hz,1H),7.06 7.08(m,3H),7.24(d,J 8.4Hz,2H),7.27 7.30(m,4H),7.33(d,J 7.8Hz,1H),7.36(d,J 8.4Hz,1H),7.53 7.56(m,1H),8.41(s,1H),11.45(s,1H).¢ Á

6 .69(t ,J 7 .2 ,1H) ,6 .80 6 .83(m ,1H) ,6 .89 6 .93(m ,1H) ,6 .94(t ,J 7 .8 ,1H) ,6 .98 7 .02 (m ,2H) ,7 .03 7 .07(m ,2H) ,7 .17 7 .20(m ,2H) ,7 .25 7 .29(m ,1H) ,7 .30 7 .32(m ,2H) ,7 .38 7 .42(m ,2H) ,7 .69(s ,1H) ,11 .34(s ,1H) .$^{13}$C NMR(150MHz ,DMSO $d_6$) :δ69 .7 ,110 .4 ,111 .6 , 112 .3 ,115 .2(d ,$^{2}J_{C\ F}$ 20 .7Hz) ,116 .4(d ,$^{2}J_{C\ F}$ 21 .9Hz) ,117 .9 ,118 .3 ,119 .1 ,121 .3 , 121 .6(d ,$^{2}J_{C\ F}$ 15 .3Hz) ,121 .9 ,123 .5(d ,$^{4}J_{C\ F}$ 3 .2Hz) ,124 .1(d ,$^{4}J_{C\ F}$ 2 .3Hz) ,124 .8 , 126 .5 ,127 .3(d ,$^{2}J_{C\ F}$ 12 .0Hz) ,129 .2(d ,$^{4}J_{C\ F}$ 3 .3Hz) ,130 .2(d ,$^{3}J_{C\ F}$ 7 .7Hz) ,130 .5(d ,$^{3}J_{C\ F}$ 7 .7Hz) ,130 .8 ,133 .1 ,136 .4 ,137 .8 ,159 .8(d ,$^{1}J_{C\ F}$ 243 .9Hz) ,160 .5 ,161 .6(d , $^{1}J_{C\ F}$ 247 .2Hz) ,200 .3 .$^{19}$F NMR(565MHz ,DMSO $d_6$)δ: 112 .4(s) , 107 .7(s) .HRMS calcd for $C_{28}H_{18}F_2N_2NaO$:459 .1279[M+Na]$^+$ ,found:459 .1272 .

[0054] 2 Cyclopropyl 2 (2 cyclopropyl 1H indol 3 yl)indolin 3 one(2p)

[0055] Yellow solid(23 .1mg ,47 ) .$^{1}$H NMR(400MHz ,DMSO $d_6$) :δ0 .02 0 .08(m ,1H) , 0 .33 0 .39(m ,1H) ,0 .68 0 .74(m ,2H) ,0 .81(d ,J 8 .0Hz ,2H) ,0 .85 0 .88(m ,2H) ,1 .77 1 .83 (m ,1H) ,2 .19 2 .26(m ,1H) ,6 .70(t ,J 7 .6Hz ,1H) ,6 .75 6 .80(m ,2H) ,6 .94(t ,J 8 .0Hz , 1H) ,7 .20 7 .25(m ,2H) ,7 .38(s ,1H) ,7 .44 7 .47(m ,2H) ,10 .54(s ,1H) .$^{13}$C NMR(150MHz , DMSO $d_6$) :δ1 .0 ,4 .6 ,8 .0 ,8 .3 ,9 .7 ,16 .8 ,68 .1 ,110 .7 ,111 .3 ,111 .5 ,117 .3 ,119 .1 ,119 .5 , 119 .8 ,120 .5 ,124 .6 ,128 .0 ,134 .9 ,137 .8 ,139 .3 ,161 .4 ,204 .2 .HRMS calcd for $C_{22}H_{20}N_2NaO$:351 .1468[M+Na]$^+$ ,found:351 .1466 .

[0056] 2 (Naphthalen 2 yl) 2 (2 (naphthalen 2 yl) 1H indol 3 yl)indolin 3 one(2q)

[0057] Yellow solid(34 .5mg ,46 ) .$^{1}$H NMR(400MHz ,DMSO $d_6$) :δ6 .54(d ,J 8 .0Hz ,1H) , 6 .67 6 .72(m ,2H) ,7 .02 7 .07(m ,2H) ,7 .13(d ,J 8 .4Hz ,1H) ,7 .29 7 .40(m ,6H) ,7 .43 7 .46 (m ,2H) ,7 .54(d ,J 8 .8Hz ,1H) ,7 .57 7 .61(m ,3H) ,7 .65(d ,J 8 .0Hz ,1H) ,7 .75(t ,J 8 .0Hz ,2H) ,8 .06(s ,1H) ,8 .62(s ,1H) ,11 .55(s ,1H) .$^{13}$C NMR(150MHz ,DMSO $d_6$) :δ71 .7 , 111 .8 ,111 .9 ,112 .7 ,118 .1 ,119 .2 ,119 .3 ,120 .8 ,121 .8 ,124 .7 ,124 .9 ,126 .3 ,126 .36 , 126 .43 ,126 .5 ,126 .8 ,127 .0 ,127 .5 ,127 .6 ,127 .7 ,127 .8 ,128 .1 ,128 .3 ,129 .3 ,131 .0 , 132 .3 ,132 .4 ,132 .6 ,132 .7 ,136 .6 ,138 .07 ,138 .09 ,138 .3 ,160 .1 ,200 .6 .HRMS calcd for $C_{36}H_{24}N_2NaO$:523 .1781[M+Na]$^+$ ,found:523 .1767 .

[0058] 2 (4 Chlorophenyl) 2 (2 (4 chlorophenyl) 5 methyl 1H indol 3 yl) 5 methylindolin 3 one(2r)

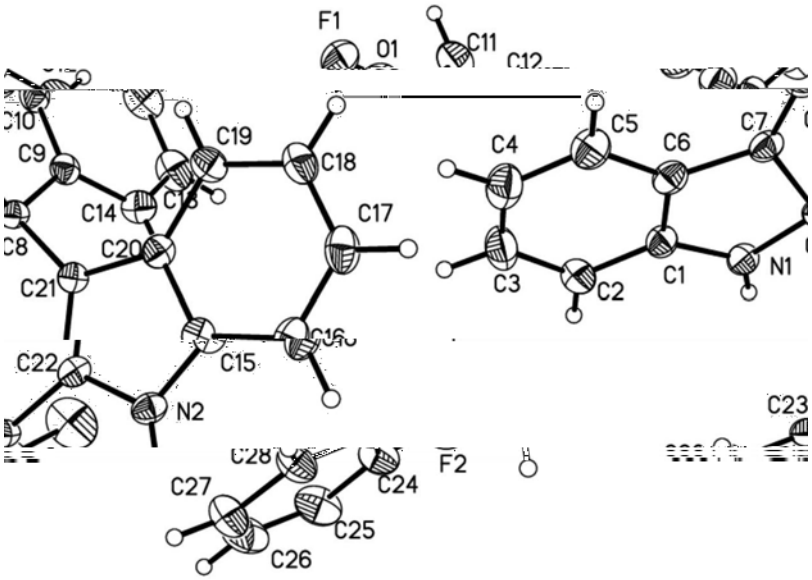
[0059] Yellow solid(46 .1mg ,62 ) .$^{1}$H NMR(600MHz ,DMSO $d_6$) :δ2 .16(s ,3H) ,2 .26(s , 3H) ,6 .50(s ,1H) ,6 .91(d ,J 8 .4Hz ,1H) ,6 .94(d ,J 7 .8Hz ,1H) ,7 .11(d ,J 8 .4Hz ,2H) , 7 .14(s ,5H) ,7 .26(d ,J 8 .4Hz ,1H) ,7 .34(d ,J 8 .4Hz ,2H) ,7 .41(d ,J 8 .4Hz ,1H) ,8 .15 (s ,1H) ,11 .31(s ,1H) .$^{13}$C NMR(150MHz ,DMSO $d_6$) :δ20 .6 ,22 .0 ,71 .5 ,111 .5 ,111 .6 ,112 .6 , 118 .9 ,120 .3 ,123 .6 ,124 .1 ,127 .4 ,127 .5 ,127 .6 ,127 .7 ,127 .9 ,128 .9 ,129 .4 ,130 .8 , 131 .8 ,132 .3 ,132 .5 ,132 .7 ,134 .7 ,137 .2 ,139 .5 ,139 .7 ,159 .4 ,200 .8 .HRMS calcd for $C_{30}H_{22}Cl_2N_2NaO$:519 .1001[M+Na]$^+$ ,found:519 .0989 .

[0060] 2 (3 Chlorophenyl) 2 (2 (3 chlorophenyl) 5 methyl 1H indol 3 yl) 5 methylindolin 3 one(2s)

[0061] Yellow sōlid(37 .2mg , 0i o o

3H) ,6 .49(s ,1H) ,6 .91(d ,J 8 .4Hz ,1H) ,6 .97(d ,J 8 .4Hz ,1H) ,7 .05 7 .09(m ,2H) ,7 .13 7 .14(m ,1H) ,7 .15 7 .17(m ,3H) ,7 .19 7 .21(m ,1H) ,7 .26(d ,J 8 .4Hz ,1H) ,7 .31 7 .32(m , 2H) ,7 .41(dd ,$J_1$ 8 .4Hz ,$J_2$ 1 .8Hz ,1H) ,8 .23(s ,1H) ,11 .36(s ,1H) .$^{13}$C NMR(150MHz , DMSO $d_6$) :δ20 .6 ,22 .0 ,71 .5 ,111 .3 ,111 .7 ,112 .6 ,118 .8 ,120 .2 ,123 .7 ,124 .1 ,126 .0 , 127 .3 ,127 .5 ,127 .6 ,127 .67 ,127 .73 ,128 .3 ,129 .4 ,129 .8 ,129 .9 ,132 .6 ,132 .9 ,134 .7 , 135 .5 ,137 .1 ,139 .9 ,142 .8 ,159 .3 ,200 .7 .HRMS calcd for $C_{30}H_{22}Cl_2N_2NaO$:519 .1001[M+ Na]$^+$ ,found:519 .0997 .

[0062]


F1
O1
C11
C12
C10
C9
C19
C18
C5
C7
C4
C6
C14
C13
C17
C8
C20
C3
C2
C1
N1
C21
C22
C15
N2
C23
C28
F2
C27
C24
C25
C26

1