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2004 01 16

(21) 10-2002-0039475
(22) 2002 07 08

(71) .

20

(72) 572-127 201

(74)

:

(54)

가

4

1 EL

2 EL

3a 3i 2 EL

4	1	EL	.
5a	5i 4	EL	.
6	2	EL	.
7a	7i 6	EL	.
8	3	EL	.
9a	9i 8	EL	.

< >

1 : 30,70 :
32,72 : 32a,72a :
32b,72b : 34,74 :
36,76 : 38,78 :
40,44,54,80,84,94 : 42,82 :
46a,46b,86a,86b : 48,88 :
56 : 58,98 :
60,100 : 62,102 :
64,104 : EL 66,106 :
68 :

(Cathode Ray Tube)
(Liquid Crystal Display),
(Plasma Display Panel)
(Field Emission Display),
(Electro - Luminescence : 'EL')
EL

EL 100 200V 가 , EL EL EL 5 20V , EL (contrast ratio) (Surface Lig

ht Source) , 가 (pixel),

assive matrix type) EL (P

가 / ,

(Scan Line) (Signal Line)

가 , 가 ,

(Thin Film Transistor ; 'TFT'

1 , / ,

가 1 가 2 TFT가 , TFT

(Cst ; storage capacitor)

가 EL ,

가 가 ,

가 가

1 EL

1 , 2 EL 1 ; 1

(Pixel area) ,

EL

TFT , TFT , EL

TFT

EL (Electron) , (Hole) (Anode Electrode)

(Cathode Electrode) 가

가 ,

가 EL 가 , TFT

TFT 가 TFT 가

TFT (開閉) EL 가 TFT

가 TFT 가 가 가

EL

가가 가 , EL

EL TFT EL (a-Si) TFT (electric field effect mobility)가 (p-Si) TFT가

TFT 가 IC TFT

2 EL , 1 EL

TFT EL

2 T)가 , (1) TFT(T) (32), (C_{ST}) (38), EL (E) (50,52) TFT(

(C_{ST}) 가 (42) (34) EL (E) EL (64) (58) (66)

(E) , TFT(T) (50) (42) , (52) EL

(66) EL (64) (58) EL (64) (Work function)

EL EL

EL (30) , (1) (32) (42) (30) , (44) , (C_{ST}) 가 1 (40) , (50) (58) (52) 3 (54) , (5) (60) (64) (60) 가 1 3 (40,44,54)

3a 3i 2 EL

(Photo Resist Coating), (Align amp ; Exposure), (Develop) (Photolithography)

3a 3i , (1) 3a (30) (32a) (34) (34) (30) 1 (32a)

(36) (32a) 3b (36) (38) 2

(36) (40) 3b (38) 1 (40) (42) 3c (42) 1 (40) 2 3 (34)

2 3c 3d 2 (44) 2 (44) 3c (44) 1,
 3 (46a,46b) 4 (48) 가 (32a) 2 (42) (46a
 ,46b) (32a) (la) (lb) 1,2
 (32a) (32b)
 (32a) (32b) (32)
 (32) (50,52) 3e 3d 3
 1 (3d 46a) (42) (50) (3d 48)
 (52) 2 (3d 46b) (lb) (la) (32b) (32b)
 (42) (32), (38), (50,52) TFT(T)가
 , (34) (34) (C_{ST})가
 (34) (38) (42)
 3 (54) 3f 3 (54) 3e 4
 6 (56)
 (I) 3g (58) (58) (3f 56)
 (52) 7
 (62) 가 3h (60) (60) 3g 5
 8 (60) TFT(T) (58)
 58) , EL (E) EL (64) 3i (3h 62) (66)
 (T) , EL EL (64) (1) (40,44,54) , (SiNx) TFT
 x) (30) 1 3 가 (SiO
 , EL
 1

$$\eta_{extl} = \frac{1}{2n^2} \times \eta_{intl} = \frac{1}{2 \times 1.5^2} = \frac{1}{5} \approx 20\%$$

, η

(n) 1.5 , n

, 20% EL EL (64) (1)

가

(n) 1.5

(n) 1.5

(Silica aerogel)

(Silica gel)

1

2

1

1

p

1

2

(Indium Tin Oxide)

1

1

2

3

3

가 1 2 , 1 가
1 1 가
p p , 1 2
1 1
2
3 3
1 1
2
3
1 1
2
3
1 3 1
가 가
4 9i
EL 1
가
4 1 TFT EL , 1 EL
TFT EL
4 , 1 EL
(1) (70) EL (68) (1)
TFT(T) , TFT(T) (72), (38), (90,92)
(C_{ST}) EL (E)

(68) EL (E)
 (68) 가 (Silica aerogel) (n) 1.07 (Silica aerogel) (Silica
 gel)
 TFT(T) (C_{ST}) EL (E)
 (DL)
 EL (E)
 (C_{ST}) 가 (82) (74)
 EL (E) EL (104) (98) (106)
 EL (E) (1)
 , TFT(T) (90) (82) , (92) EL
 (E) (98)
 , EL (98) EL (104)
 (106) EL (104) (Work functio
 n)
 , EL TFT(T) , EL
 (68) (1) (72) (70) ,
 (C_{ST}) 가 1 (80) , (90) (82) (84) ,
 (98) (92) 3 (94) , (98) EL (104) (100)
 가 , 1 3 (80,84,94) (100)
 EL (I) EL (E)
 EL (E) (98) , (106) , (98)
 (106) EL (104) EL (104) (98) (106)
 98) (106) , , (,
 ()
 (exciton
) , (Polaron)
 (1) ,
 가 EL EL (104)
 (1) , (68)
 , (Silica aerogel) 1.07 EL (10
 4) 2

$$\eta_{ext} = \frac{1}{2n^2} \times \eta_{int} = \frac{1}{2 \times 1.07^2} \approx \frac{1}{2 \times 1^2} = \frac{1}{2} = 50\%$$

, EL (68)
 2.5
 5a 5j 4 EL
 ; Exposure), (Develop) , (Photo Resist Coating), (Align amp
 (Photolithography)

5a (1) (68) (

68) EL (E) (68) 가 (Silic

a aerogel) (Silica gel)

5b (70) (72a) (74) (70) 1

(68) (1) 1 (I)

(72a) (74) (70)

2

(72a) 5c (76) (78)

(76) (78) 5b 2 1 3

(76) (80) 5c (78) 1 (80) (42) 5d (82) 1 (8

0) 2 4 3 (74)

5d 5e 2 (84) 2 (84) 5d (80)(84)

3 1,2 (86a,86b) 5 (88) 가 1 2 (72a) (42)

1 2 (80)(84) (I) 1,2 (86a,86b) (88) (I)

(72a) 1,2 (86a,86b)

(la) (lb)

(72a) (72b) (72b)

(72) (90,92) 5f 5e 3

1 (5e 86a) (82) (lb) (la) (72b) (5e 88)

(92) 2 (7e 46b) (72b) (72b)

(82) (72), (78), (90,92) TFT(T)가

(74) (78) (C_{ST})가

(74) (78) (82)

3 (94) 5g 3 (94) 5f 4

7 (96) (I)

(I) 5h (98) (98) (5g 96)

(92) (I) (1) (98) 8

(102) 가 5i (100) (100) 5h

5 (100) TFT(T) (98)

(98) EL (E) EL (104) 7j (106) (5i 102)

6 2 EL 1

4 (68) 3 (94) (98) .

6 (72), (C_{ST}) 2 (78), EL (90,92) (70) T_{FT}(T) , T_{FT}(T) (1)
T(T) (94) EL (E) (E) 2 (68) EL TF
T_{FT}(T) (C_{ST}) EL (E)
(DL) EL (E)

(C_{ST}) 가 (82) (74)
(E) EL (64) (98) (106) .
EL EL (E) (1)

, T_{FT}(T) (90) (82) , (92) EL
(E) (98)

EL (98) EL (104)
(106) EL (104) (Work functio
n)

EL T_{FT}(T) EL
(1) (72) (70) , (C_{ST}) 가
1 (80) , (90) (82) 2 (84) , (98) 가
(92) 3 (94) , (98) EL (104) (100) 가
, 1 3 (80,84,94) (100)

EL (I) T_{FT}(T) 3 (94)
EL (E) EL (E) EL (104) EL (98) ,
(106) , (98) (106) EL (104) EL (104) (
98) (106)

(98) (106)

()

(exciton) , (Polaron)

(94) (1) , (68) 3

(80,84) 가 EL (68) 3 EL (104) (70), 1 2 가
(94) (1)

7a 7i 6 EL

; Exposure), (Develop) , (Photo Resist Coating), (Align amp
(Photolithography)

7a 7j , (1) 7a (70) (72a)
(74) (I) (70) 1 (72a) (74) 1 (70)
2

(76) (72a) 7a 7b (76) 1 (78) 3
(78)

0) 1 (76) (80) 7b (78) 4 1 (80) (42) 7c (82) 1 (8)
 2 (74)

3 7c 7d 2 (84) 2 (84) 7c (80)(84)
 1,2 (86a,86b) 7 (88) 가 (72a) 1 2 (42)
 1 2 (80)(84) (I) (1) 1,2 (86a,86b) (88) (I)

(72a) 1,2 (86a,86b)
 (Ia) (Ib)

(72a) (72b) (72) (72b)

1 (72) (90,92) 7e 7d 3 (7d 88)
 (7d 86a) (82) (Ib) (72b) (72b)
 (92) 2 (7d 46b) (Ia)

(82) (72), (78), (90,92) TFT(T)가
 (74) (78) (C_{ST})가 (82)

68) 3 (94) (68) 7f 3 (94) (96) 7

(I) 7g (98) (98) (7f 96)
 (92) (I) (1) 3 (94), 8 (68) (98)

7 (102) 가 7h (100) (100) 7g
 (100) TFT(T) (98)

(98) EL (E) EL (104) 7i (106) (7h 102)

8 3 EL (68) (1) (70) 2

8 (70) (1) EL (68) (78), (90,92)
 TFT(T) , TFT(T) (72), (C_{ST}) EL (E) EL (E)
 2 (68) EL TFT(T) (94) EL (E)

TFT(T) (C_{ST}) (DL) EL (E) EL (E)

(C_{ST}) 가 (82) (74)

, EL (E) EL (64) (98), EL (104) (106)
 . EL (E) (1) .

(E) , TFT(T) (90) (82) , (92) EL
 (98) .

, EL (98) EL (104)
 , (106) EL (104) (Work functio
 n)

, EL TFT(T) (I) , EL
 (68) (1) (72) (70) ,
 (C_{ST}) 가 1 (80) , (90) (82) 2
 (98) (92) 3 (94) , (98) EL (104)
 (84) , 가 , 1 3 (80,84,94) (100)

1 EL (I) (68) (1) (70)
 3 (80,84,94) , 3 (94) EL (E) EL
 (E) (98) , (106) , (98) (106)
 EL (104) . EL (104) (98) (106)
 , , , (98) (106)
 ()
 (exciton) ,
 (Polaron)

(1) , (68) 3 (94) .
 가 EL EL (104) (68)
 (1) 가 .

9a 9j 8 EL
 .

p; Exposure), (Develop) , (Photo Resist Coating), (Align am
 (Photolithography) .

9a 9j (1) 9a (68) . (68)
 EL (E) (68) 가 (Silica ae
 rogel) (Silica gel) .

9a 9b (70) (72a) (74) .
 (70) 1 , (72a) (74)
 1 .

(76) (72a) 9b 9c (76) (78) . 2
 (78) 2 1

0) . 1 (76) (80) 9c (78) 1 (80) (42) 9d (82) 1 (8
 2 2 3 3 (74)

2 9d 3 (86a,86b) 9e 2 (84) . 2 (84) 9d (84) 1,
 (88) 가 (72a) (82)

,86b) , (72a) (la) , (lb) 1,2 (86a)

(72a) (72a) (72b) (72) (72b)

(72) (90,92) 9f 9e 3

1 (9e 86a) (82) (90) (9e 88)

(92) 2 (9e 86b) (lb) (la) (82b) (72b)

(82) (72), (78), (90,92) TFT(T)가

(74) (74) (C_{ST})가

(74) (78) (82)

3 (94) 9g 3 (94) 9f 4

6 (96)

(l) 9h (98) (98) (9g 96)

(92) 7

(102) 가 9i (100) (100) 9h 5

8 (100) TFT(T)

(98) EL (E) EL (104) 9j (106) (9i 102)

1 3 EL

TFT(T) EL

TFT 가 4 TFT , 1

가

가

(57)

1.

9. 7 ,
p ,
1 2 .

10. 6 ,
(Indium Tin Oxide)

11. ,
 ,
 ,
 ,
가

12. 11 ,
(n) 1.5 .

13. 12 ,
(n) 1.5 (Silica aerogel) (Silica gel)

14. 13 ,
(Silica aerogel) (n) 1.07

15. 11 ,
1 ,
1 ,
2

16.

15

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17.

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18.

16

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19.

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(Indium Tin Oxide)

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20 21. ,
(n) 1.5 (Silica aerogel) (Silica gel)

20 22. ,
1 ,
1 ,
1 가 가 2

22 23. ,
1 1 가

22 24. ,
p p ,
1 2

22 25. ,
(Indium Tin Oxide)

26. ,
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1 ,

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3

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27.

26

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(n) 1.5

(Silica aerogel)

(Silica gel)

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28.

26

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3

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1

가 가

2

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29.

28

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가

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30.

28

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p

p

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1

2

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31.

28

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(Indium Tin Oxide)

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32.

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1

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2

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3

33.

32

(n) 1.5 (Silica aerogel) (Silica gel)

34.

32

1 1 3

1

1 가 가 2

35.

34

1 1 가

36.

34

p p

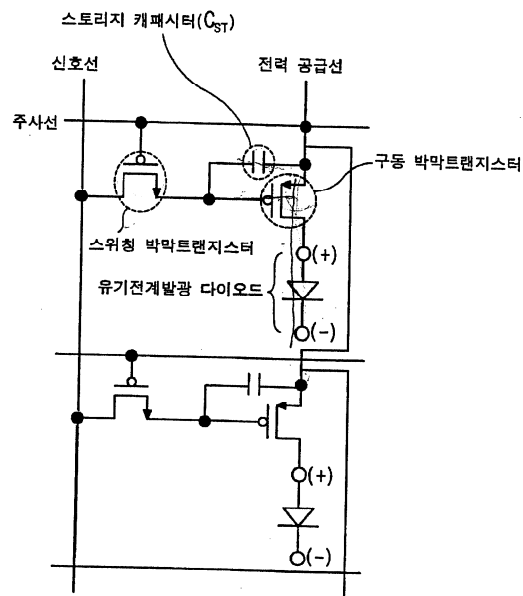
1 2

37.

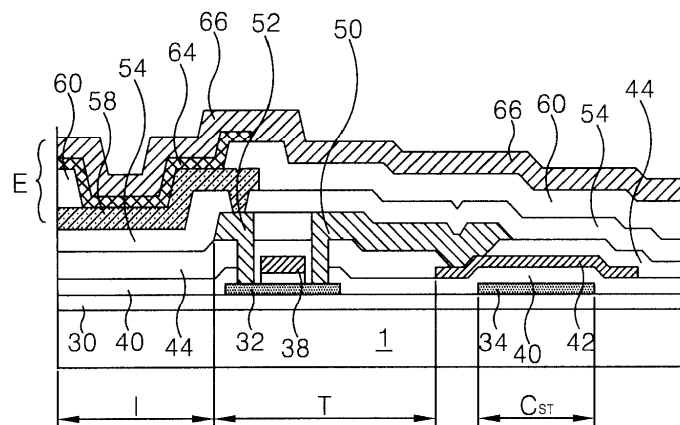
34

(Indium Tin Oxide)

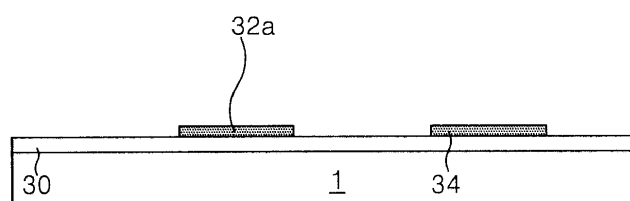
1



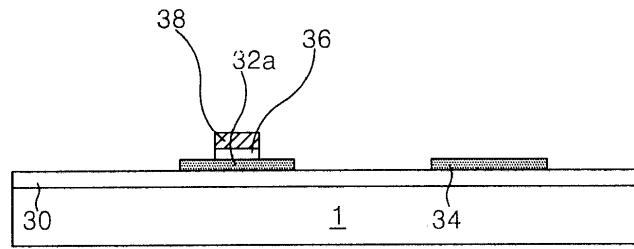
2



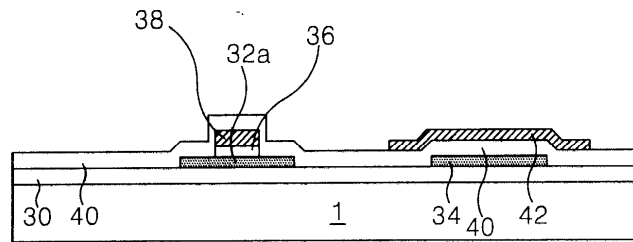
3a



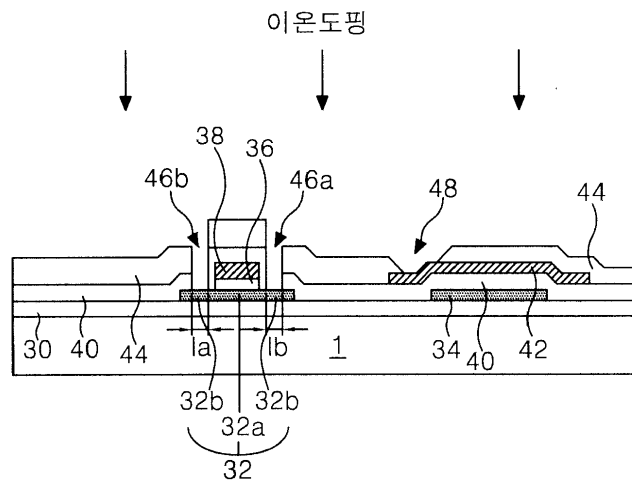
3b



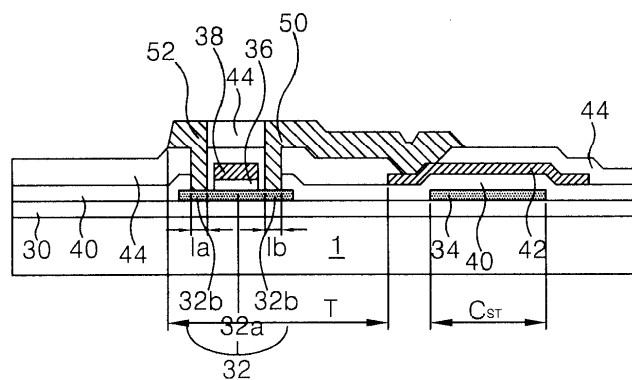
3c



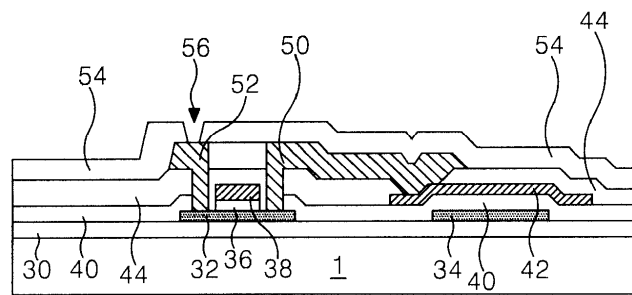
3d



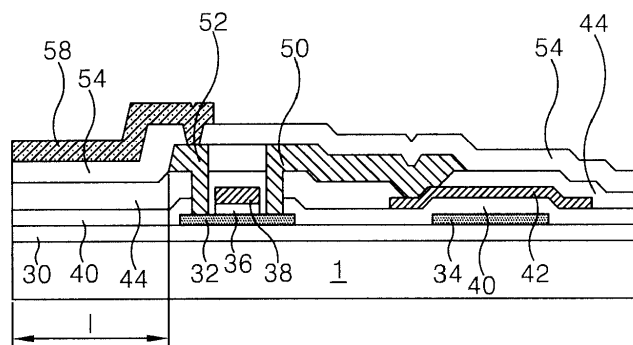
3e



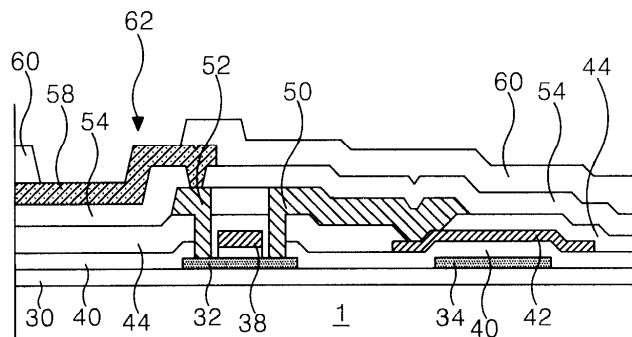
3f



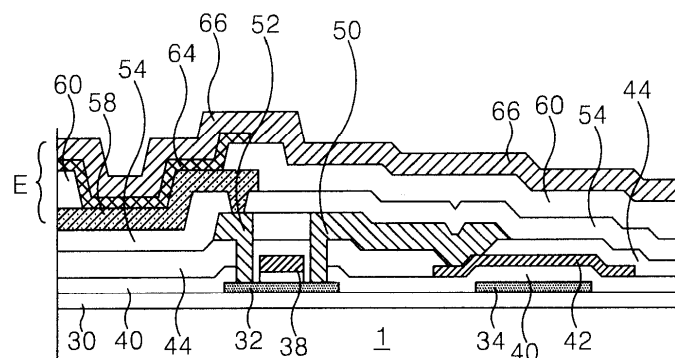
3g



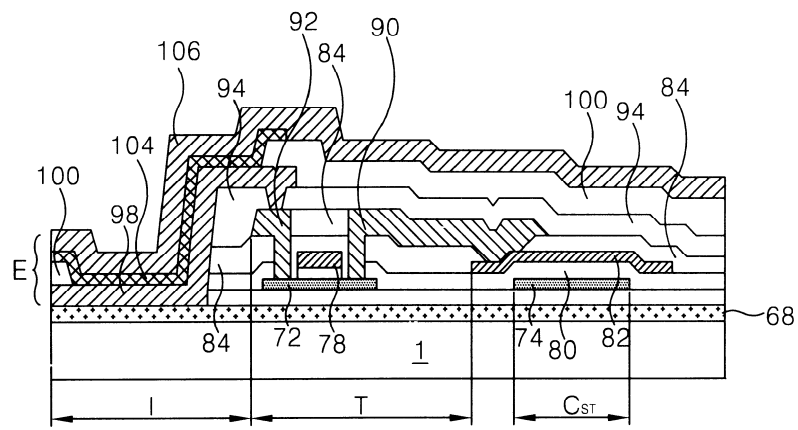
3h



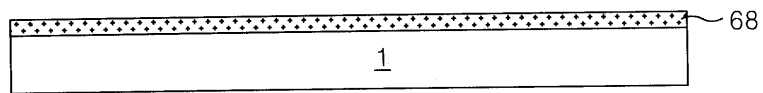
3i



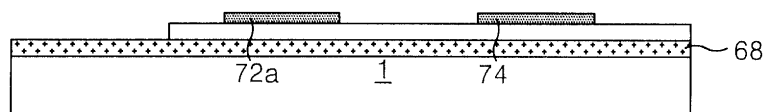
4



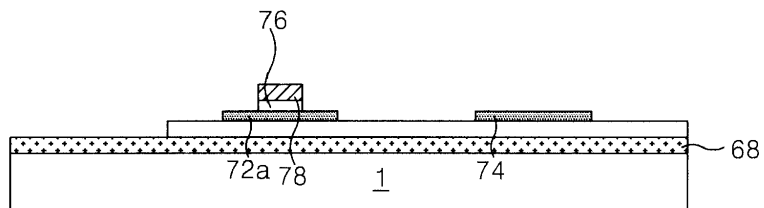
5a



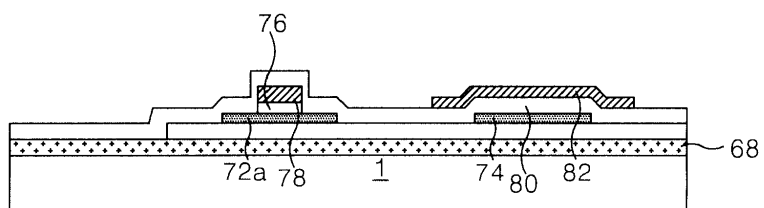
5b



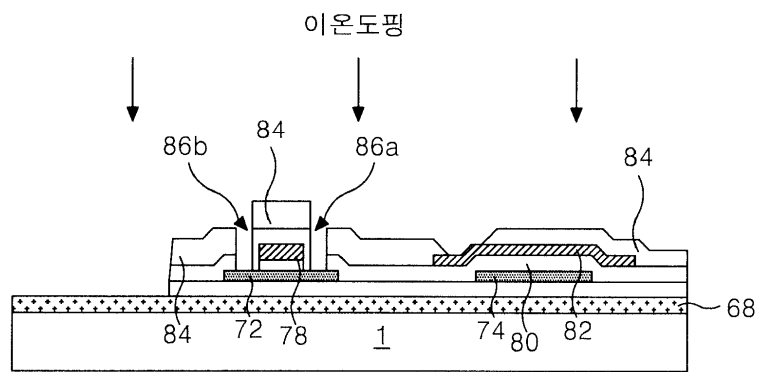
5c



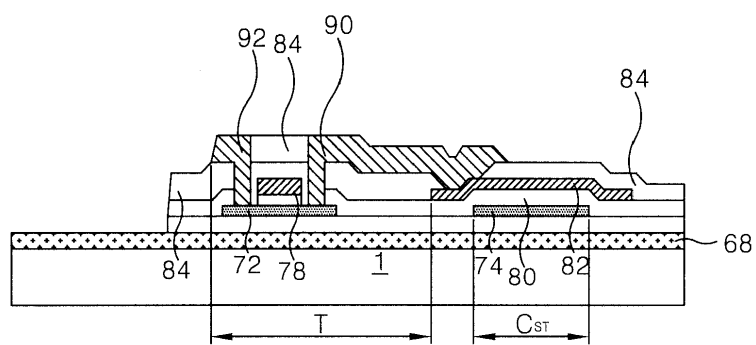
5d



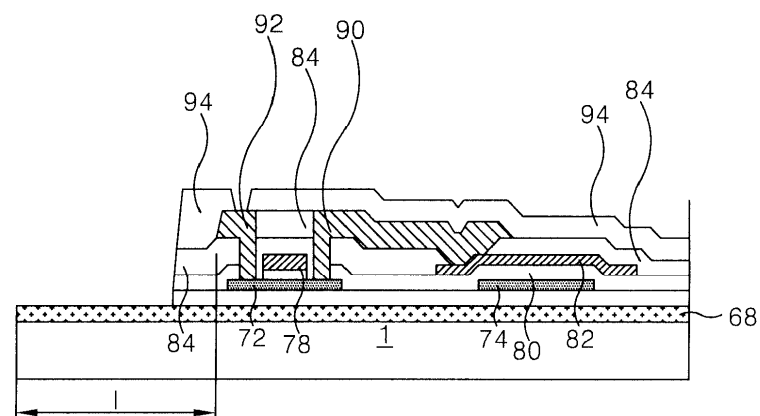
5e



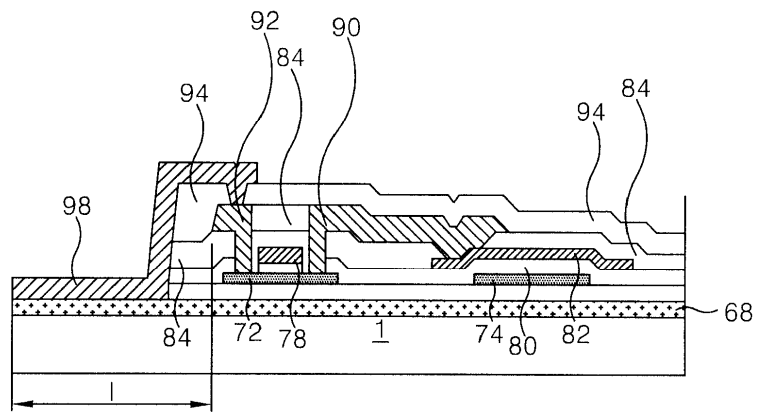
5f



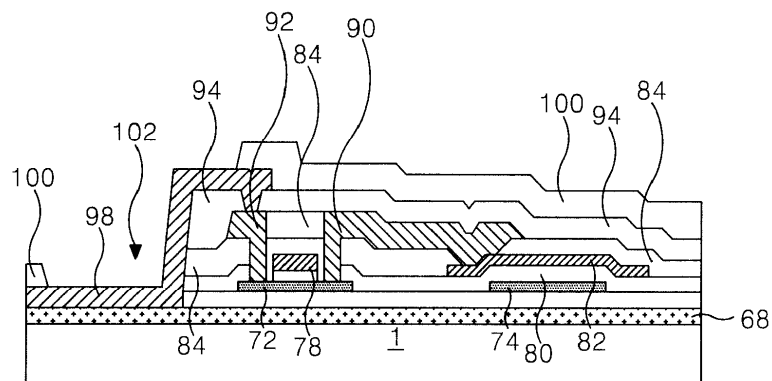
5g



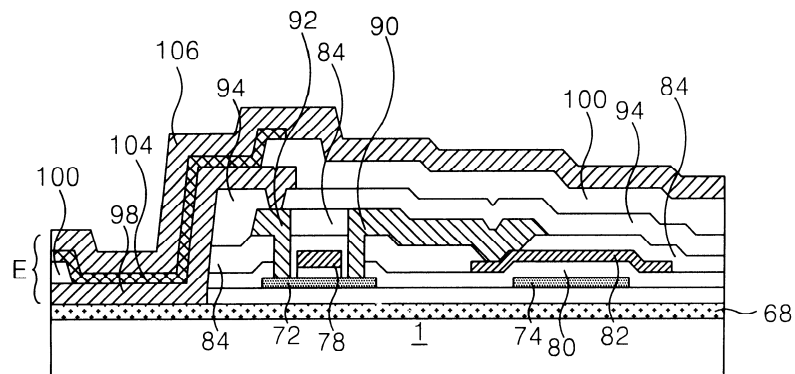
5h



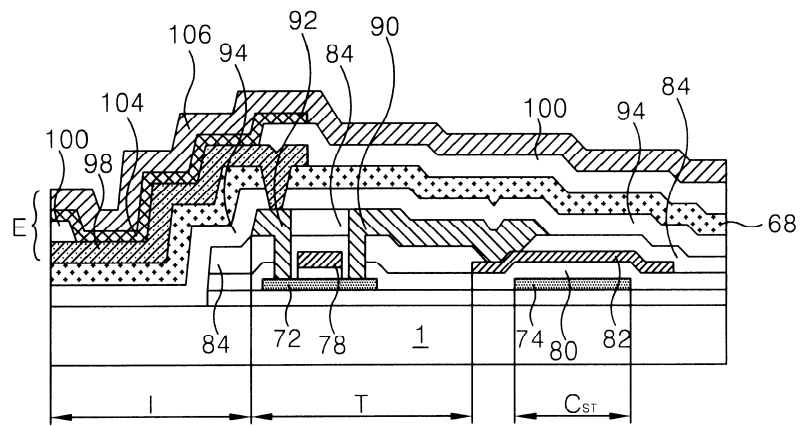
5i



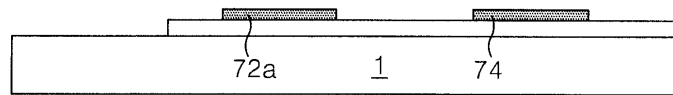
5j



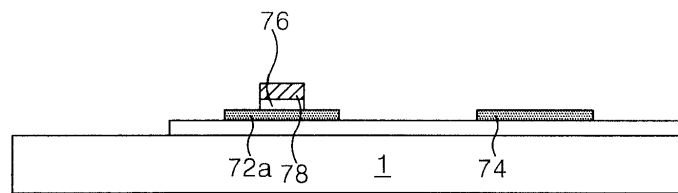
6



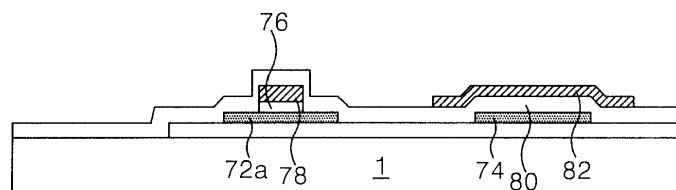
7a



7b

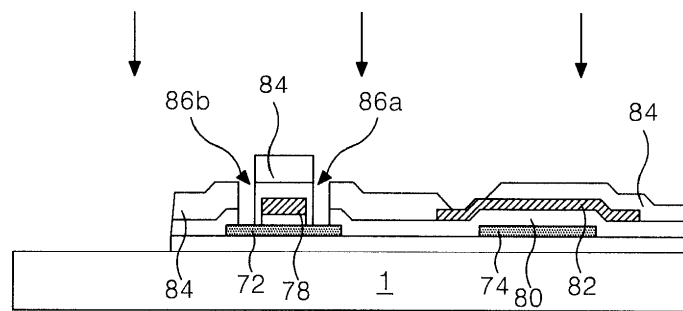


7c

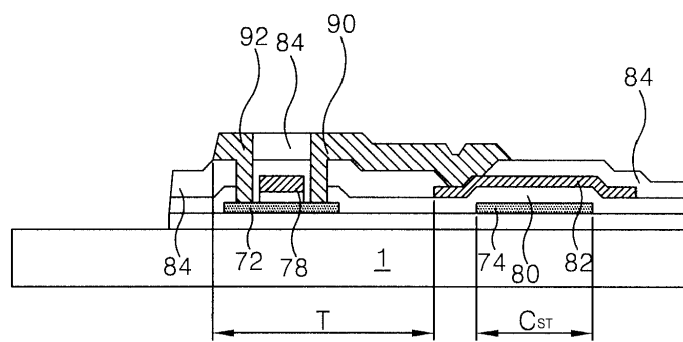


7d

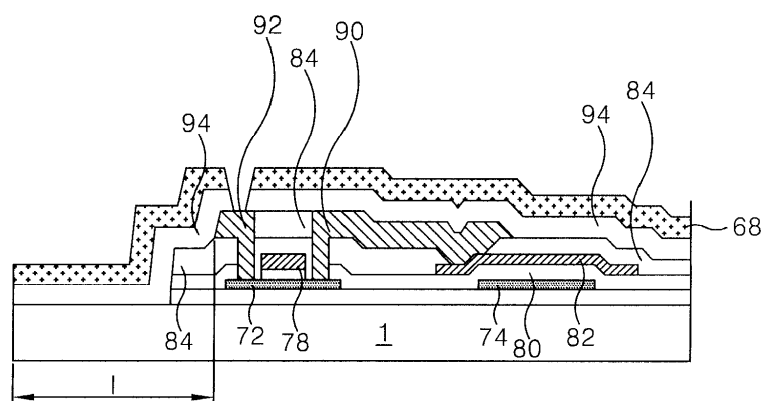
이온도핑



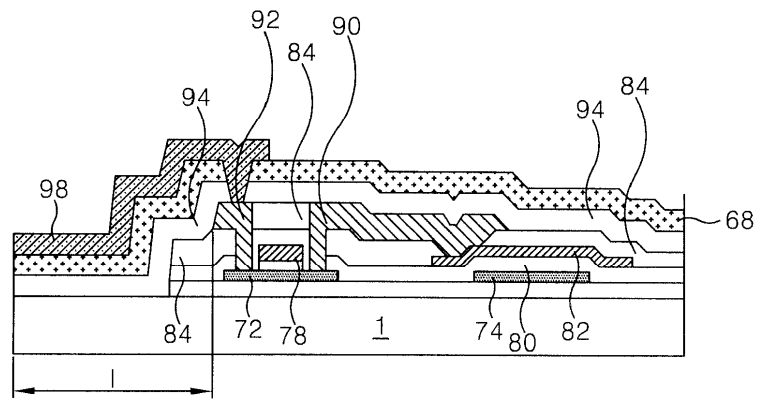
7e



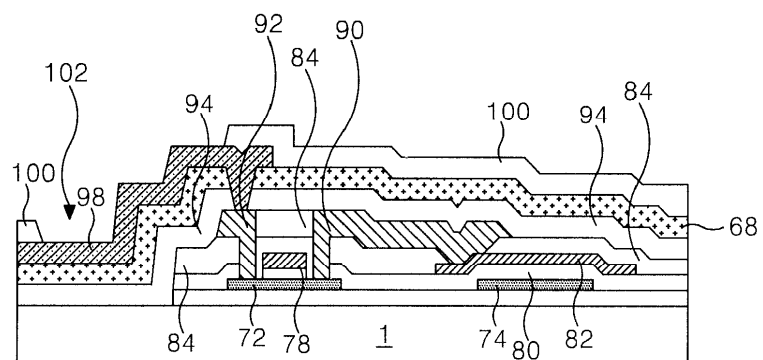
7f



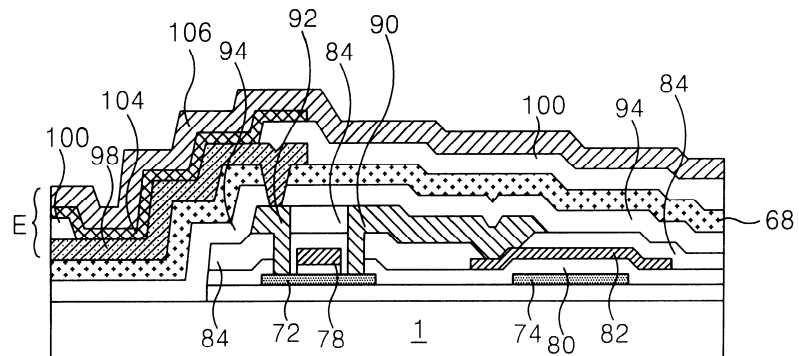
7g



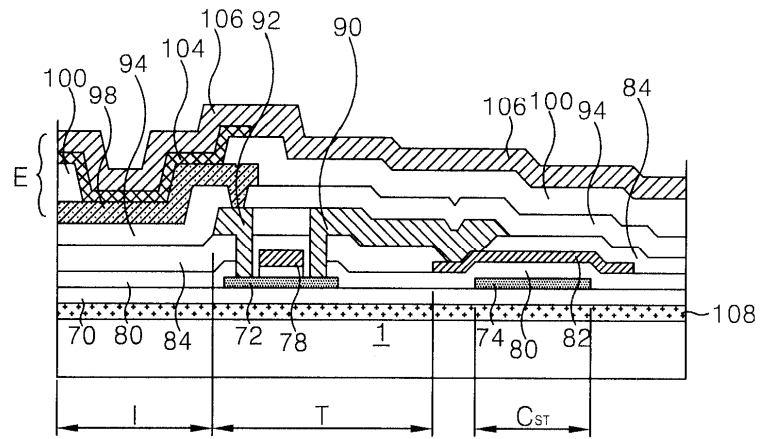
7h



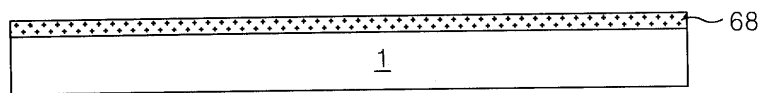
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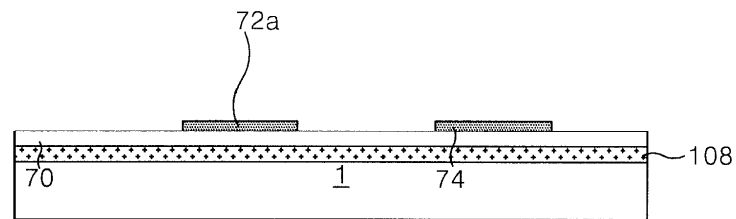
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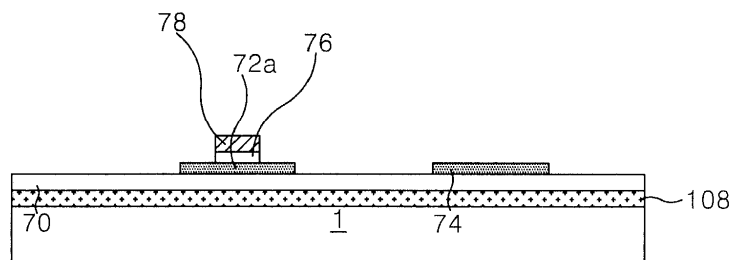
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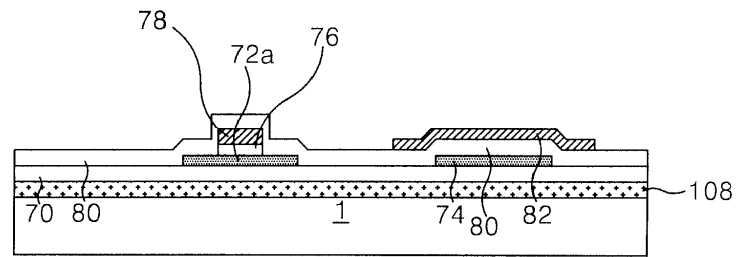
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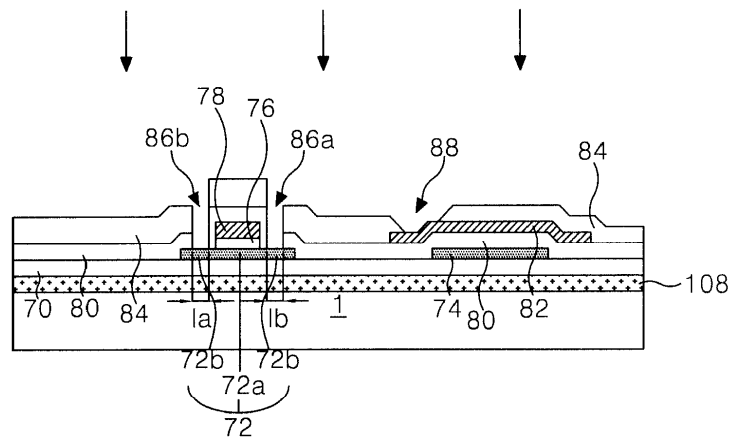


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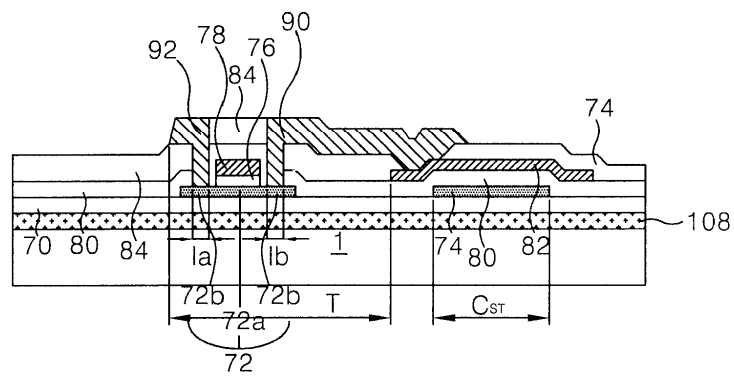


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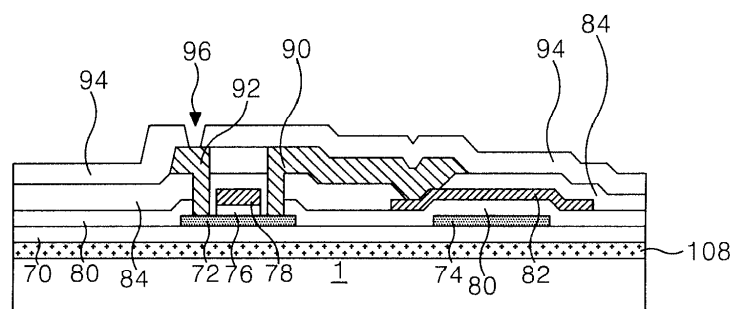
이온도핑



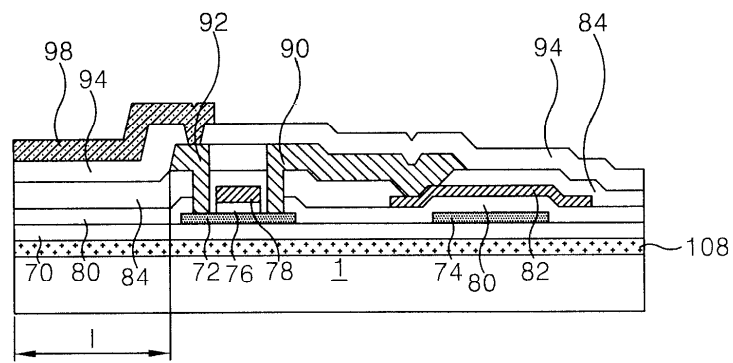
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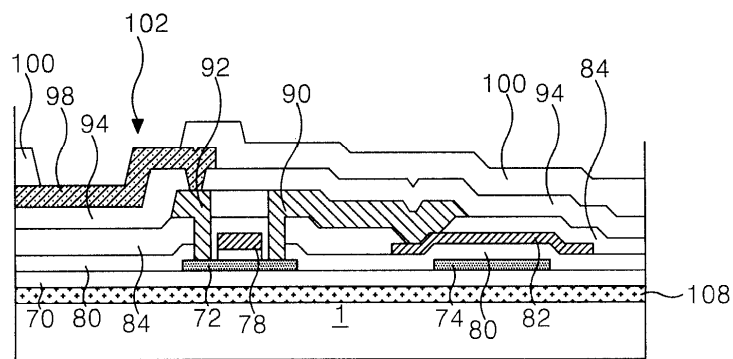
9g



9h



9i



9j

