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(73) 3 308 - 2 301

(72) 3 308 - 2 301

3 587 - 6 B - 205

7 673 - 7331/3

APT101 - 702

(74)

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(54)

가 a - Si:H

가 CaF₂ , CeO₂ , Si

가 CaF₂ , CeO₂ , PVD 1 ,

3 5mm, CaF₂ 99.95% CeO₂ CaF₂ , CeO₂ , Ce

VD μ c - Si PEC

SiH₄ He 80% H₂

1a

1a 1 (Top gate type TFT)

1b 2 (Bottom gate type TFT)

2

3 / a - Si:H μ c - Si X -

4 /

<

10 :

20 :

100 : 200 :

300 : μ c - Si 400,450 : n+ μ c - Si

500 : 600 :

700 : 750 :

a - Si:H 가

(Thin Film Transistor; TFT) (a - Si:H)

300 . a - Si:H TFT - LCD

CRT (cathode ray tube)

PC,

LCD, TV, TV, LCD, TV (high definition television)

TFT - LCD active layer

, TFT - LCD, a - Si:H TFT 가
 μ c - Si

, 30' UXGA(Ultra extended graphic array) a - Si TFT LCD
 PDP(Plasma display panel) LCD가 30'
 , a - Si:H TFT $1\text{cm}^2/\text{V} \cdot \text{s}$, 30' UXGA
 , a - Si:H TFT

50nm (grain size) 가 TFT $10\text{cm}^2/\text{V} \cdot \text{s}$

poly - Si TFT 가 가, SPC(solid phase crystallization), MIC(Metal induced crystallization), MILC(Metal induced lateral crystallization), Microwave
 , ELA(Excimer laser annealing) 1 MIC, MILC, Microwave, ELA

1. Si

	()			Grain size(μm)
Furnace anneal	620	a - Si:H/Glass	: 24h	0.02
Excimer	-	a - Si:H/Glass	Power : $300\text{mJ}/\text{cm}^2$	0.1
Zone melting recrystallization	1450	a - Si:H/Fused silica	Scan rate : $0.1 \sim 2\text{mm/s}$	100

, SPC Microwave 600 가
 MIC MILC 500
 i , 가 가 . ELA S

poly - Si PECVD(Plasma enhanced chemical vapor deposition), LPCVD(Low pressure chemical vapor deposition)
 a - Si:H , Microwave, Excimer laser
 가 가 , 가

, 30'
 , UXGA 가 $10\text{cm}^2/\text{V} \cdot \text{s}$

, 가 poly - Si 가
 Si 600 , 30' UXGA
 , a - Si:H , 30' UXGA
 가

400

(S1);

PVD CaF_2 CeO_2 (S2);

PECVD (S3);

n+ $\mu\text{c-Si}$ (S4);

n+ $\mu\text{c-Si}$ CVD RF SiO_2 SiN_x n+ $\mu\text{c-Si}$ (S5);

(S6); (Cr) (Al)

(PR) (Al)

(SS1);

(SS2); (Cr) (Al)

SS3); PVD CaF_2 CeO_2 (

PECVD (SS4);

n+ $\mu\text{c-Si}$ (SS5);

n+ $\mu\text{c-Si}$ (PR) n+ $\mu\text{c-Si}$ (Al)

CaF_2 3 5mm, 99.95% CaF_2 , CeO_2 Ce

(S3) (SS4) , SiH_4 He 80% H_2 ,

10^{-7} torr 100 sccm He 50W RF

He SiH_4 가 2sccm H_2 32sccm 88mtorr 300 1 0.18 /s

가 (seed layer) CaF₂ CeO₂ a-Si:H

CaF₂, CeO₂, 10 cm²/V · s μ c - Si Si

2 가 가 가 μ c - Si μ c - Si 400

가

2.

Material			(nm)	(%)
Si	Cubic	11.7	0.543	-
CaF ₂	Cubic	6.81	0.546	+0.55
CeO ₂	Cubic	26	0.541	-0.37

TFT - LCD panel 가 corning 1737 glass

CaF₂ CeO₂ PVD(evaporation E - beam)

PECVD(plasma enhanced chemical vapor depos

ition)

1a 1 (Top gate type TFT)

1a (100) (200) 1 CaF₂ CeO₂ PVD (100) CaF₂ 3 5mm, 99.95% CaF₂ CeO₂ Ce

(200) PECVD (200) μ c - Si (300)

10⁻⁷ torr SiH₄ He 80% H₂ RF(radio frequency) He SiH₄ 가 2sccm H₂ 32sccm 가 88mtorr, 300 1 0.18 /s μ c - Si (300)

μ c - Si (300) (700) (750) (ohmic contact) μ c - Si (300) n+ μ c - Si (400,450)

n+ μ c-Si (400,450) CVD RF SiO₂ SiN_x n+
 μ c-Si (400,450) (500)

SiO₂ SiN_x (500) , (Cr) (Al)
 (600) , (Al) (600)

(600) , (600) (Al) ,
 (PR) (700) (750) ,
 (10)가

1b 2 (Bottom gate type TFT)

1b , 2 (100) ,
 (100) (Cr) (Al) (600) (600)
 , (Al)

(600) , (200) CaF₂ CeO₂ PVD
 , CaF₂ 3 5mm, 99.95% CaF₂ , CeO₂ Ce
 , CeO₂

CaF₂ CeO₂
 (200) PECVD (200)
 μ c-Si (300)

10⁻⁷ torr SiH₄ He 80% H₂ ,
 He , 100sccm He 50W RF
 SiH₄ 가 2sccm H₂ 32sccm 가 ,
 88mtorr, 300 1 0.18 /s , μ c-Si (3
 00)

0) , (700) (750) (ohmic contact) , μ c-Si (30
 (200) n+ μ c-Si (400,450)

n+ μ c-Si (400,450) , n+ μ c-Si (400,450) (Al)
 , (PR) (700) (750)
 , (20)가

a-Si:H
 , TFT-LCD strain point가 593 , 600

가 CaF₂ CeO₂
 (Raman spectroscopy) , 가

2

2

2, a-Si:H/SiO₂/glass [2(a)] 480cm⁻¹ 가, a-Si:H, μc-Si/CaF₂/glass [2(b)] 520cm⁻¹ 가, 2(c) Si.

X- (XRD).

3 / a-Si:H μc-Si X-.

3, XRD a-Si:H/glass[3(a)], a-Si:H/SiO₂/glass[3(b)], μc-Si/CaF₂/glass[3(c)] XRD (111), (220).

a-Si:H TFT (σ_p/σ_d)가 100,000 μc-Si 가 100 TFT (scanning electron microscopy: SEM).

4 / i:H/glass [4(a)], a-Si:H/SiO₂/glass [4(b)], μc-Si/CaF₂/glass [4(c)] a-Si:H, 50,000 70.6nm (a-Si:H) 4(a) 4(b).

F₂ CeO₂, Ca, O₂ 가, Si grain size 가, CaF₂, Ce, μc-Si, CVD, PVD 가, 30' UXGA TF T-LCD 가.

(57)

1.

(S1);

2); PVD CaF_2 CeO_2 (S
 2);
 PECVD (S3);
 n+ $\mu\text{c-Si}$ (S4);
 n+ $\mu\text{c-Si}$ CVD RF SiO_2 SiN_x n+ μ
 c - Si (S5);
 (S6); (Cr) (Al)
 (PR) (Al)

2.

1 CaF_2 3 5mm, 99.95% CaF_2 C
 eO_2 Ce CeO_2

3.

1 (S3) SiH_4 He 80% H_2
 10^{-7} torr 100 sccm He 50W RF
 He SiH_4 가 2sccm H_2 32sccm 88mtorr 300
 /s 1 0.18

4.

(SS1);
 (Cr) (Al)
 (SS2);
 PVD CaF_2 CeO_2 (
 SS3);
 PECVD (SS4);
 n+ $\mu\text{c-Si}$ (SS5);
 n+ $\mu\text{c-Si}$ (PR) n+ $\mu\text{c-Si}$ (Al)

5.

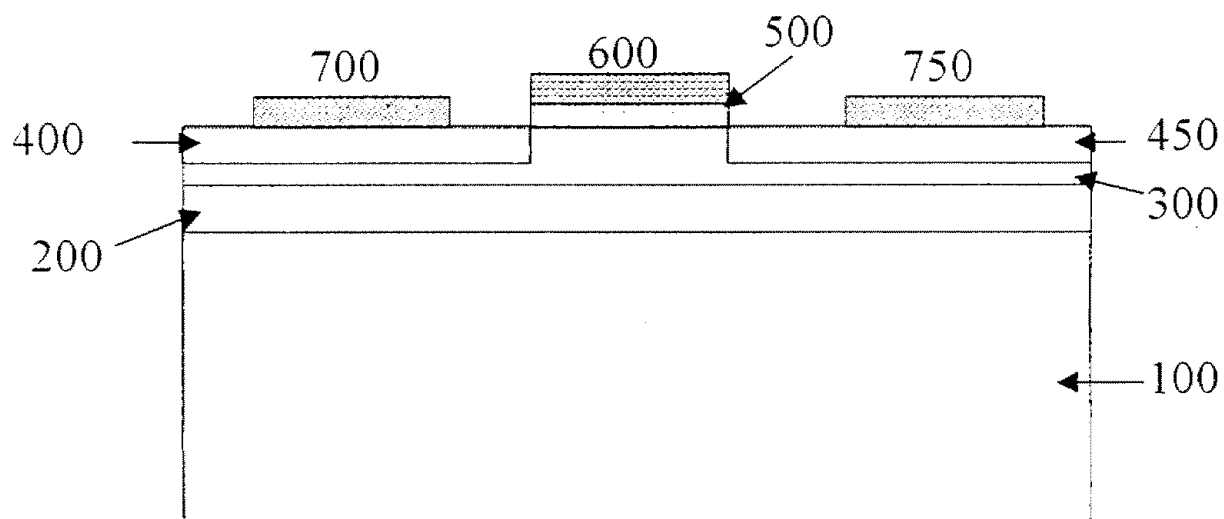
4 eO₂ Ce , CaF₂ 3 5mm, 99.95% CeO₂ CaF₂ , C

6.

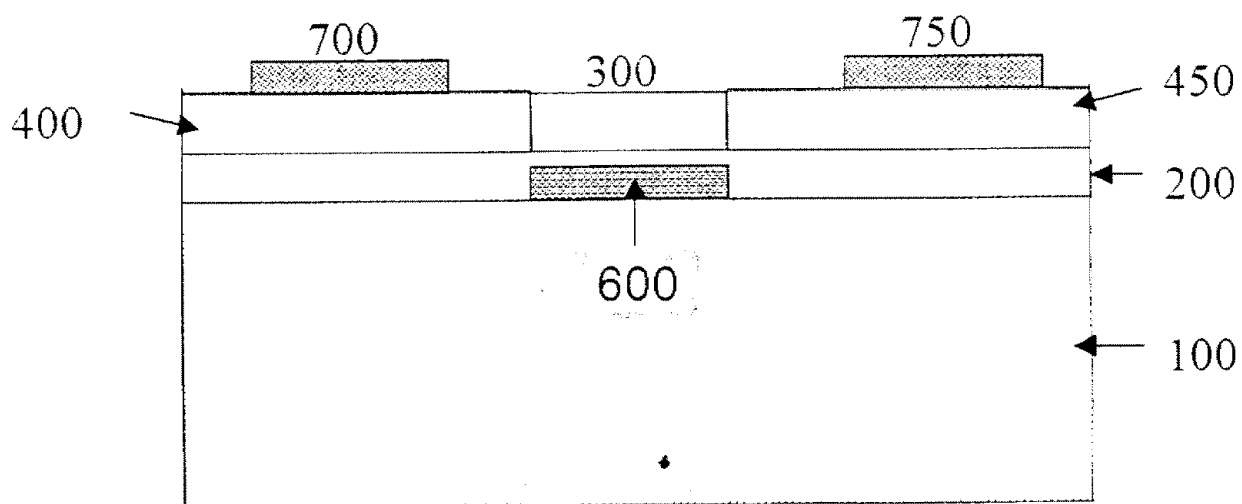
4 , (SS4) , SiH₄ He 80% H₂ ,
 10⁻⁷ torr 100 sccm He 50W RF
 , He SiH₄ 가 2sccm H₂ 32sccm 300 0.18
 /s

1a

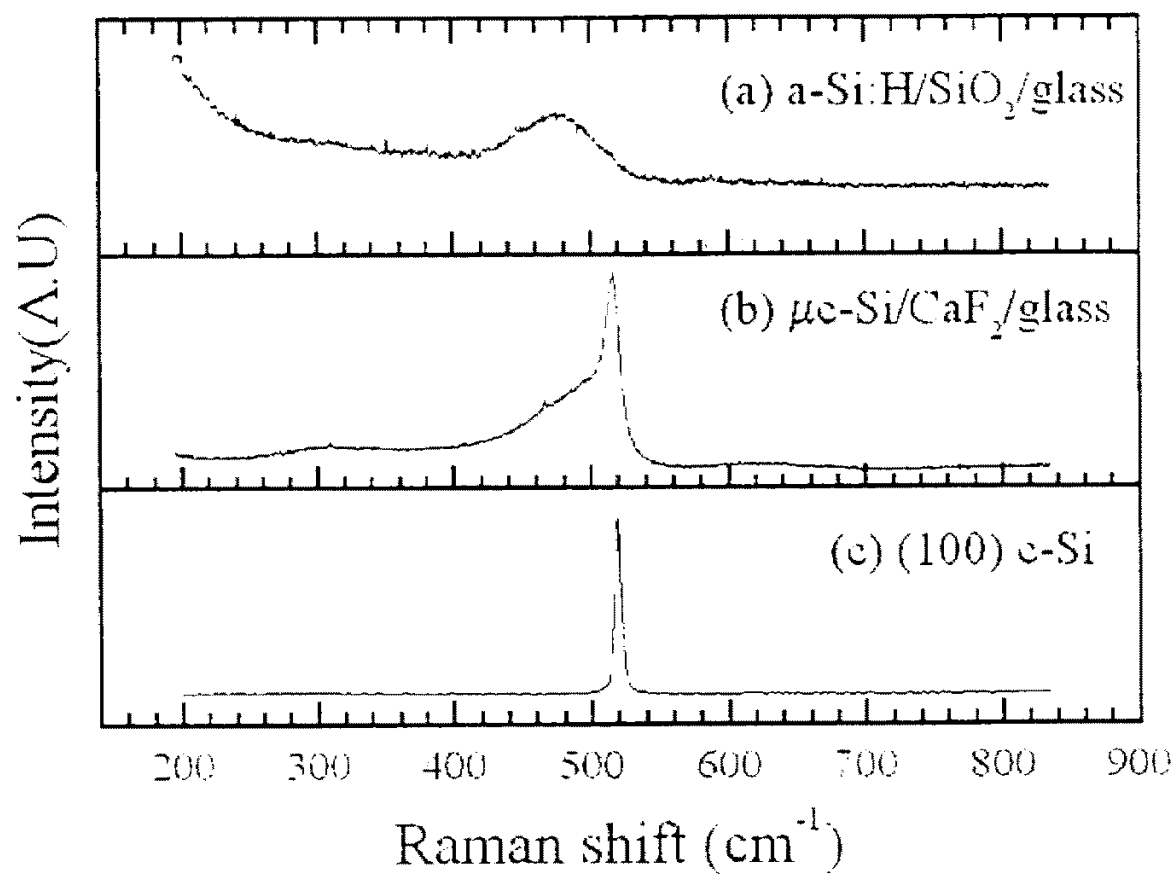
10

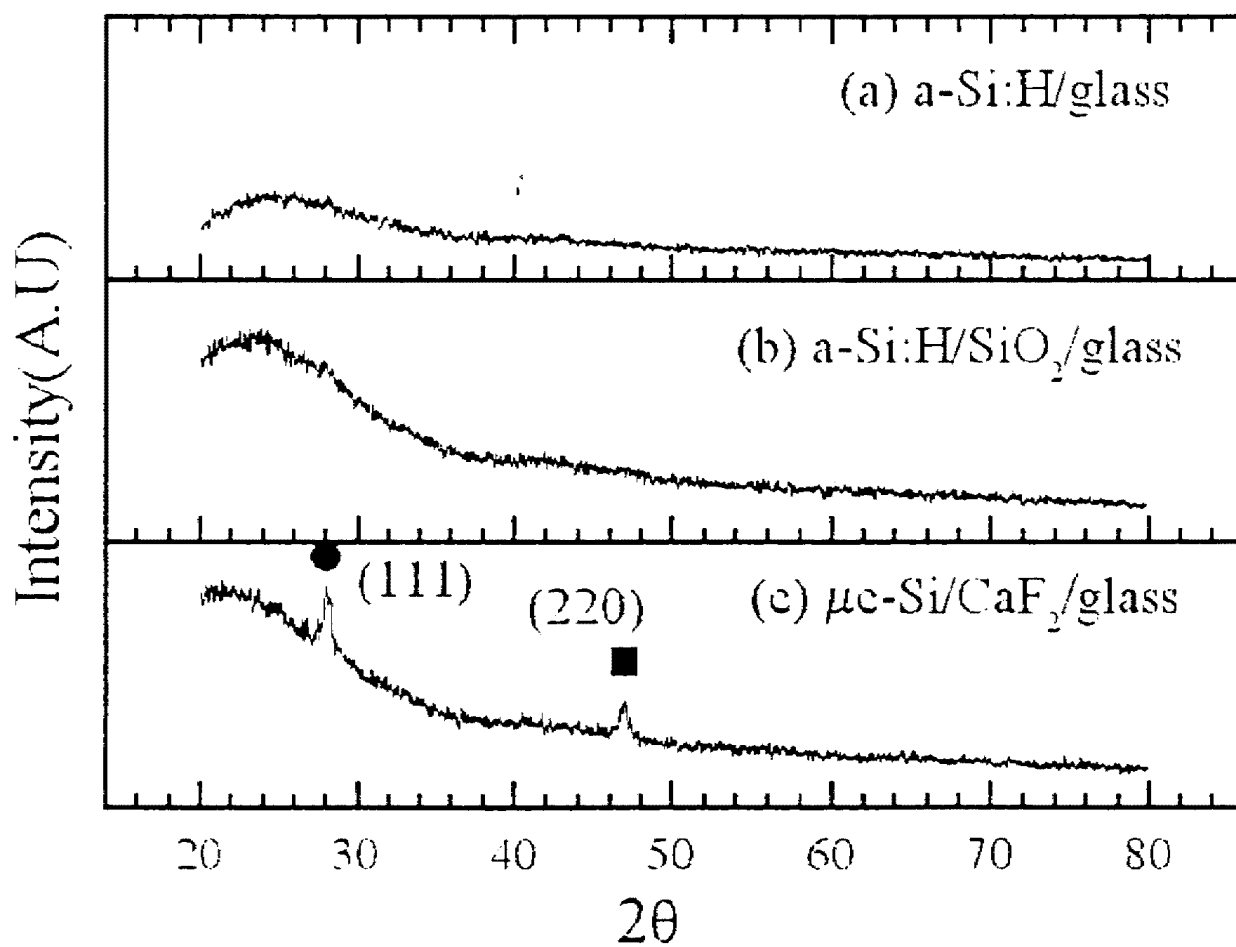


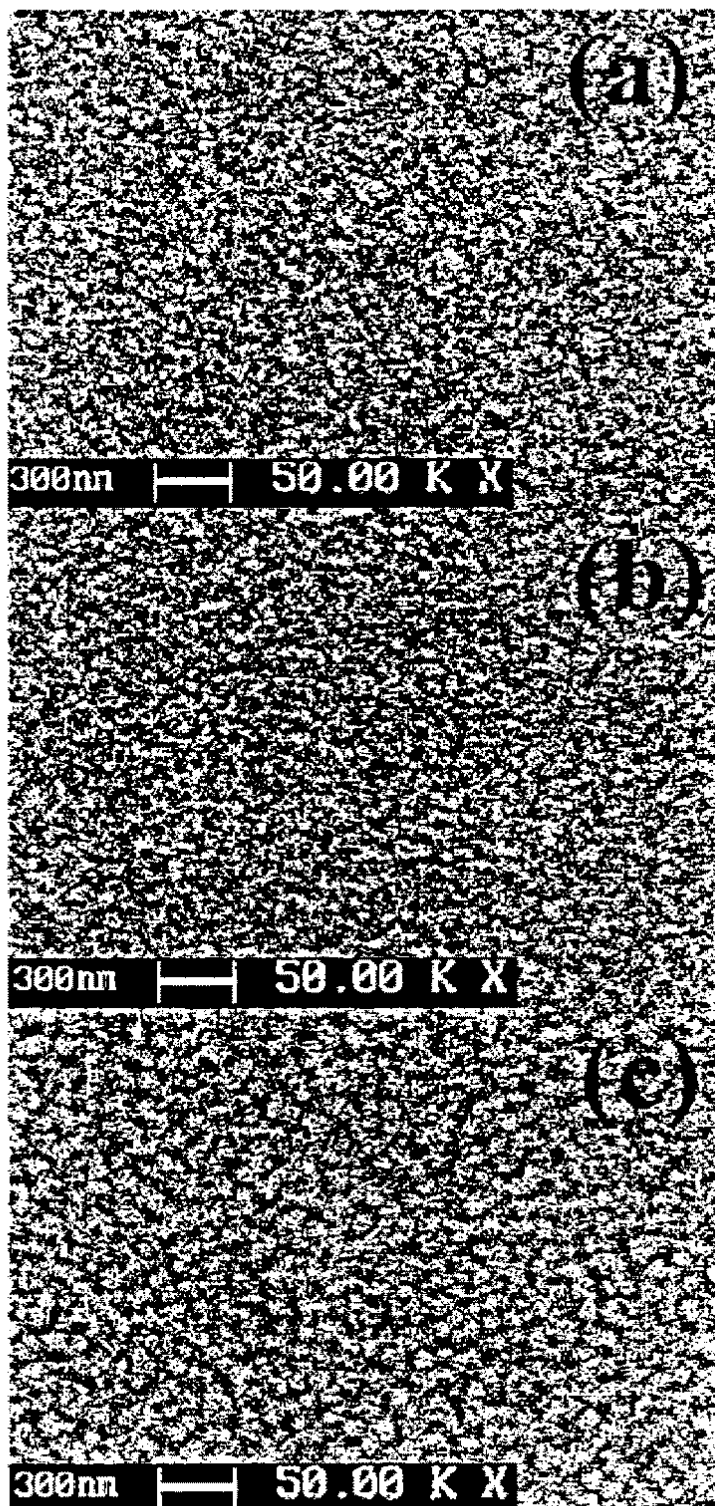
1b

20

2







(a) a-Si:H/glass

(b) a-Si:H/SiO₂/glass

(c) μ c-Si/CaF₂/glass