

台灣永光化學觸控面板用高阻抗型 黑色光阻 EK 620

研發二部

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Properties

Properties of EK 620

Characteristic	Properties
Solid content	18.0 %
Viscosity	2.8 cP
OD value	3.0 ~ 4.0 (1.0 ~ 1.5 μm)
Surface resistivity	$\geq 10^{14}$ (230 °C × 30 min.)
Uniformity	≤ 3 %
Adhesion (Cross-cut tester with 3M 610 tape)	$\geq 4\text{B}$ (STN、TN-CS)

Recipe

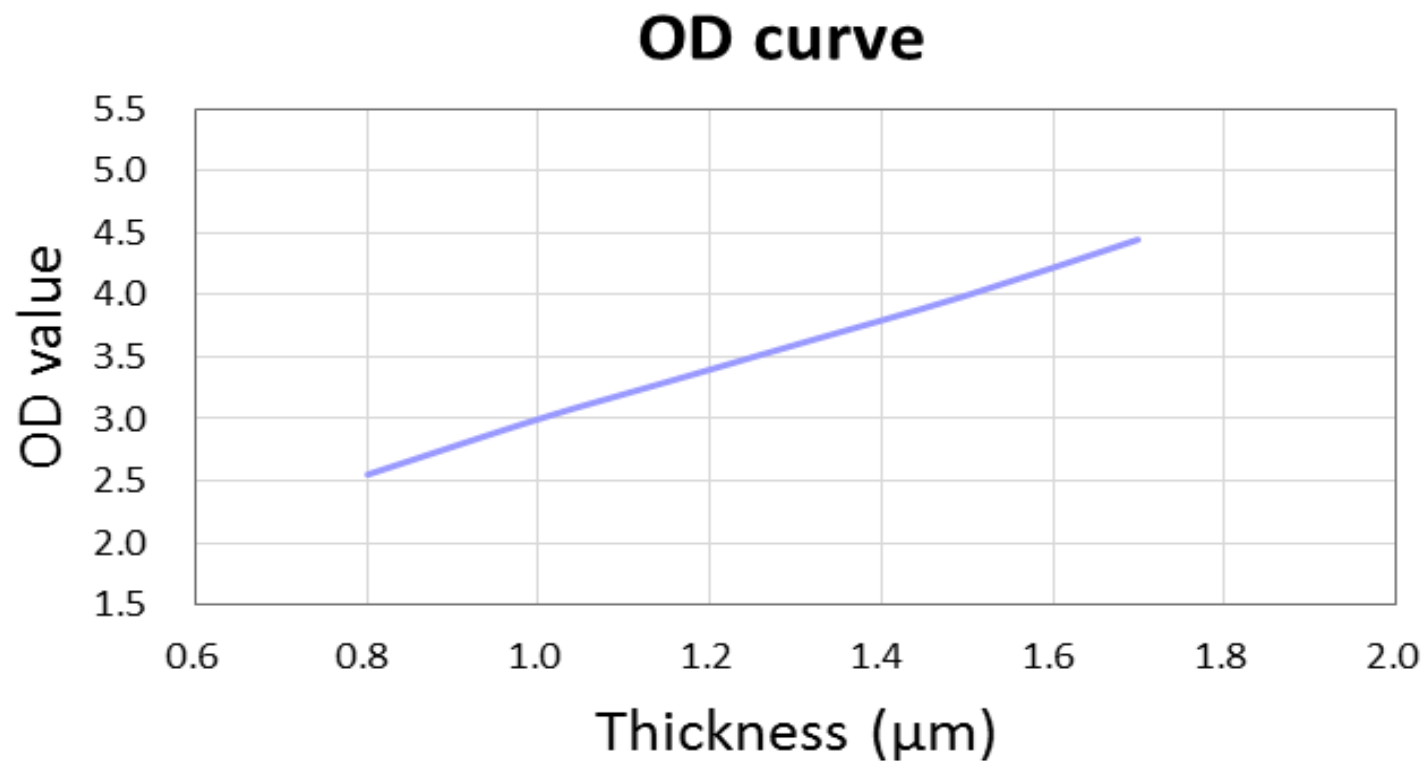
Process Condition of EK 620

Target thickness	1.5 μm
Pre-bake (oven)	90 $^{\circ}\text{C}$ $\times$ 5 min.
Exposure (broad band)	200 mJ/cm^2 (H line), 120 mJ/cm^2 (I line) gap = 100 μm
Development (spray)	ENPD 23 (KOH type) 1 wt.%, 23 $^{\circ}\text{C}$, 30 ~ 40 sec. ENPD 22 (KOH type) 2 wt.%, 24 $^{\circ}\text{C}$, 30 ~ 40 sec. ENPD 80 (Buffer type) 10 wt.%, 25 $^{\circ}\text{C}$, 20 ~ 30 sec.
Rinse	Running DI water, 30 sec.
Post-bake (oven)	230 $^{\circ}\text{C}$ $\times$ 30 min. (oven)
Substrate	TN-CS (0.55 mm)

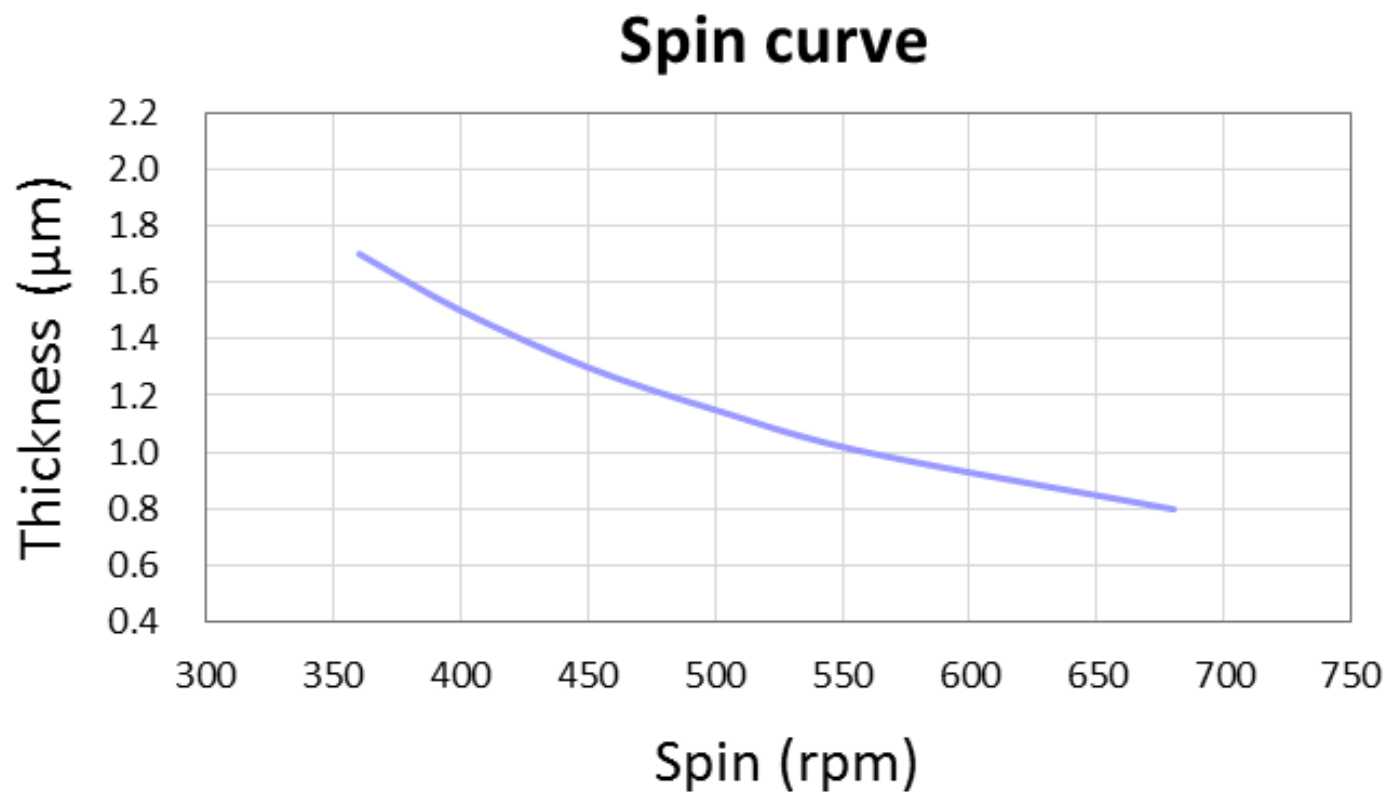
Thickness & OD value

Thickness (μm)	Spin (rpm)	OD value
0.80	680	2.55
1.00	560	3.00
1.15	500	3.30
1.30	450	3.60
1.50	400	4.00
1.70	360	4.45

Optical Density



Spin curve



Process Windows

Exposure Windows — ENPD 23

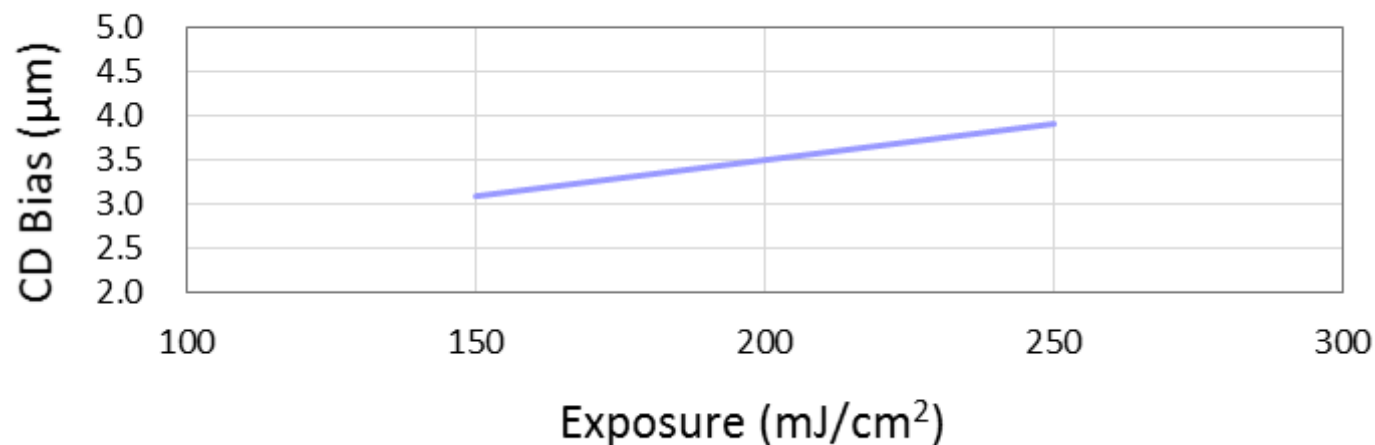
Exposure (mJ/cm ²)	CD bias (μm)
150	3.1
200	3.5
250	3.9

* Pre-baked : 90 °C × 5 min.

* Exposure (broad band) : H line

* Development time (Spray) : 35 sec.

* Developer : ENPD 23 (KOH type) 1 wt.%, 23 °C



Process Windows

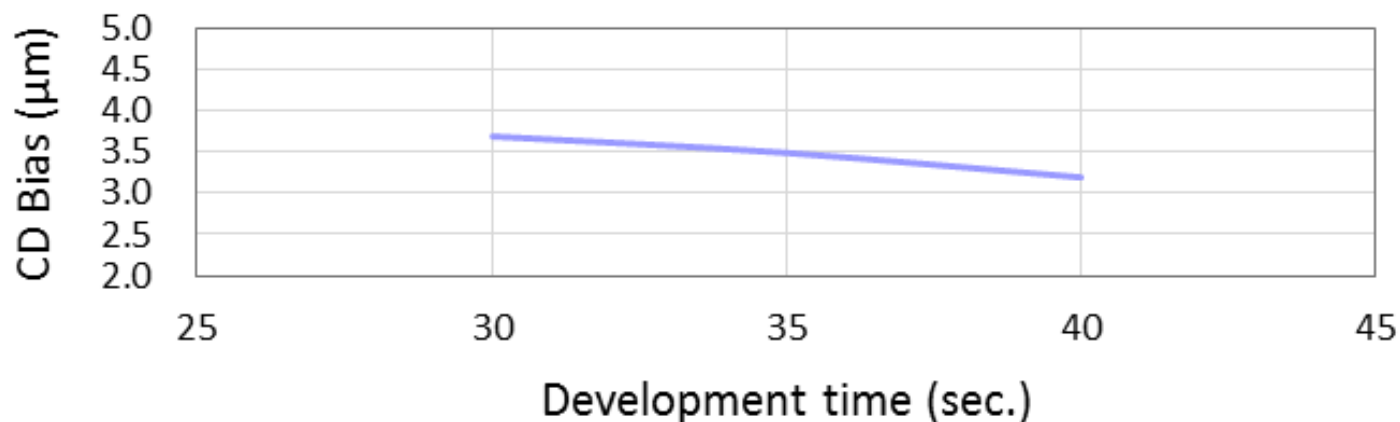
Development Windows — ENPD 23

D.T. (sec.)	CD Bias(μm)
30	3.7
35	3.5
40	3.2

* Pre-baked : 90 °C × 5 min.

* Exposure (broad band) : H line 200 mJ/cm²

* Developer : ENPD 23 (KOH type) 1 wt.%, 23 °C



Process Windows

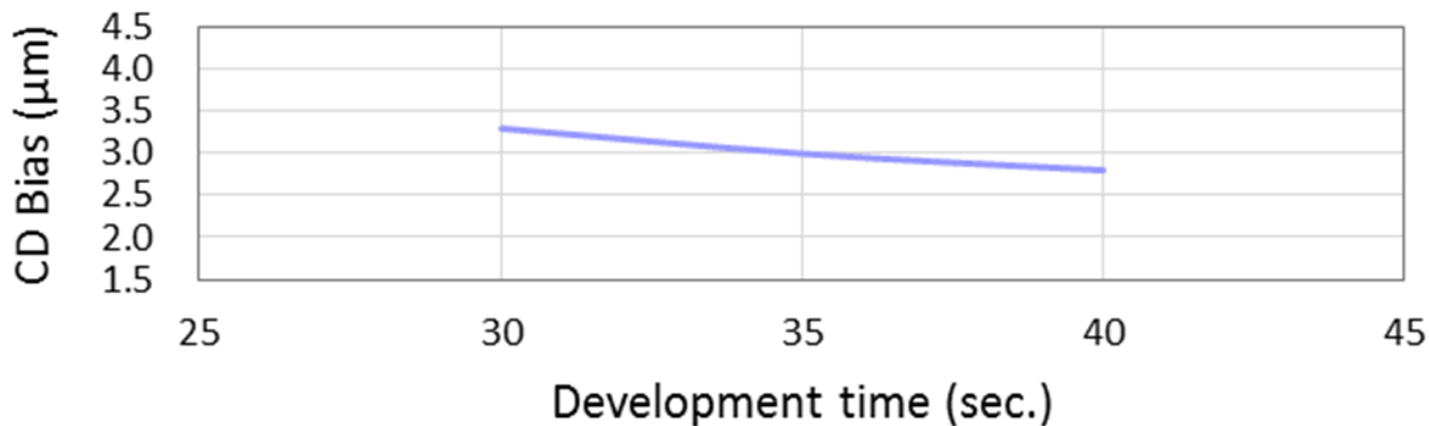
Development Windows — ENPD 22

D.T. (sec.)	CD Bias(μm)
30	3.3
35	3.0
40	2.8

* Pre-baked : 90 °C × 5 min.

* Exposure (broad band) : H line 200 mJ/cm²

* Developer : ENPD 22 (KOH type) 2 wt.%, 24 °C



Process Windows

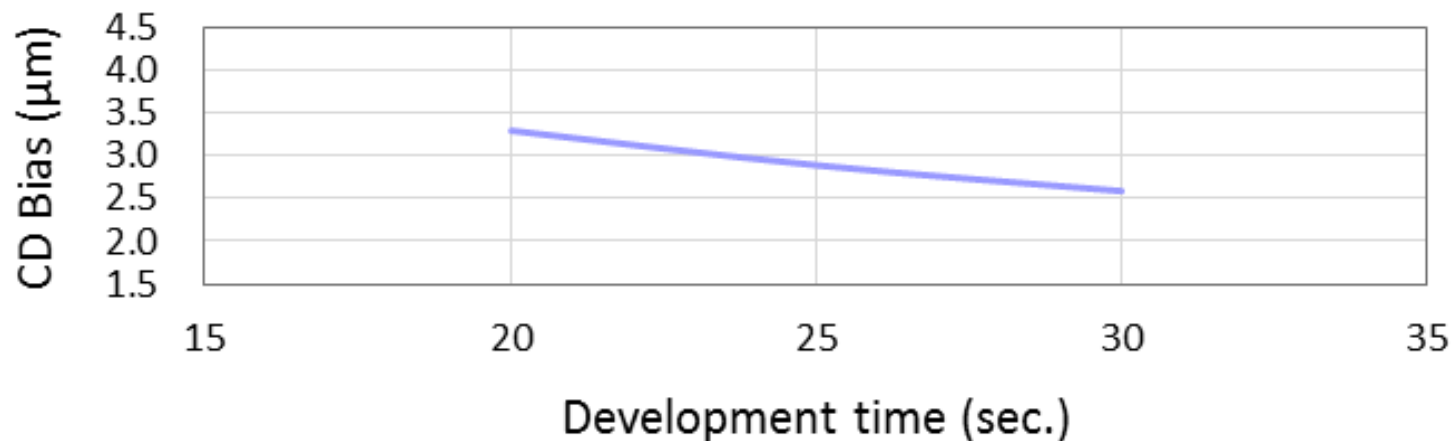
Development Windows — ENPD 80

D.T. (sec.)	CD Bias(μm)
20	3.3
25	2.9
30	2.6

* Pre-baked : 90 °C × 5 min.

* Exposure (broad band) : H line 200 mJ/cm²

* Developer : ENPD 80 (Buffer type) 10 wt.%, 25 °C



Chemical resistance - Adhesion

	FeCl ₃	10 % Aqua Regia	Al etched
STN	≥ 4B	≥ 4B	≥ 4B
TN-CS	≥ 4B	≥ 4B	≥ 4B
	Ultrasonic	PCT	TEST 1
STN	≥ 4B	≥ 4B	≥ 4B
TN-CS	≥ 4B	≥ 4B	≥ 4B

➤ FeCl₃ test*、10 % Aqua Regia test、Al etched test : 40 °C × 2 min.

*The ingredient of aqua FeCl₃ (26 mL 37 wt.% HCl_(aq.) + 10 mL H₂O + 0.8 mL 42 % FeCl_{3 (aq.)})

➤ Ultrasonic test (80 W, 43 KHz) : 55 °C × 20 min.

➤ PCT (Pressure cooking test) : 121 °C, 2 atm , 24 hr.

➤ TEST 1 : 10 % Aqua Regia (40°C × 4 min.) → 5 % KOH (40°C × 2 min.)

→ Al etched (40°C × 2 min.) → 5 % KOH (40°C × 2 min.)

Surface Resistance

Surface resistance (Ω/cm^2)		
Post-baked	230 °C × 60 min.	$\geq 10^{14}$
Heat test	250 °C × 60 min.	$\geq 10^{14}$

➤ Recipe

spin coating → 90 °C × 5 min. (oven) → 200 mJ/cm² (H line)

→ ENPD 23 (KOH type) 1 wt.%, 23 °C 40 sec. → 230 °C × 30 min. (oven)

→ 250 °C (oven) resistance test.

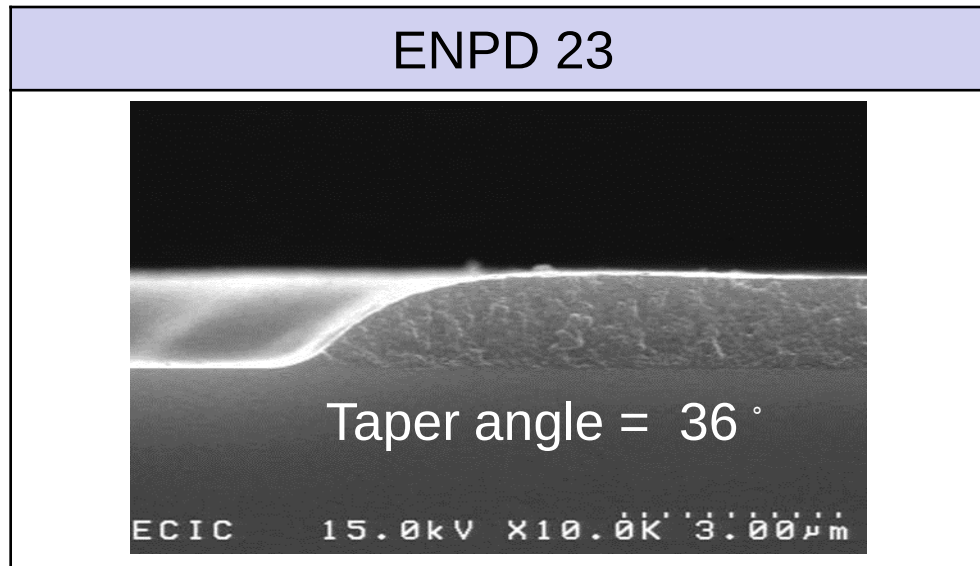
➤ Using HIOKI SM-8220 with 500 V.

TGA

	Program 1		Program 2
	°C	wt. loss (%)	wt. loss (%)
EK 620	207	1.0	1.3
	288	2.0	
	310	3.0	
	324	4.0	
	334	5.0	

- Program 1 : 25 °C to 400 °C, Rate = 10 °C/min.
- Program 2 : 25 °C to 250 °C, Rate = 10 °C/min. → 250 °C Hold 60 min.

SEM



➤ Recipe

spin coating

→ $90^{\circ}\text{C} \times 5 \text{ min.}$ (oven)

→ 200 mJ/cm^2 (H line), gap = $100 \mu\text{m}$

→ development 40 sec. (ENPD 23 (KOH type) 1 wt.%, 23°C)

→ $230^{\circ}\text{C} \times 30 \text{ min.}$ (oven)

Thank You!