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Nikko-Materials

ALPHO LDF515F

Technical Data Sheet

for direct imaging

Nikko-Materials Co., Ltd.

ALPHO LDF515F

Characteristics of ALPHO LDF515F

ALPHO LDF515F is an alkaline developing Dry Film Photo Resist (=DFPR) which is most suitable for imaging on high density printed-circuit boards. It has an excellent resolution and fine line adhesion.

It is applied to both **h-line** and **i-line** direct imaging machine.

Conditions for Storage

ALPHO LDF515F should be kept under cool (5-20 ℃, humidity must be below 60%) and dark place.
And keep the slit roll suspended in air horizontally.

If you have kept it in the refrigerator, then you must leave it in a clean room for a while before use. This will prevent the attachment of water drops.

Condition of Usage

*This value shown below is our examination data, not a guarantee data.

Methods	Recommended Condition
Compositions of DFPR	LDF515F is composed of 3 layers as below. PE film / 15μm thickness resist / PET film
Pre-treatment	Buff Scrub #320 - #1000 Jet scrub scrub10-30% Chemical abrasion (see manufacturer recommendatory condition)
Pre-heat	60 ℃, 10min. Panel surface temperature before lamination; 40-60 ℃
Lamination	90-120 ℃, 0.2-0.4MPa, 0.8-2.5m/min.
Hold Time	More than 15 min.
Exposure	Step3-5 /SST21 Proper exposure energy depends on exposure machine. Check proper energy at your device.
Hold Time	More than 15 min.
Developing	0.6-1.0%Sodium Carbonate, 25-30 ℃, DI water rinse 0.10-0.15MPa
Developing Time	0.7% Sodium Carbonate, 27 ℃, 0.15MPa, DI water rinse : 22-30sec. (B.P.= 2/3 – 1/2)
Stripping	2-4%Sodium Hydroxide, 40-60 ℃, 0.15-0.25MPa Amine Stripper (see manufacturer recommendatory condition)
Stripping Time	3%Sodium Hydroxide, 50 ℃ : 26-52sec.(L.P.=1/2 – 1/4)

Performance Data

○Exposure Energy

Exposure Energy (mJ/cm^2)	22.6	32	45.3
21SST(Step)	3.0	4.0	6.0
41SST(Step)	9.0	12.0	16.5

Exposure condition : h-DI Exposure machine (ORC)
Developing condition : 0.7% Na_2CO_3, 27 ℃, 0.15MPa（spray pressure）
Developing time 30 sec.（B.P.=1/2）
Water rinse : DI water 0.1MPa(Spray pressure)
Sensitivity : use Stouffer 21step tablet（see Fig.2）

○Resolution vs. Exposure Energy

Exposure Energy (mJ/cm^2)	22.6	32	45.3
Resolution (Line/Space)	8μm	10μm	15μm

Exposure condition : h-DI Exposure machine (ORC)
Developing condition : 0.7% Na_2CO_3, 27 ℃, 0.15MPa（spray pressure）
Developing time 30 sec.（B.P.=1/2）
Water rinse : DI water 0.1MPa(Spray pressure)
Pattern Mask : h-DI pattern data

○Fine Line Adhesion vs. Exposure Energy

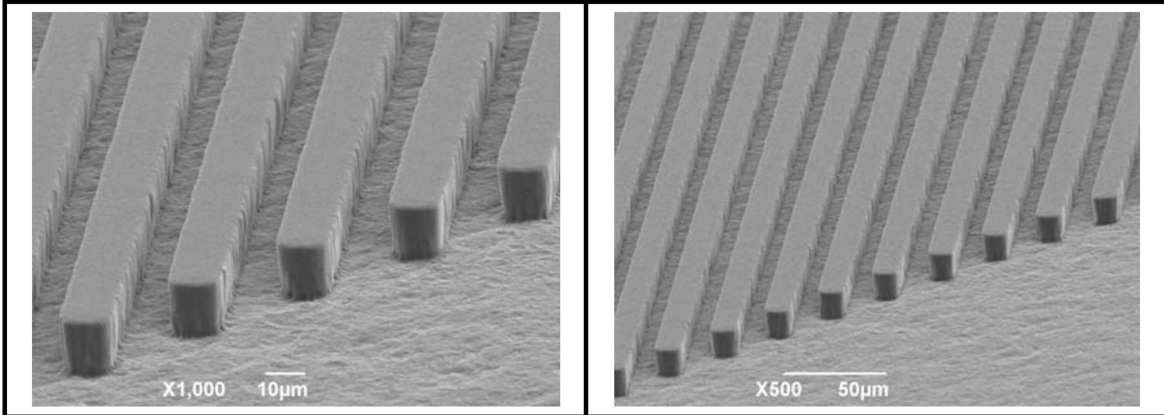
Exposure Energy (mJ/cm^2)	22.6	32	45.3
Adhesion (Line/Space)	10μm	8μm	8μm
Fine Line Adhesion (Isolate line)	12.5μm	8μm	8μm

Exposure condition : h-DI Exposure machine (ORC)
Developing condition : 0.7% Na_2CO_3, 27 ℃, 0.15MPa（spray pressure）
Developing time 30 sec.（B.P.=1/2）
Water rinse : DI water 0.1MPa(Spray pressure)
Pattern Mask : h-DI pattern data

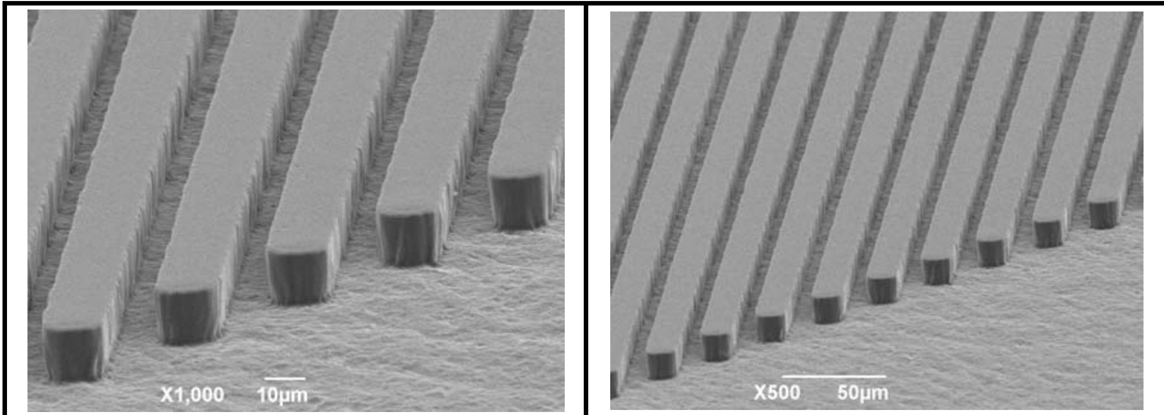
* Conditions for evaluation in detail, see page6, 7

○SEM Photograph

L/S = 12.5/12.5(μm), 22.6mJ/cm^2



L/S = 12.5/12.5(μm), 32mJ/cm^2



Exposure condition	: h-DI Exposure machine (ORC)
Developing condition	: 0.7% Na_2CO_3, 27 ℃, 0.15MPa（spray pressure） Developing time 30 sec.（B.P.=1/2）
Water rinse	: DI water 0.1MPa(Spray pressure)
Pattern Mask	: h-DI pattern data

* Conditions for evaluation in detail, see page6, 7

○Stripping（method : Spray）

Time (sec.)	13
Stripped Particle size	L

Stripping condition　　: 3%-Sodium Hydroxide aq., 50℃, 0.15MPa spray

○Stripping（method : Dipping）

NaOH (%)	2.0		3.0		4.0	
Temperature (℃)	40	50	40	50	40	50
Time (sec.)	**30**	**20**	**29**	**20**	**31**	**21**
Stripped Particle size	**L**	**L**	**L**	**L**	**L**	**L**

Stripping condition　　: Sodium Hydroxide aq., Dipping

Temperature (℃)	40	50
Time (sec.)	**12**	**9**
Stripped Particle size	**M**	**M**

Stripping condition　　: 10%-HTO aq. (Nikko-Materials),
Organic amine stripper, Dipping

* Conditions for evaluation in detail, see page6, 7

Conditions for Evaluation

*Conditions below are based on our apparatus.

○Substrate : Glass Epoxy copper clad laminate 0.2mmt
copper thickness 12µm

○Pre-treatment of substrate : Jet scrub

○Pre-heating : 60 ℃, 10min.

○Lamination : 100 ℃, 1.0m/min., 0.3MPa

○Exposure : h-DI Exposure machine (ORC)
Exposure wavelength = 405nm

○Developing : 0.7%Sodium Carbonate, 27 ℃, 0.15MPa spray
Water rinse = DI water 0.1MPa spray

○Stripping : Sodium Hydroxide aq., Organic amine stripper

○Sensitivity : Stouffer21 sensitivity guide is used.
Please set the substrate and step tablet on the exposure machine as is shown below.

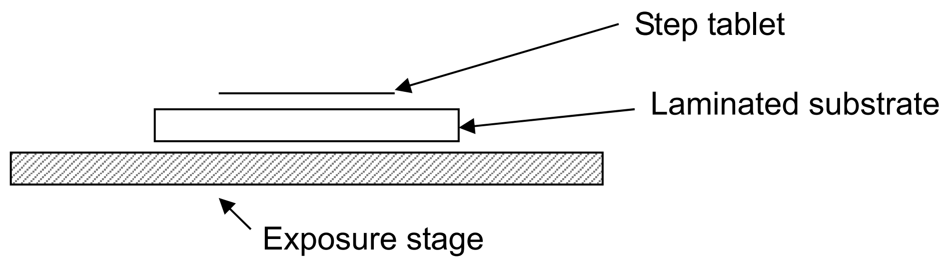


Fig.1 : Exposure Stage（cross section）

You may determine the sensitivity after developing.
See example below. In this case, the sensitivity will be step5.

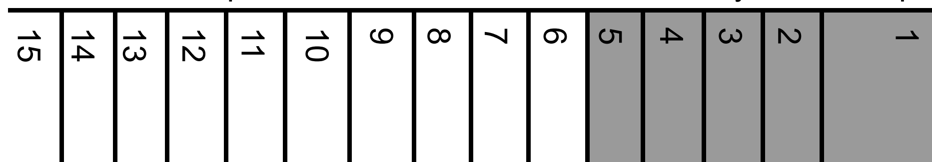


Fig.2 : Stouffer21 sensitivity guide

○Resolution

After developing, resolution is decided by using microscope.

[Pattern for resolution]

Line width = Space width

Width : 8, 10, 12.5, 15, 17, 20, 25, 30, 40 μm

○Fine Line Adhesion

After developing, fine line adhesion is decided by using microscope.

[Pattern for fine line adhesion]

Line width = Space width : 8, 10, 12.5, 15, 17, 20, 25, 30, 40 μm

Isolate Line width : 8, 10, 12.5, 15, 17, 20, 25, 30, 40 μm

○Stripping

Exposure : h-DI Exposure machine (ORC), 32mJ/cm^2

Developing : 0.7%Sodium Carbonate, 27 ℃, 0.15MPa spray
Developing time 30sec.（B.P.=1/2）

Set the test piece (65x90mm : expose the whole surface) in stripper liquid and measure the stripping time.

[Stripped particle size]

L	:	Sheet	(same size as test piece)
M	:	Dispersion	(ca.10mm-50mm)
S	:	Dispersion	(Less than 10mm)

Matters to be attended to

Storage

Please keep DFPR in a cool and dark place.
(5-20 ℃, humidity must be below 60%RH)
Don’t expose DFPR to UV light and keep it suspended in air horizontally.
Don’t strike or drop DFPR slit roll.
Pay attention when you’re handling it.

Room condition for operation

Please handle the resist under yellow safety lamp until the end of developing.

Abrasion

Abrasion should be done properly.
Please rinse with water sufficiently after abrasion.
Don’t touch the substrate directly with your hands after abrasion.

Pre-heating

Please pre-heat the substrate before lamination.
(surface temperature of the substrate must be 40-60 ℃)

Lamination

Make sure there is no trash around on laminating.
The maintenance of laminator should be done regularly.
During lamination, gas breaks out. So please set up an exhaust equipment.
Please leave the substrate for more than 15 minutes after lamination.

*It may cause skin inflammation if you contact with the resist surface.
When you touch the resist surface directly, then scour with soap sufficiently.

Exposure

Exposure should be done in a clean-room.
Please set the temperature and humidity of the exposure room to a fixed level.
(Temperature : 22±3 ℃, humidity : 60±10%RH)
The maintenance of exposure machine should be done regularly.
Please set the exposure energy properly.
Please leave the substrate for more than 15 minutes after exposure.

Developing

Please set the developing conditions properly.

(0.6-1.0% of sodium carbonate, 25-30 ℃, 0.10-0.15MPa)

The total pass time should be set so that the breakpoint will be 1/2-2/3 of the whole length of the developing spray zone.

Please exchange the developing solution quickly, when it is heavily loaded.

(the DFPR amount loaded should be below 0.4m^2/l)

When the developing solution foams, then add an adequate deformer into it.

(ex. JASCO Y or 7D066　500-1000ppm)

After developing, please rinse the substrate with sufficient water.

Convey roll and squeeze roll should be cleaned regularly.

Stripping

Please set the stripping condition properly.

(2.0-3.0% of sodium hydroxide, 50-60 ℃, 0.15-0.20MPa)

The total pass time should be set so that the stripping time will be 1/2-1/4 of the whole length of the stripping spray zone.

Please exchange the stripping solution quickly, when it is heavily loaded. (DFPR amount loaded must be below 0.8m^2/l)

After stripping, please rinse the substrate with sufficient water.

Convey roll and squeeze roll must be cleaned regularly.

Warranty

The information contained herein is correct to the best of our knowledge. The recommendations or suggestions contained in this bulletin are made without guarantee or representation as to results. We suggest that you evaluate these recommendations and suggestions in your laboratory prior to use.

Our responsibility for claims arising from defects in material or workmanship or any other breach of warranty, negligence or otherwise is limited to the purchase price of the material.

If you have any questions concerning with this technical data, please ask us.

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