



INTERVIA™ BPN PHOTORESIST

For Advanced Packaging Applications

Regional Product Availability			
N.America	Japan/Korea	Asia	Europe
✓	✓	✓	✓

DESCRIPTION

InterVia BPN Photoresist is a liquid negative-tone photoresist formulated for wafer level bump plating. InterVia BPN Photoresist contains an environmentally safe solvent, ethyl lactate, and is free of PGME and PGMEA. InterVia BPN is developed with TMAH.

InterVia BPN Photoresist can be used on all metal and organic substrates including, aluminum, copper, gold, nickel, titanium, chromium, silicon, silicon oxide, glass, ceramic, and polyamide. InterVia BPN Photoresist is specifically designed to fill the need for a 50–100 micron single-spin, bump plating photoresist for WLP applications.

ADVANTAGES

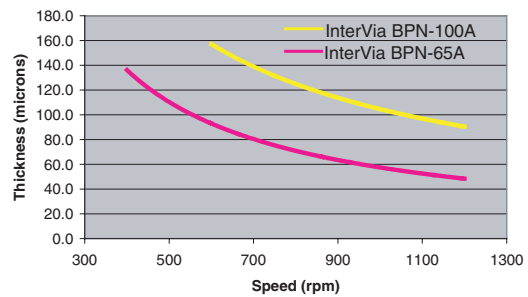
- Single-spin film thickness 30–140 microns
- Vertical side walls
- i-Line and broad band exposure processing
- Excellent adhesion to all WLP substrates
- Alkaline development—no image swelling
- Acrylate based, retains flexibility after cure
- Excellent chemical resistance—withstands a variety of both alkaline and acid plating and etching solutions.

PROCESS GUIDELINES

I. Spin Coat

InterVia BPN Photoresist is designed to produce low defect coatings over a very broad range of film thickness. Thickness is controlled by a combination of spin speed, spin time, ventilation, and percent solids. Due to the fact that InterVia BPN viscosity changes with temperature, clean-room temperature will also affect coating thickness.

Spin Speed Curves of InterVia BPN-65A and InterVia BPN-100A



Automatic dispense is recommended for bubble free coatings. Due to the high viscosity of the resist a high viscosity dispense system is required. The viscosity at 25°C is 9,000 cp for the InterVia BPN-100A and 4,000 cp for the InterVia BPN-65A.

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Parameters suggested for InterVia BPN-100A

step	time	speed	nozzle	exhaust
Resist Dispense	13 sec.	120 rpm	dispense	0%
Cast/level	40 sec.	900–1100	none	0%
EBR	15 sec.	300	EBR	50%
BSW	15 sec.	300	BSW	50%
Snap	3 sec.	1,200–1,400	none	50%

Parameters suggested for InterVia BPN-65A

step	time	speed	nozzle	exhaust
Resist Dispense	13 sec.	120 rpm	dispense	0%
Cast/level	40 sec.	600–800	none	0%
EBR	15 sec.	300	EBR	50%
BSW	15 sec.	300	BSW	50%
Snap	3 sec.	900–1,100	none	—

The previous recipe will result in a coating uniformity with less than 2.4% variation (200 mm wafer) for resist thickness up to 100 μm .

II. Soft Bake

After the resist has been spun onto the substrate, it must be baked to evaporate the solvent.

A multi-step soft bake is recommended for uniform defect-free coatings. Dewetting or bubbles may occur if bake is done at too high an initial temperature. The bake can be done using one hotplate with changing pin heights or with two hotplates at different temperatures. A convection oven with two different temperatures can also be used.

On a 120°C hotplate (with proximity pins), the following process is suggested.

- 1) 2 minutes with pins at 5 mm
- 2) 1 minute at proximity
- 3) 3–6 minutes in contact with hotplate

Using two hotplates (no proximity pins)

- 1) 60°C hotplate for 2.5–3 minutes
- 2) 120°C hotplate for 3–6 minutes

Suggested process for convection bake

- 1) 15 minutes at 60°C
- 2) 45 minutes at 90°C

Notes: ¹ If baked in a convection oven, process times will depend on the ventilation conditions in the convection oven
² Rework after soft bake can be done using developer or stripper

Edge Bead Removal

InterVia BP EBR is an Edge Bead Removal recommended after bake to get the most uniform edge.

- EBR time depends on resist thickness
- EBR time depends on if EBR is done before or after bake
- Two step EBR provides the best results

III. Exposure

InterVia BPN Photoresist is most commonly processed with conventional broad band (350–400 nm) radiation, although it may be imaged with Laser, or i-Line (365 nm) radiation. Exposure may be done using an aligner or stepper. The energy dose (as measured using standard radiometer which measures at 365 nm wavelength), is a function of thickness and exposure unit.

The InterVia BPN resists are capable of 2:1 aspect ratio.

IV. Development

InterVia BPN Photoresist is developed with InterVia BP Developer at room temperature. Development can be either batch or puddle.

For 65 μm

- 3 \times 60 second puddles
- 90 second D.I. water spray rinse

For 100 μm

- 3 \times 75 second puddles
- 90 second D.I. water spray rinse

Rework after stripper can be accomplished using stripper (see Section VII)

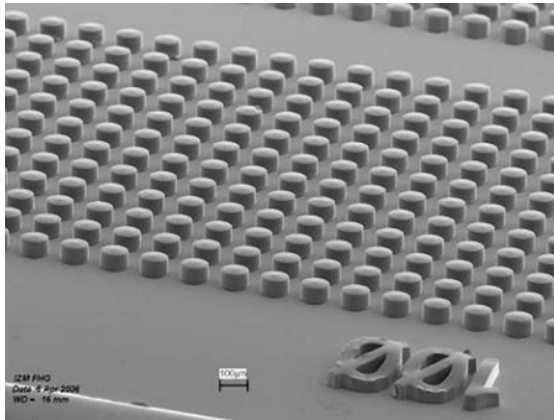
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V. Post Develop Bake

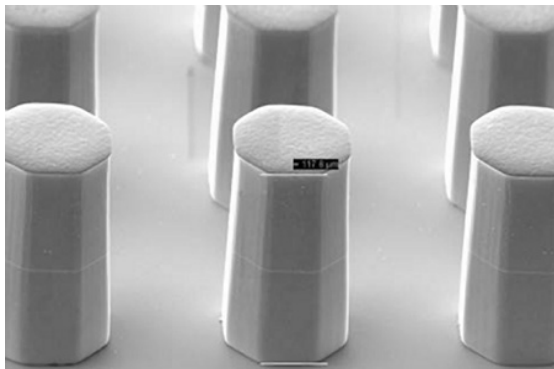
A post develop bake is not required.

VI. Etch/Plate

InterVia BPN Photoresist can be used with a wide variety of acid and alkaline etchants and plating baths.



Copper Bump with height of 50 μm .



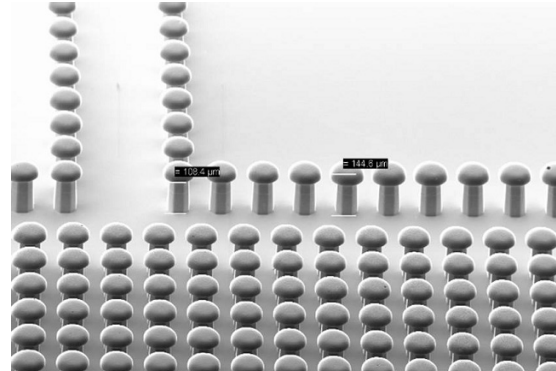
InterVia BPN Photoresist plates
with no foot or undercut.

VII. Removal

The InterVia BPN Photoresist can be easily removed with several Rohm and Haas Electronic Materials strippers. Choice is dependant on the size and pitch of the features. Most NMP based strippers such as Rohm and Haas Electronic Materials Shipley BPR™ Photostripper work well. Rohm and Haas Electronic Materials Shipley BPR Photostripper is formulated to remove the InterVia BPN through intermolecular breakdown and leave no residue after rinse.

Process Conditions:

- 1) Shipley BPR Photostripper is used at full strength and should not be diluted.
- 2) Stripping is done by immersion with agitation or by spray at 60–70°C.
- 3) Strip time depends on resist thickness.
- 4) Rinsing should be with D.I. water, IPA and should be aggressive.



Copper Pillar Mushroom bumping after
InterVia BPN removed. Bump Height 144 μm .

PRODUCT DATA

For the specific Product Data values, please refer to the Certificate of Analysis provided with the shipment of the product(s).

REFRACTIVE INDEX INFORMATION

Thickness 100,500Å and 11,950Å | sigma 690Å

n at 365 nm	1.551
k at 365 nm	0.0007
n at 673 nm	1.522

Note: From the k value at 365 nm the film seems very transparent

EQUIPMENT

InterVia BPN Photoresist is compatible with most commercially available photoresist processing equipment. Compatible materials include stainless steel, glass, ceramic, nylon, Teflon™ fluoropolymer, unfilled polypropylene, and high-density polyethylene.

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HANDLING PRECAUTIONS

Before using this product, consult the Material Safety Data Sheet (MSDS)/Safety Data Sheet (SDS) for details on product hazards, recommended handling precautions and product storage.

CAUTION! Keep combustible and/or flammable products and their vapors away from heat, sparks, flames and other sources of ignition including static discharge. Processing or operating at temperatures near or above product flashpoint may pose a fire hazard. Use appropriate grounding and bonding techniques to manage static discharge hazards.

CAUTION! Failure to maintain proper volume level when using immersion heaters can expose tank and solution to excessive heat resulting in a possible combustion hazard, particularly when plastic tanks are used.

STORAGE

Store products in tightly closed original containers at temperatures recommended on the product label.

DISPOSAL CONSIDERATIONS

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Rohm and Haas Electronic Materials Technical Representative for more information.

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