INTERVIA™ BPP-10 Photoresist

For Advanced Packaging Applications

Description

INTERVIA BPP-10 Photoresist is a general-purpose, multi-wavelength resist designed to cover a wide range of film thicknesses, 5–15 μm, with a single-coat process. INTERVIA BPP-10 Photoresist also has excellent adhesion and plating characteristics, which make it ideal for such thick film applications as bump processes.

Regional Product Availability

- North America
- Japan/Korea
- Asia
- Europe

Advantages

- Broadband, g-Line and i-Line capable
- >10 μm film thickness in a single coat with good uniformity
- Fast photospeed: 210 mJ/cm^2 for 1.1 μm lines/spaces at 4.0 μm film thickness (i-Line)
- Excellent wet and dry etch adhesion
- Au, Cu and Ni/Fe plating without cracking
- MIF and MIB developer compatible

See *Table 1* for recommended process conditions and *Figure 1* for various applications.

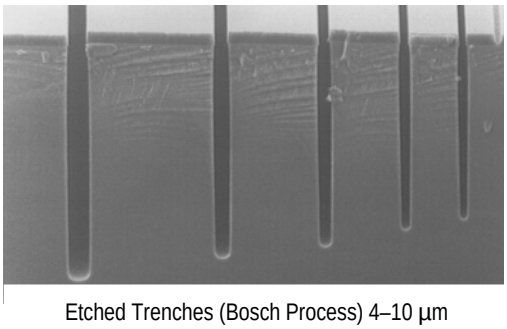
Table 1. Recommended Process Conditions

	1.1–4.0 μm Thickness*	4.0–10.0 μm Thickness*
Thickness	1.1–4.0 μm	4.0–10.0 μm
Softbake	115°C/90 sec. Contact Hotplate	30 sec. step-down to 115°C/90 sec. Contact Hotplate*
Expose	ASML™ PAS 5500™/200 i-Line (0.48 NA, 0.50s)	
PEB	115°C/90 sec. Contact Hotplate	
Developer	MF™-24A at 21°C, 60 sec. single spray puddle	

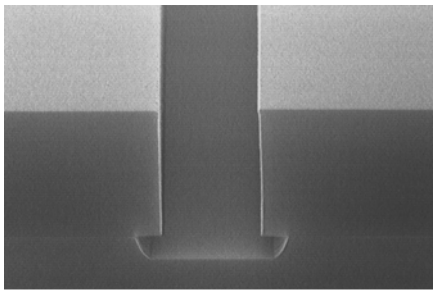
*Recommended for isolated spaces as well.
**Refer to softbake section for further details.

All data shown within this flyer used the process conditions listed above unless otherwise stated.

Figure 1. Various Applications

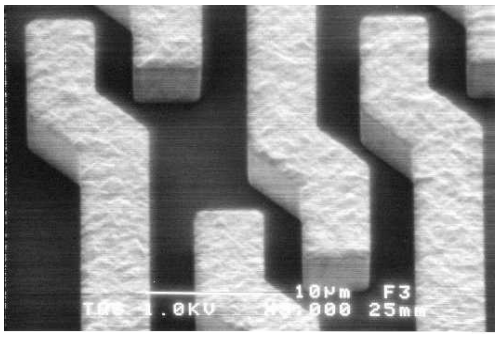


Etched Trenches (Bosch Process) 4–10 µm Features (up to 100 µm deep)



Wet Wafer Etch (1:5 HF 5 min.); 2 µm Feature

Image courtesy of TriQuint



Gold Plated Deposit; 5 µm Features

Table 2. Photospeed and Linearity of Dense Line/Spaces

	Film Thickness	Photospeed*	Linearity
g-Line	1.2 µm	210 mJ/cm^2	0.65 µm
g-Line	3.0 µm	320 mJ/cm^2	0.90 µm
g-Line	7.0 µm	470 mJ/cm^2	1.80 µm
i-Line	1.2 µm	160 mJ/cm^2	0.45 µm
i-Line	3.0 µm	310 mJ/cm^2	0.90 µm
i-Line	5.0 µm	380 mJ/cm^2	0.90 µm

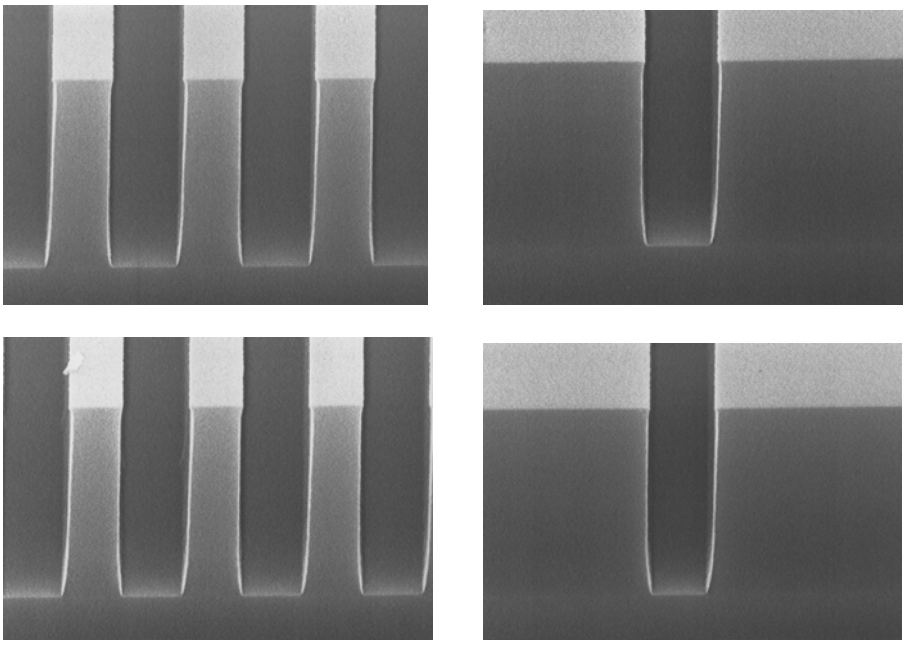
*See Table 6 for recommended develop conditions.

Figure 2. Resolution at 3.0 µm Film Thickness

g-Line (320 mJ/cm^2)

1.0 µm

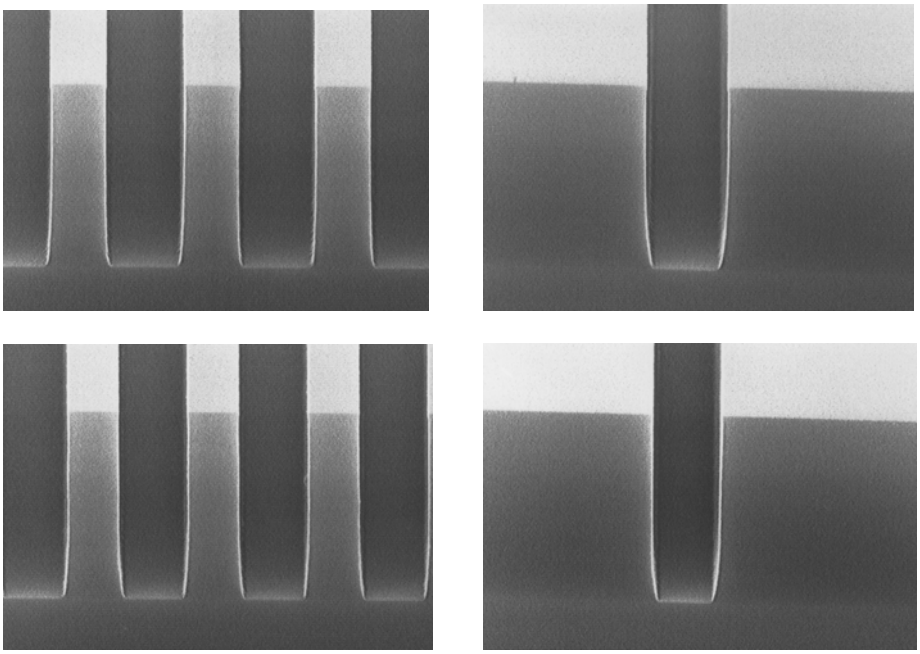
0.9 µm



i-Line (310 mJ/cm^2)

1.0 µm

0.9 µm



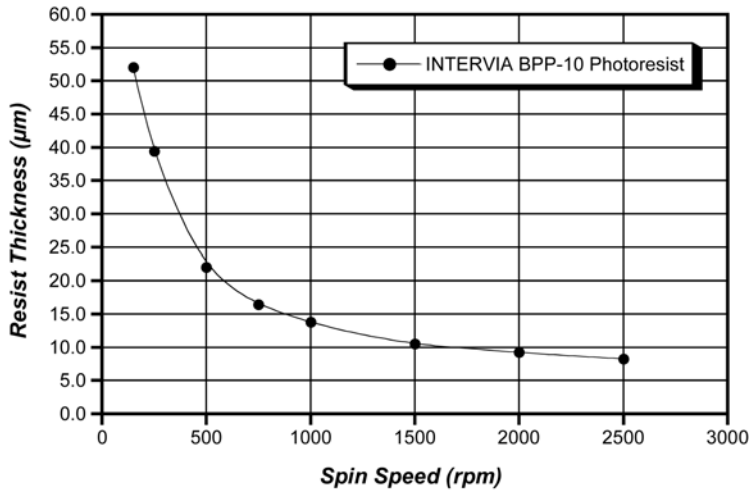
Substrate

INTERVIA™ BPP-10 Photoresist is compatible with a wide range of substrates, including but not limited to silicon, aluminum oxide, gold, copper and nickel-iron. A hexamethyldisilizane (HMDS)-based MICROPOSIT™ primer is recommended to promote adhesion with substrates that require such treatment. Vacuum vapor priming at 120°C for 30 seconds with concentrated HMDS is recommended.

Coat

Figure 3 shows the relationship between spin speed and resist thickness for 8-inch (200 mm) substrates applying INTERVIA BPP-10 Photoresist. Nominal film thickness may vary slightly due to process, equipment and ambient conditions.

Figure 3. Spin Speed Curve, INTERVIA BPP-10 Photoresist on 8 in.



Softbake

The recommended softbake process for INTERVIA BPP-10 Photoresist for films up to 4.0 µm is 115°C for 90 seconds on a contact hotplate. For films greater than 4.0 µm, use a 30 second ramp in temperature (step-down to hotplate) to 115°C and hold for a minimum of 90 seconds. For film thickness greater than 10 µm, apply a 30 second ramp in temperature (step-down to hotplate) to 115°C and hold for a minimum of 300 sec.

Film Thickness Measure

Figure 4 (see next page) shows the refractive index of INTERVIA BPP-10 Photoresist as a function of wavelength. Cauchy coefficients are listed in *Table 3*. Refractive index and dill parameters are listed in *Table 4* and *Table 5*, respectively (see next page for these tables). For film thickness greater than 10 µm the resist is exposed to an energy dose between 700 and 1,300 mJ/cm^2 (measured using standard radiometer @ 365 nm wavelength) using a high energy light source that generates peak output of wavelengths between 350 to 400 nm. Coating uniformity and the applied soft bake parameters can affect the required exposure energy needed for standardization and determination of the optimized exposure.

Figure 4. Dispersion Curve

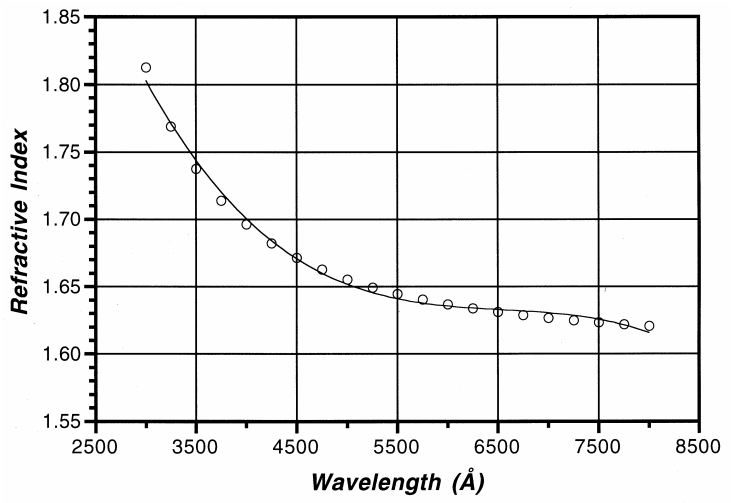


Table 3. Cauchy Coefficients

n1	1.6035
n2	9.7122e+5
n3	8.2082e+12

Table 4. Refractive Index

RI at 365 nm	1.73
RI at 405 nm	1.70
RI at 436 nm	1.67
RI at 633 nm	1.63

Table 5. Dill Parameters

	365 nm	405 nm	436 nm
Dill A	0.5250	0.7075	0.4242
Dill B	0.0298	0.0173	0.0150

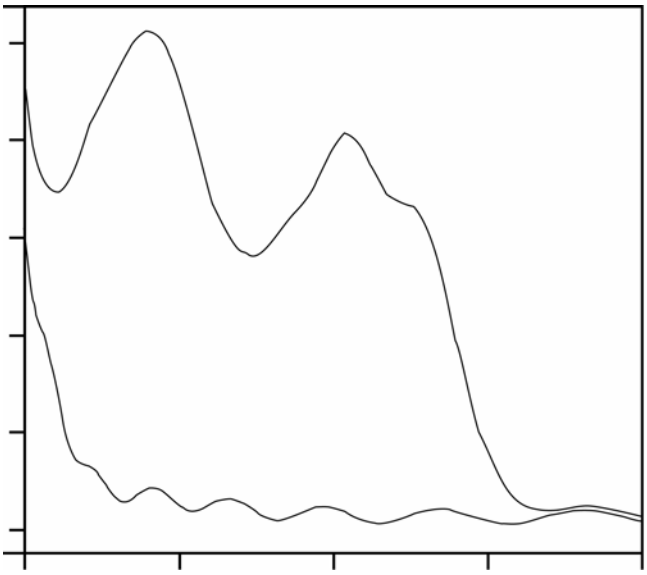
Expose

The absorbance curves for the unexposed and exposed resist film are shown in *Figure 5.*

Post-exposure Bake

Post-exposure bake (PEB) is run at the same temperature as the softbake. With thicker films (above 7 µm), no PEB is necessary. A film thickness greater than 10 µm requires a minimum hold time of 45 minutes between exposure and develop should be applied.

Figure 5. Absorbance Curves



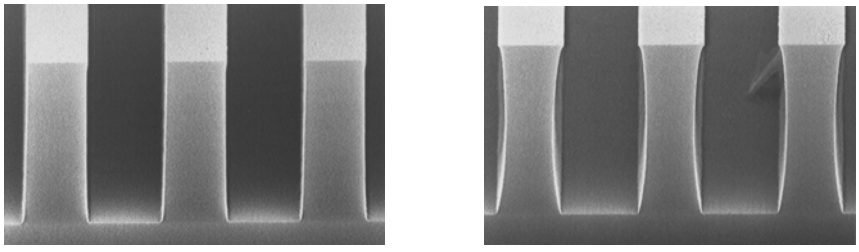
Develop

INTERVIA™ BPP-10 Photoresist is optimized for 0.24N developers. Thicker films or high-throughput processes can utilize 0.26N developers. INTERVIA BPP-10 Photoresist has also been formulated for use in metal-ion free and metal-ion bearing developers, as demonstrated in *Figure 6*. See *Table 6* for recommended develop conditions.

Table 6. Recommended Develop Conditions

	1.2 µm FT	3.0 µm FT	5.0 µm FT	7.0 µm FT
INTERVIA BP-24 Developer	40 sec. SP	60 sec. SP	60/60 sec. DP	60/60 sec. DP
MF-26A	40 sec. SP	60 sec. SP	80 sec. SP	60/60 sec. DP
M452	—	3 min. Imm.	3 min. Imm.	3 min. Imm.
M453	—	3 min. Imm.	3 min. Imm.	3 min. Imm.

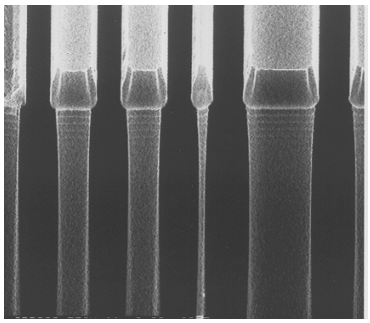
Figure 6. Developer Compatibility



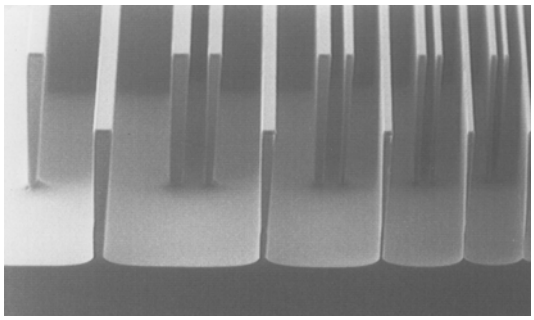
MIF (MF-24A) MIB (M452)

For thick film application 10 µm or greater using MF-26A developer, the overall development time will behave similar to the thin film time cited in *Table 6 above.*

Figure 7. Etch Performance



Etched Lines (Bosch Process)
2.5 to 10 µm Features (up to 200 µm deep)



Etched Lines
5 to 20 µm Features (up to 100 µm deep)

Photoresist Removal

INTERVIA™ BPP-10 Photoresist can be removed with INTERVIA Photo Strip 2000G Remover, a next generation remover that is NMP free. A two-bath process is recommended with each bath at a temperature of 80°C (176°F). The first bath removes the bulk of the Photoresist and the second removes residual traces of photoresist. Please consult specific remover data sheets for additional process information.

Product Data

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

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 Dow Electronic Materials Technical Representative for more information.

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