ELECTRONIC MATERIALS
MICROELECTRONIC TECHNOLOGIES

UV™ 210 POSITIVE DUV PHOTORESIST

For DUV Applications

DESCRIPTION

UV210 is a multipurpose resist that can be utilized for gate, phase shift mask contact holes, and trench applications in the 180–130 nm CD range.

FEATURES:

Sizing Energy

- 28 mJ/cm^2 for 130 nm 1:1.5 lines/spaces
- 33 mJ/cm^2 for 180 nm 1:1 trenches
- 60 mJ/cm^2 for 180 nm 1:1 contact holes

Depth-of-Focus

- 1.00 µm DoF for 130 nm 1:1.5 lines/spaces
- 0.80 µm DoF for 180 nm 1:1 trenches
- 0.70 µm DoF for 180 nm 1:1 contact holes

Resolution

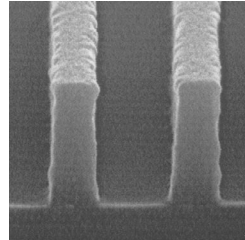
- 130 nm for 1:1.5 lines/spaces
- 150 nm for 1:1 contact holes (70 nm bias)
- 160 for 1:1 trenches

Other Responses

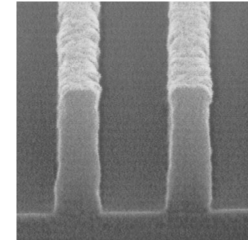
- 1 hour post-exposure bake stability
- <4 nm/°C post-exposure bake sensitivity
- 9-month shelf life
- 150°C thermal stability

See *Figure 1* for lithographic performance and *Table 1* for recommended process conditions.

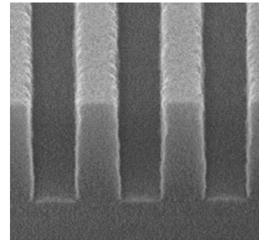
Figure 1. Lithographic Performance



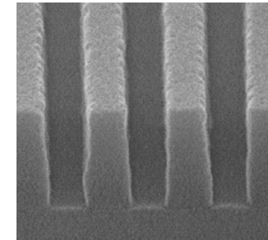
150 nm
1:1.5 Lines/Spaces
(27.4 mJ/cm^2)



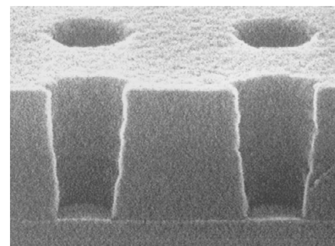
130 nm
1:1.5 Lines/Spaces
(28.0 mJ/cm^2)



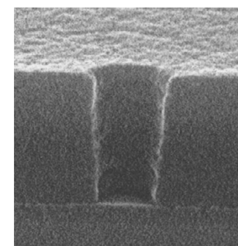
170 nm Dense Trenches
(Dark Field)
(37.4 mJ/cm^2)



160 nm Dense Trenches
(Dark Field)
(37.4 mJ/cm^2)



150 nm 1:1 Contact Holes
6% APSM (70 nm bias)
(66.0 mJ/cm^2)



150 nm 1:3 Contact Holes
6% APSM (70 nm bias)
(66.0 mJ/cm^2)

Table 1. Recommended Process Conditions*

	Contact Holes	Lines/Spaces
Thickness	3,000–8,000Å	3,000–8,000Å
Softbake	140°C/60 sec. Proximity Hotplate	130°C/60 sec. Proximity Hotplate
Developer	140°C/90 sec. Proximity Hotplate	130°C/90 sec. Proximity Hotplate
PEB	MF CD-26 @ 21°C, 45 sec. single puddle	MF CD-26 @ 21°C, 45 sec. single puddle

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

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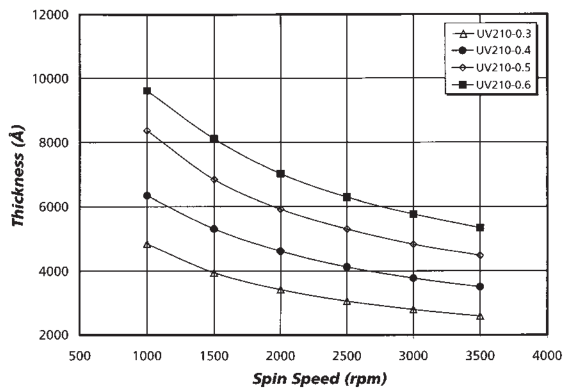
SUBSTRATE

UV210 photoresist is compatible with a wide range of substrates, including silicon, and both organic and inorganic anti-reflective materials. 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 2 shows the relation between spin speed and resist thickness for silicon substrates. Nominal film thickness may vary slightly due to process, equipment and ambient conditions.

Figure 2. Spin Speed Curves



SOFTBAKE

The recommended softbake processes for reflective and non-reflective substrates are listed in *Table 2*.

Table 2. Softbake Process Conditions

	Contact Holes	Lines/Spaces and Isolated Lines
Temperature	140°C	130°C
Time	60 sec. Proximity Hotplate	60 sec. Proximity Hotplate

FILM THICKNESS MEASUREMENT

Cauchy coefficients are listed in *Table 3*. *Figure 3* shows the refractive index of UV210 as a function of wavelength. Resist thicknesses of 3,900-6,200Å were used to characterize UV210. *Figure 4* displays the E_0 interference curve for UV210 on silicon.

Table 3. Cauchy Coefficients

n_1	1.532
n_2	8.97e+5
n_3	3.00e+10

Figure 3. Dispersion Curve—Cauchy Relationship

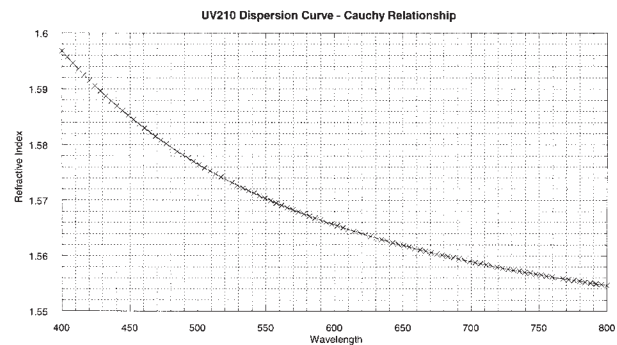
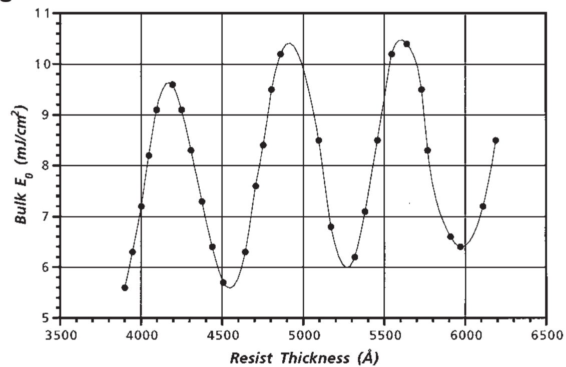


Figure 4. Interference Curve on Silicon



EXPOSE

Figure 6 displays the absorbance curve for the unexposed resist film. *Table 4* (next page)lists the parameters needed for resist modeling.

Figure 6. Absorbance Curve

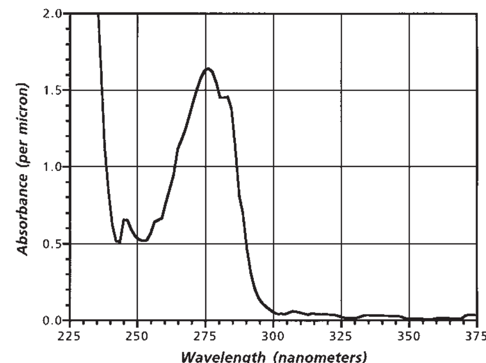


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Table 4. Prolith Parameters

Dill A	0.0564 l/µm
Dill B	0.5251 l/µm
Dill C	0.034 cm²/mJ
R_{min}	0.014 Å/sec.
R_{max}	1,028 Å/sec.
n	—
RI @ 673 nm	1.56
RI @ 248 nm	1.79

Note: Chemically-amplified resist requries additional modeling parameters which are currently being determined. Please see you TSR for an updated copy of modeling prameters.

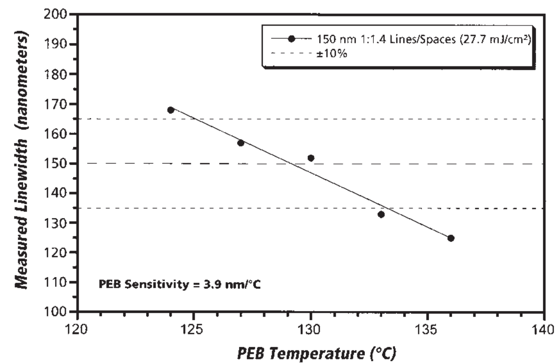
POST-EXPOSURE BAKE

The recommended PEB conditions for UV210 on reflective and non-reflective substrates are listed in *Table 5. Figure 7* shows the PEB sensitivity of UV210.

Table 5. PEB Process Conditions

	Contact Holes	Lines/Spaces and Isolated Lines
Temperature	140°C	130°C
Time	90 sec. Proximity Hotplate	90 sec. Proximity Hotplate

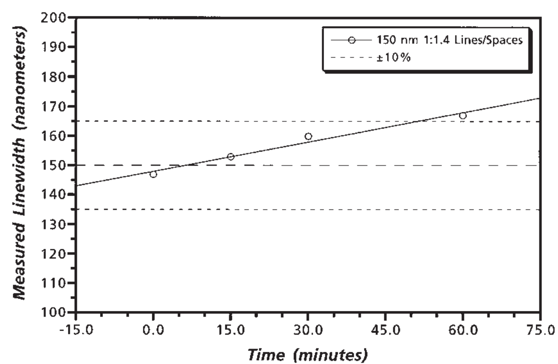
Figure 7. PEB Sensitivity Plot



POST-EXPOSURE DELAY STABILITY

The post-exposure delay stability for UV210 is shown in *Figure 8.*

Figure 8. PED Stability Plot



DEVELOP

UV210 is optimized for 0.26N developers. A 45 second single puddle with no pre-wet is recommended for most applications including lines/spaces, isolated lines and contact holes.

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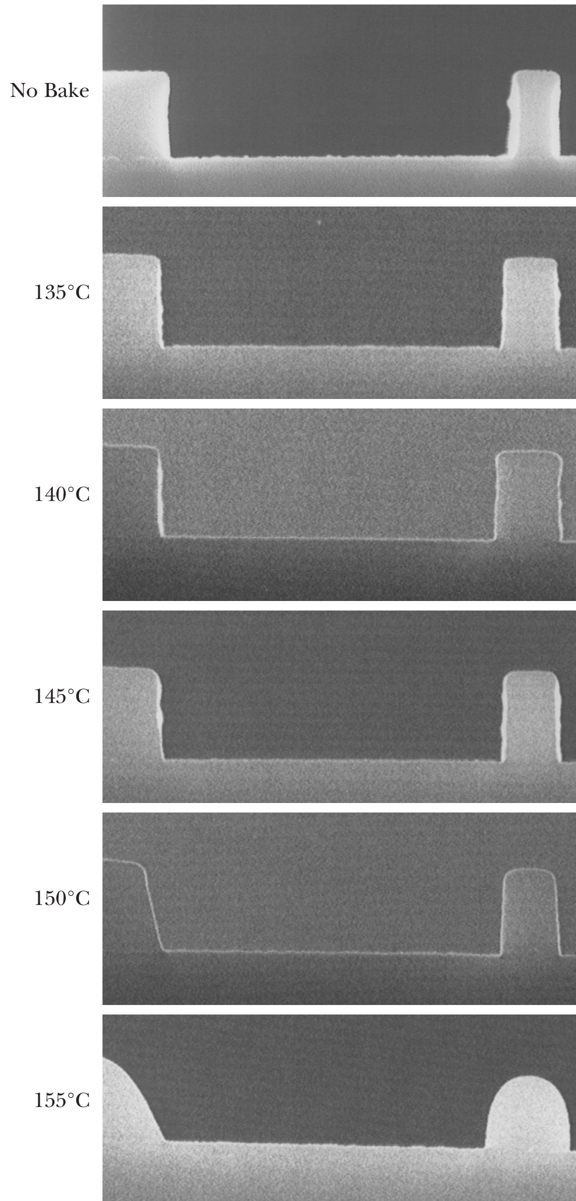
HARDBAKE

Figure 9 shows the thermal flow characteristics of UV210.

Figure 9. Thermal Flow Characteristics



PHOTORESIST REMOVAL

UV210 can be removed with MICROPOSIT REMOVER 1165. A two-bath process is recommended with each bath at a temperature of 80°C. The first removes the bulk of the photoresist and the second removes residual traces of photoresist. Consult specific remover datasheets for additional process information.

HANDLING PRECAUTIONS

UV210 is a combustable liquid and vapor, keep away from heat, sparks, and open flame. Irritation to eyes, nose and respiratory track can occur. Use with adequate ventilation and avoid breathing vapors and mists. Wash thoroughly after handling and always wear chemical goggles, gloves and suitable protective clothing.

In case of eye or skin contact, flush affected areas with plenty of water for at least 15 minutes. Contact a physician at once.

WASTE TREATMENT

UV210 contains ethyl lactate and may be included with other wastes containing similar organic solvents to be discarded for destruction or reclaim in accordance with local, state and federal regulations.

STORAGE

Store UV210 only in upright, sealed, original containers in a dry area at 30–50°F (-1–10°C) away from heat and sunlight. Keep away from alkaline materials, acids, and oxidizers. Keep container closed when not in use.

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