

NOVO and NOVO-SAFE POSITIVE PHOTORESIST DEVELOPERS

DESCRIPTION

Transene NOVO series positive photoresist developers are high purity alkaline TMAH-based inorganic solutions for developing exposed positive photoresist materials such as KLT 5300, KLT 6000, AZ-4620, 895I, and S1811.

Designed for ultra fine-line control of a broad range of positive resist materials including DNQ-novolac, deep ultraviolet (DUV), and lift off applications, NOVO resist developers are well suited for 193 nm applications down to the 90 nm node. NOVO resist developers are essentially free of metal ionic contaminants. NOVO developers are designed for use in photomask, integrated circuit, or other microelectronic applications in either batch immersion or spray processes. Available with or without surfactant, NOVO chemistries may be customized to meet specific formulation requirements. Standard concentrations:

PRODUCT	TMAH CONCENTRATION	TMAH NORMALITY
NOVO DEVELOPER 5	4.8-5.1%	0.50-0.55
NOVO DEVELOPER 587	1.951-1.987%	0.214-0.218
NOVO DEVELOPER 591	2.12-2.16%	0.232-0.238
NOVO DEVELOPER 5035S (contains surfactant)	2.18-2.22%	0.240-0.250
NOVO DEVELOPER 26	2.27-2.47%	0.26 nominal
NOVO Developer 219	2.17-2.21%	0.240-0.246
NOVO Developer 342	2.30-2.46%	0.26 nominal

APPLICATION

During the development cycle, the exposed photoresist is removed by the appropriate developer system in a spray or immersion process, exposing the desired pattern. To obtain very fine line resolution, it is recommended that spray processing be employed. Immersion development is adequate for less critical geometries, i.e. 7 μ or greater

line widths and spacings, especially if mechanical or nitrogen bubbling is used. A typical development cycle is shown in the table below.

Typical Development Cycle

Solution	Time (seconds)
Developer	15 to 75
Water Rinse	20 to 30
Nitrogen Dry	15 to 20

DESCRIPTION

Transene has introduced NOVO-SAFE Developers for positive photoresists or silicon etching in response to growing concerns about the dermal toxicity of TMAH solutions. NOVO-SAFE chemistries provide comparable performance to TMAH with an order of magnitude improvement in dermal toxicity safety.

Benefits include:

FEATURES

- Similar performance to TMAH with higher LD₅₀ levels for dermal exposure
- Targeted activity by varying temperature or concentration
- High organic solubility with enhanced rate and capacity results
- Low metal ion and halide levels for critical applications (100 ppm and 10 ppb for most developer applications)
- Available as concentrates or solutions with etch rates equivalent to standard concentrations such as 2.38%,0.26 N

PROPERTIES

Product	LD50, Dermal, Rat	Rate vs. TMAH @ Equivalent Concentration
TMAH (25%)	< 120 mg/kg	100%
NOVO-SAFE SE-33 (20%)	>1000 mg/kg	87%

NOVO-SAFE SE-44 (35%)		60%
NOVO-SAFE CM-85 (55%)	>2000 mg/kg	20%

In addition, Transene offers TMAH solutions in non-aqueous solutions. Low water content minimizes corrosion, provides ppb levels of contaminants, and improved solubility of organic residues. Uses include resist strips, electronic surface cleaning, edge bead removal, and other microelectronic processes where little or no water is a requirement. Contact Transene for details.

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