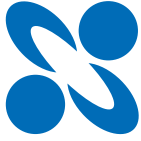


UniLOR® N5.0

Negative Photoresist for Single Layer Lift-off Processes

Description

UniLOR® N is a negative-tone, chemically amplified, proprietary co-polymer resist series for use in UV lithography processing of semiconductors, MEMS and other nanofabricated structures. It is available in 4 standard viscosities and provides wall profile adjustability and high thermal stability across a broad range of film thicknesses. Ideally suited for lift-off applications, it is easily removable and compatible with TMAH developers.

These processing guidelines are specific to the UniLOR® N5.0 dilution that enables thick (≥ 5 μm) lift-off processes in a single layer. Please refer to the UniLOR® N Datasheet for additional information on the product series and processing guidelines for the UniLOR® N1.5, 2.5 and 3.5 dilutions.

Features

- Adjustable profile
- Optimized for 3-5 μm, but capable of > 6 μm in a single coat
- i-Line sensitivity, 1:1 aspect ratio imaging
- High-temperature pattern stability
- Excellent adhesion to various substrates (Si, GaAs, SiC)
- Compatible with standard TMAH Developers
- Easy removal

PROCESSING GUIDELINES

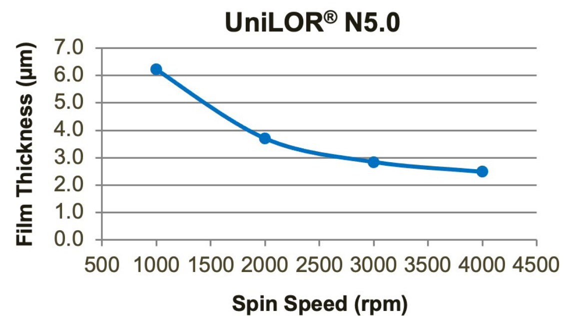


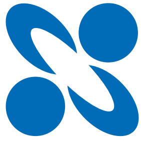
Figure 1. Thickness vs. Spin Speed

UniLOR® N5.0 is highly sensitive to process changes, especially with regards to the undercut profile and development step (See Figures 2 and 3 below). The baseline processing conditions are summarized in Table 1 below.

PROCESSING CONDITIONS	
Coat	1000-4000 rpm/30 seconds See spin speed curve for the available thickness range
Soft Bake	115°C, 2-4 minutes (hot plate)
Exposure	200-600 mJ/cm^2
PEB	120°C, 2-4 minutes (hot plate)
Development	0.5-2 minutes in 0.26N TMAH
Removal	30 minutes in Remover PG; time can be shortened with sonication or high temperature

Table 1. Baseline Processing Conditions

The soft bake step offers the most control over the undercut rate. Higher soft bake temperatures will decrease the undercut rate during the development



step, allowing more precise control over the final undercut width, while increasing processing time for the development step.

The exposure dose and post exposure bake (PEB) offer control over the undercut height and width. Increasing the dose and PEB time/temperature will decrease the undercut height and width as the resist effectively crosslinks from the top down.

Undercut Profiles for an 8 µm Thick Layer

Figure 2. 30 µm line with shallow undercut, using sample processing conditions (see Table 2) with **1 minute of development.**

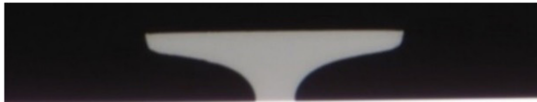


Figure 3. 30 µm line with deep undercut, using sample processing conditions (see Table 2) with **2 minutes of development.**

PROCESSING STEPS		
Dispense	1 mL of resist for each inch (25 mm) of substrate diameter	
Spin	500 rpm 5-10 seconds 500 rpm/s	800 rpm 30 seconds 1000 rpm/s
Film Thickness	8 µm	
Soft Bake	115°C, 3 minutes (hot plate)	
Exposure	200 mJ/cm^2 ABM Broadband mask aligner with 360 nm long pass filter Intensity measured at 365 nm	
PEB	120°C, 3 minutes (hot plate)	
Development	MICROPOSIT® MF® CD-26 (0.26N TMAH) Time depends on desired undercut	
Removal *Not used in Figures 1 and 2.	30 minutes in Remover PG; time can be shortened with sonication or high temperature	

Table 2. Sample Processing Conditions for an 8 µm thick layer

Kayaku Advanced Materials recommends an undercut width to height ratio of 2:1 to avoid sealing of the resist during the subsequent deposition step. If the resist is completely sealed with the deposited material, it can impair or even prevent removal of the resist, and introduce defects in the deposited metal layer.

Disclaimer

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