Innovation
Creativity
Customer-specific solutions

# Thermostable Negative Resist SX AR-N 4340/7



## Negative photoresist for one- and two-layer systems

Experimental sample/custom-made product

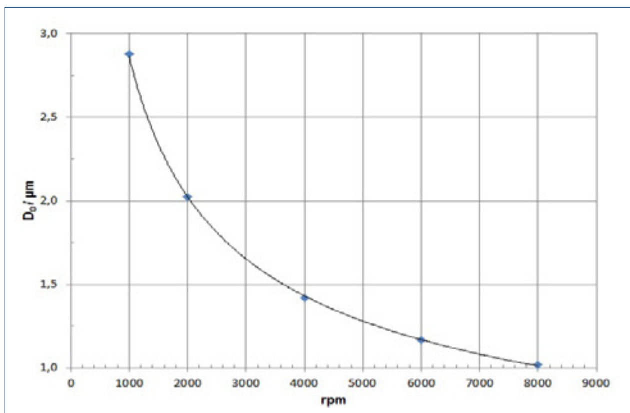
### Characterisation

- i-line, g-line, deep UV (248 – 266 nm)
- highest sensitivity, high resolution
- good adhesion properties, high contrast, chemically enhanced
- undercut profiles (lift-off) possible
- may be used with AR-BR 5400 as 2-layer system
- plasma etching stable, thermostable up to 300 °C
- polyhydroxystyrene polymer, higher photosensitivity
- acid generator and aminic crosslinker
- safer solvent PGMEA

### Properties I

| Parameter / SX AR-N | 4340/7 |
|---|---|
| Solids content (%) | 25 |
| Viscosity 25 °C (mPas) | 38 |
| Film thickness/4000 rpm (nm) | 1.4 |
| Resolution (µm) | 0.7 |
| Contrast | 5.0 |
| Flash point (°C) | 42 |
| Storage 6 month (°C) | 10-18 |

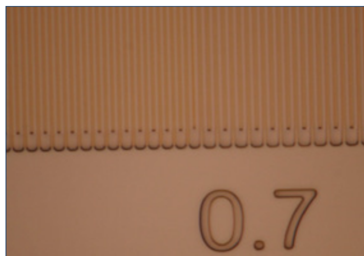
### Spin curve




### Properties II

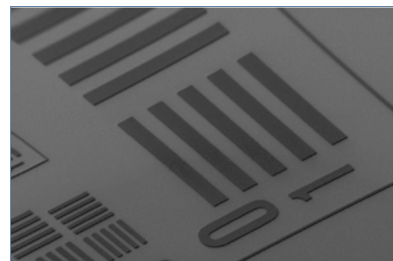
| | | |
|---|---|---|
| Glass transition temperature (°C) | 118 | |
| Dielectric constant | 3.1 | |
| Cauchy-Koeffizienten | $N_0$ | 1.55 |
| | $N_1$ | 82.6 |
| | $N_2$ | 0 |
| Plasma etching rates (nm/min) | Ar-sputtering: | 7 |
| (5 Pa. 240-250 V Bias) | $O_2$ | 175 |
| | $CF_4$ | 45 |
| | 80 $CF_4$ + 16 $O_2$ | 98 |

### Structure resolution




SX AR-N 4340/7
0.7 µm resolution at a film thickness of 1.4 µm

### Resist structures



Resist structures of SX AR-N 4340/7 after tempering at 300 °C

### Process parameters

| Substrate | Si 4“ wafer |
|---|---|
| Soft bake | 90 °C, 60 s, hot plate |
| Exposure | i-line stepper (NA: 0.65) |
| Development | AR 300-47, 60 s, 22 °C |

### Process chemicals

| Adhesion promoter | AR 300-80 new |
|---|---|
| Developer | AR 300-47 |
| Thinner | AR 300-12 |
| Remover | AR 600-71, AR 600-70 |

# Thermostable Negative Resist SX AR-N 4340/7



## Process conditions

This diagram shows exemplary process steps for resist SX AR-P 4340/7. All specifications are guideline values which have to be adapted to own specific conditions. For further information on processing ☞ "Detailed instructions for optimum processing of photoresists". For recommendations on waste water treatment and general safety instructions ☞ "General product information on Allresist photoresists".

| Process step | Conditions |
|---|---|
| Coating with SX AR-N 4340/7 | 4000 rpm, 60 s, 1.4 µm |
| Soft bake (± 1 °C) | 90 °C, 2 min hot plate or<br>85 °C, 30 min convection oven |
| UV exposure | i-line stepper<br>Exposure dose ($E_0$, i-line stepper):<br>25 mJ/cm² |
| Crosslinking bake | 95 °C, 2 min hot plate or<br>90 °C, 30 min convection oven |
| Development (21-23 °C ± 0.5 °C) puddle | AR 300-47<br>60 s |
| Rinse | DI-$H_2O$, 30 s |
| Customer-specific technologies | Generation of e.g. semi-conductor properties or lift-off |
| Removal | AR 600-71 or $O_2$ plasma ashing |

### Processing instructions for the generation of lift-off structures and supplementary information

An undercut of the resist structure (lift-off) can be obtained with a prolonged development after minimum exposure. The undercut and structures with vertical side walls remain even at high temperatures of up to 300 °C. This high temperature stability is also used in the two-layer system with AR-BR 5400 and allows intensive sputtering processes at very high temperatures (see product information AR-BN 5400).

This resist formulation is currently successfully processed by customers, may however also be modified according to new customer's requirements.