Thermostable Negative Resist SX AR-N 4340/7

Negative photoresist for one- and two-layer systems

Experimental sample/custom-made product

Characterisation

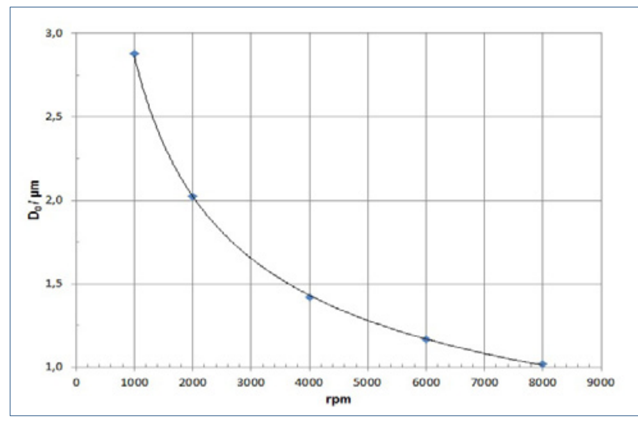
- i-line, g-line, deep UV (248 – 266 nm)
- highest sensitivity, high resolution
- good adhesion properties, high contrast, chemically enhanced
- undercut profiles (lift-off) possible
- may be used with AR-BR 5400 as 2-layer system
- plasma etching stable, thermostable up to 300 °C
- polyhydroxystyrene 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 temperature (°C)*	10-18

* Products have a guaranteed shelf life of temperatures from the date of sale if stored correctly and can also be used without guarantee until the date indicated on the label.

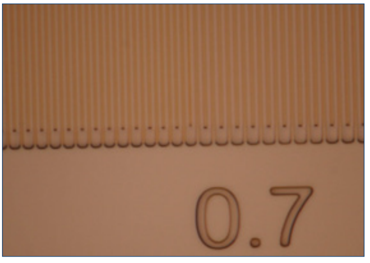
Spin curve



Properties II

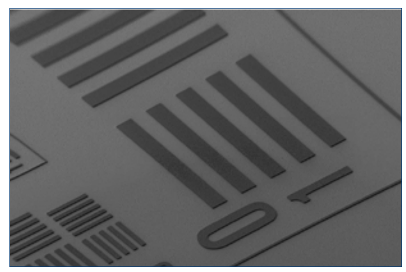
Parameter		Value
Glass transition temperature (°C)	118	
Dielectric constant	3.1	
Cauchy-Koeffizienten	N_0	1.55
	N_1	82.6
	N_2	0
Plasma etching rates (nm/min) (5 Pa. 240-250 V Bias)	Ar-sputtering:	7
	O_2	175
	CF_4	45
	80 CF_4 + 16 O_2	98

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

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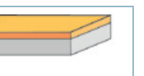
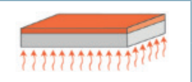
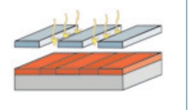
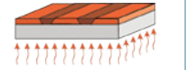
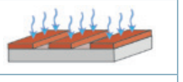
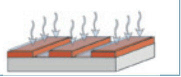
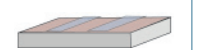
Process conditions

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
		85 °C, 30 min convection oven
UV exposure		i-line stepper
		Exposure dose (E_0, i-line stepper):
		25 mJ/cm^2
Crosslinking bake		95 °C, 2 min hot plate or
		90 °C, 30 min convection oven
Development (21-23 °C ± 0.5 °C) puddle		AR 300-47 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.