ALLRESIST

Innovation
Creativity
Customer-specific solutions

Negative E-Beam Resists AR-N 7500

AR-N 7500 e-beam resists for mix & match

High-resolution e-beam resists for the production of integrated circuits

Characterisation

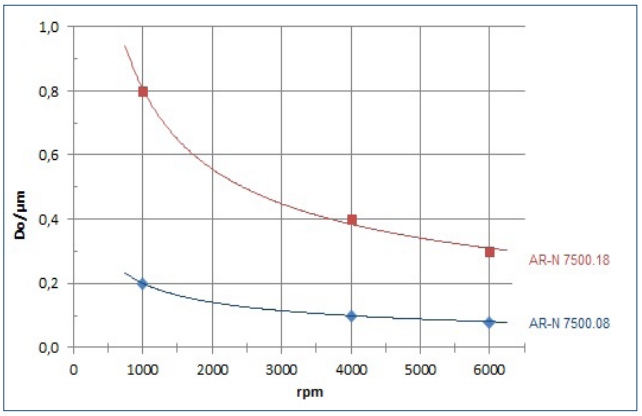
- e-beam, deep UV, i-line, g-line
- intermediate sensitivity
- mix & match-processes between e-beam and UV exposure 310 - 450 nm, positive or negative depending on the exposure wavelength chosen
- high resolution, process-stable (no CAR)
- plasma etching resistant, temp.-stable up to 120 °C
- novolac, naphthoquin. diazide, organic crosslink. a.
- safer solvent PGMEA

Properties I

Parameter / AR-N	7500.18	7500.08
Solids content (%)	18	8
Viscosity 25 °C (mPas)	4	2
Film thickness/4000 rpm (µm)	0.4	0.1
Resolution best value (nm)	40	
Contrast	5	
Flash point (°C)	42	
Storage temperature (°C) *	10-18	

* Products have a guaranteed shelf life of 6 months from the date of sale if stored correctly and can also be used without guarantee until the date indicated on the label.

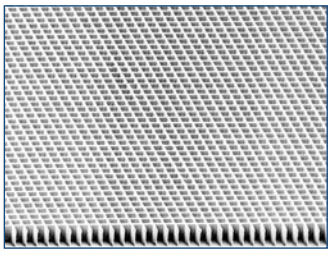
Spin curve



Properties II

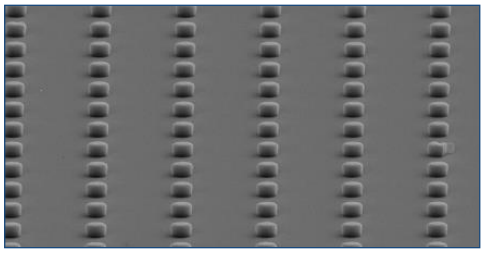
Glass trans. temperature (°C)	108	
Dielectric constant	3.1	
Cauchy coefficients	N_0	1.614
	N_1	157.1
	N_2	0
Plasma etching rates (nm/min) (5 Pa, 240-250 V Bias)	Ar-sputtering	8
	O_2	170
	CF_4	40
	80 CF_4 + 16 O_2	90

Structure resolution



AR-N 7500.18
Film thickness 400 nm
Lattice with 70 nm lines

Resist structures



AR-N 7500.18,
rows of cylinders
with a diameter of
500 nm

Process parameters

Substrate	Si 4“ waver
Soft bake	85 °C, 90 s, hot plate
Exposure	ZBA 21, 30 kV
Development	AR 300-47, 4 : 1, 60 s, 22 °C

Process chemicals

Adhesion promoter	AR 300-80 new
Developer	AR 300-46, 300-47
Thinner	AR 300-12
Remover	AR 300-76, AR 300-73

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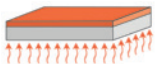
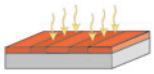
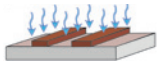
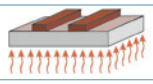
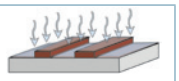
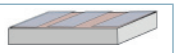
Process conditions

This diagram shows exemplary process steps for AR-N 7500 resists. 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 e-beam resists". For recommendations on waste water treatment and general safety instructions, ☞ "General product information on Allresist e-beam resists".

Coating		AR-N 7500.18 4000 rpm, 60 s, 0.4 µm
Soft bake (± 1 °C)		85 °C, 2 min hot plate or 85 °C 30 min convection oven
E-beam exposure		ZBA 21, 20 kV Exposure dose (E_0): 180 µC/cm^2
Development (21-23 °C ± 0,5 °C) puddle		AR 300-47, 4 : 1 60 s
Rinse		DI-H_2O, 30 s
Post-bake (optional)		120 °C, 1 min hot plate or 120 °C, 25 min convection oven for enhanced plasma etch resistance
Customer-specific technologies		Generation of semiconductor properties
Removal		AR 300-76 or O_2 plasma ashing

Developments recommendations

optimal suitable

Developer	AR 300-26	AR 300-35	AR 300-47
AR-N 7500.18 ; .08	1 : 4 ; 1 : 7	4 : 1 ; 1 : 1	4 : 1

Processing instructions

These resists are predestined for e-beam exposure, but also suitable for UV exposure. Mix & match processes are possible, if both exposure methods are carefully coordinated. During e-beam exposure, the resist works in a negative mode. If these resists are exposed to UV, they also work in a negative mode if image-wise exposure is performed at 310 to 365 nm, followed by flood exposure at > 365 nm (optimum g-line). The exposure dose is in this case roughly 100 mJ/cm^2 (i-line) for a film thickness of 400 nm. With an additional tempering step (85 °C, 2 min hot plate) after image-wise exposure, the sensitivity can be slightly increased. A positive image is obtained after image-wise UV exposure at 365 - 450 nm without subsequent flood exposure. The developer dilution should be adjusted with DI water in such a way that the development time is in a range of 30 and 120 s at 21 – 23 °C.