Negative E-Beam Resists AR-N 7520

AR-N 7520 e-beam resists for mix & match

E-beam resists with highest resolution for the production of integrated circuits

Characterisation

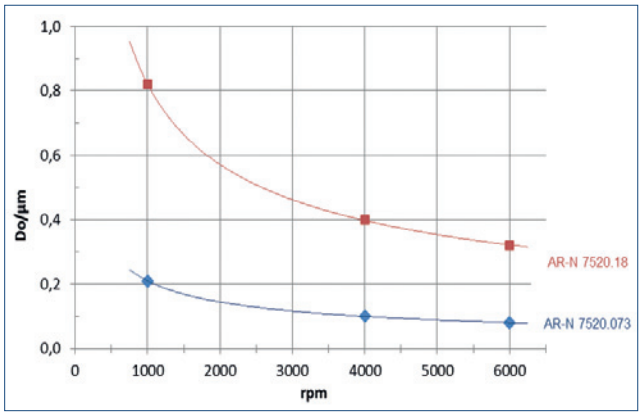
- e-beam, deep UV, i-line
- very high contrast, excellent transfer of structures, high-precision edges
- mix & match processes between e-beam and UV exposure 248-365 nm
- highest resolution, very process-stable (no CAR)
- plasma etching resistant, temp.-stable up to 140 °C
- novolac, organic crossl. agent, safer solvent PGMEA

Properties I

Parameter / AR-N	7520.18	7520.073
Solids content (%)	18	7.3
Viscosity 25 °C (mPas)	4.2	2.3
Film thickness/4000 rpm (µm)	0.4	0.1
Resolution best value (nm)	28	
Contrast	10	
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.

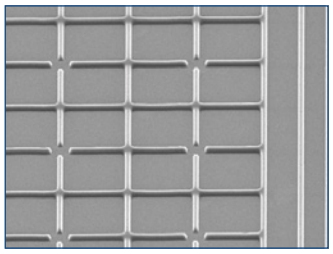
Spin curve



Properties II

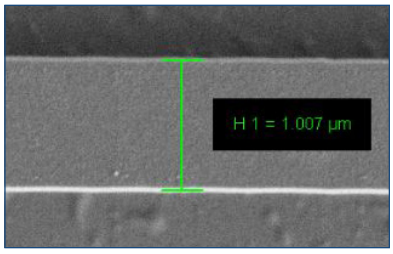
Glass trans. temperature (°C)	102	
Dielectric constant	3.1	
Cauchy coefficients	N_0	1.63
	N_1	122.0
	N_2	0
Plasma etching rates (nm/min) (5 Pa, 240-250 V Bias)	Ar-sputtering	8
	O_2	169
	CF_4	41
	80 CF_4 + 16 O_2	90

Structure resolution



400 nm lines with AR-N 7520.073

Resist structures



1 µm line with high-precision edges, AR-N 7520.18, Resist thickness 340 nm, 1.400 µC/cm², 100 kV

Process parameters

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

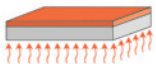
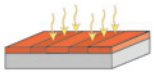
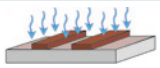
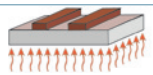
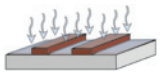
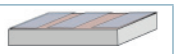
Process chemicals

Adhesion promoter	AR 300-80
Developer	AR 300-47, AR 300-26
Thinner	AR 300-12
Remover	AR 300-76, AR 300-73

Negative E-Beam Resists AR-N 7520

Process conditions

This diagram shows exemplary process steps for AR-N 7520 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 7520.18	AR-N 7520.073
	4000 rpm, 60 s, 0.4 µm	4000 rpm, 60 s, 0.1 µm
Soft bake (± 1 °C) 	85 °C, 2 min hot plate or 85 °C, 30 min convection oven	
E-beam exposure 	Raith Pioneer, 30 kV	
	Exposure dose (E_0): 100 nm space & lines	
	500 µC/cm²	300 µC/cm²
Development (21-23 °C ± 0,5 °C) puddle 	AR 300-47, 4 : 1 90 s	AR 300-47, 4 : 1 50 s
Rinse	DI-H_2O, 30 s	
Post-bake (optional) 	85 °C, 1 min hot plate or 85 °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	

Development recommendations

optimal suitable

Developer	AR 300-26	AR 300-35	AR 300-40
AR-N 7520.18, 7520.073	2 : 3 ; 1 : 3	2 : 1; pur	300-47, 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. (For details on Mix & Match, see AR-N 7520 new). Due to their composition, resists AR-N 7520 are approximately 8 x more insensitive than resists of the series AR-N 7520 new. The required higher dose predestines these resists for the production of very precise structural edges, since due to the high electron density edges are perfectly reproduced. For the very high imaging quality however, longer writing times have to be accepted.

The developer dilution should be adjusted with DI water such that the development time is in a range between 20 s and 120 s. By dilution of the developer, contrast and development rate can be influenced to a large degree. A stronger dilution results in an increased contrast and a reduced development rate.