



Positive Photoresist AR-P 3100

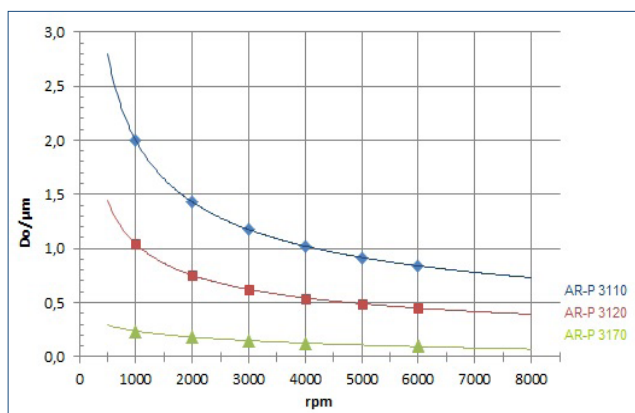
AR-P 3100 photoresist product series for mask production

Adhesion-enhanced positive resists for the production of masks and fine scale divisions

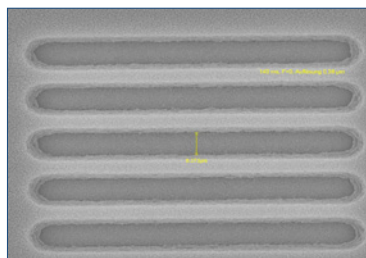
Characterisation

- broadband UV, i-line, g-line
- high photosensitivity, high resolution
- strong adhesion to critical glass/chromium surfaces for extreme stresses during wet-chemical etching processes
- for the production of CD masters and lattice structures
- 3170 also suitable for laser interference lithography
- plasma etching resistant
- combination of novolac and naphthoquinone diazide
- safer solvent PGMEA

Spin curve



Structure resolution



AR-P 3120
Film thickness 0.6 μm
Resist structures 0.38 μm L/S

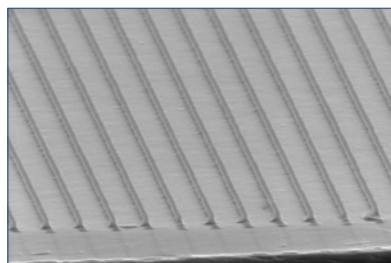
Properties I

Parameter / AR-P	3110	3120	3170
Solids content (%)	28	21	8
Viscosity 25 °C (mPas)	12	5	2
Film thickness/ 4000 rpm (nm)	1000	550	120
Resolution (μm)	0.5	0.4	0.4
Contrast	3.0	3.0	3.0
Flash point (°C)	42		
Storage 6 month (°C)	10 - 18		

Properties II

Glass transition temperature	108	
Dielectric constant	3.1	
Cauchy coefficients	N ₀	1.621
	N ₁	65.6
	N ₂	195.6
Plasma etching rates (nm/min) (5 Pa, 240-250 V bias)	Ar-sputtering	7
	O ₂	165
	CF ₄	38
	80 CF ₄ + 16 O ₂	89

Resist structures



70-nm-lines generated with the AR-P 3170 by laser interference lithography

Process parameters

Substrate	Si 4" wafer
Tempering	95 °C, 90 s, hot plate
Exposure	i-line stepper (NA: 0.65)
Development	AR 300-47, 1:1, 60 s, 22 °C

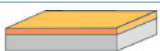
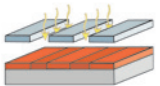
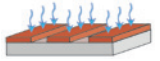
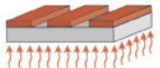
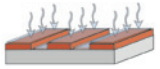
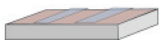
Process chemicals

Adhesion promoter	AR 300-80
Developer	AR 300-26, AR 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-P 3100 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 photoresists". For recommendations on waste water treatment and general safety instructions, ☞ "General product information on Allresist photoresists".

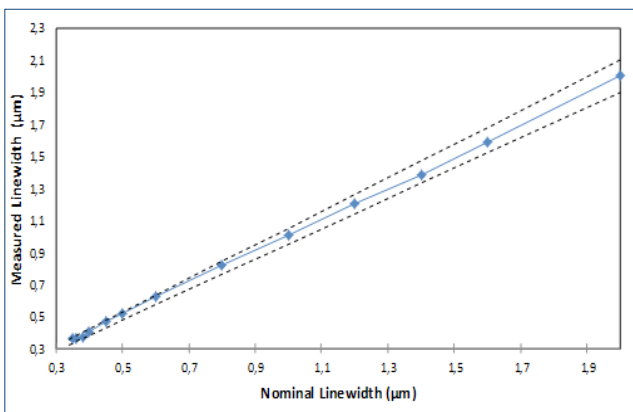
Coating		AR-P 3110 4000 rpm, 60 s 1000 nm	AR-P 3120 4000 rpm, 60 s 550 nm	AR-P 3170 4000 rpm, 60 s 120 nm
Tempering (+/- 1 °C)		100 °C, 1 min hot plate or 95 °C, 25 min convection oven		
UV exposure		Broadband UV, 365 nm, 405 nm, 436 nm Exposure dose (E ₀ , broadband UV stepper): 70 mJ/cm ² 65 mJ/cm ² 60 mJ/cm ²		
Development (21-23 °C ± 0,5 °C) puddle		AR 300-26 2 : 5 60 s	AR 300-47, 5 : 1 60 s	AR 300-47, 3 : 1 60 s
Rinse		DI-H ₂ O, 30 s		
Post-bake (optional)		115 °C, 1 min hot plate or 115 °C, 25 min convection oven		
Customer-specific technologies		Generation of e.g. semi-conductor properties		
Removal		AR 300-70 or O ₂ plasma ashing		

Development recommendations

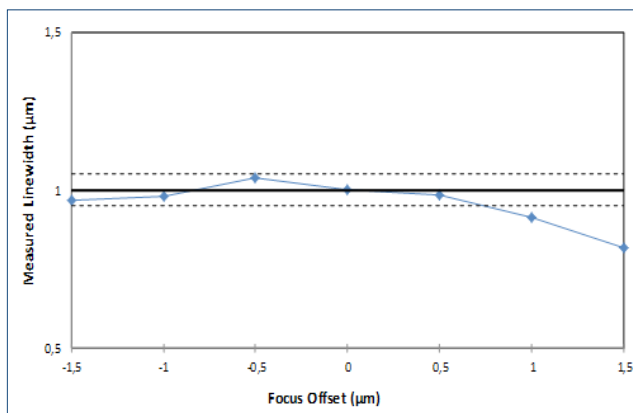
Resist / Developer	AR 300-26	AR 300-35	AR 300-47
AR-P 3110	1 : 2 to 1 : 3	pure	6 : 1
AR-P 3120	1 : 3	5 : 1	5 : 1
AR-P 3170	1 : 4	2 : 1	3 : 1

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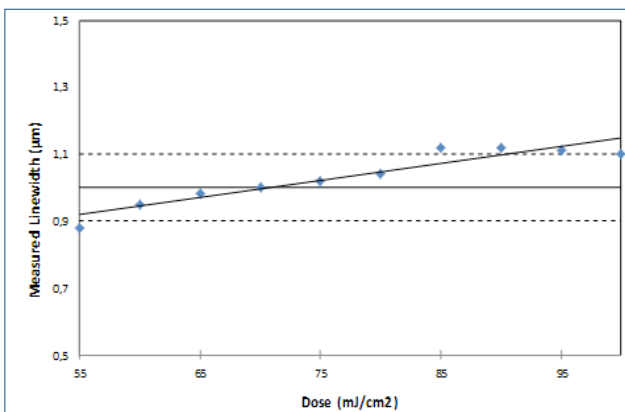
Linearity



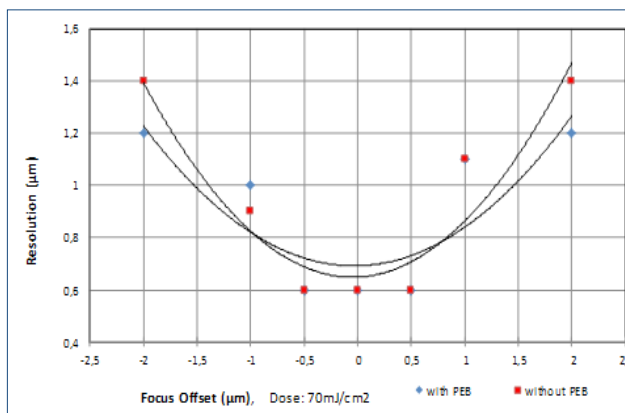
Focus variation



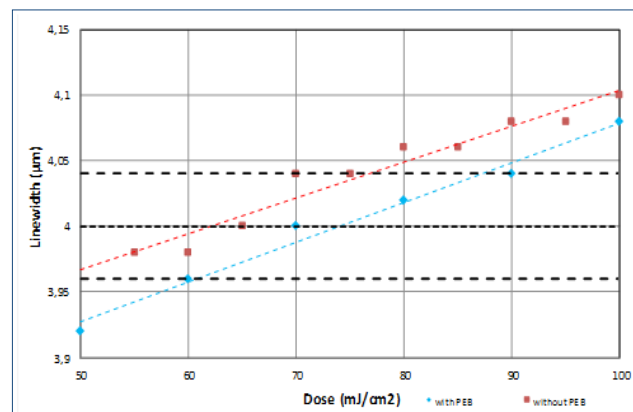
Optimum exposure dose



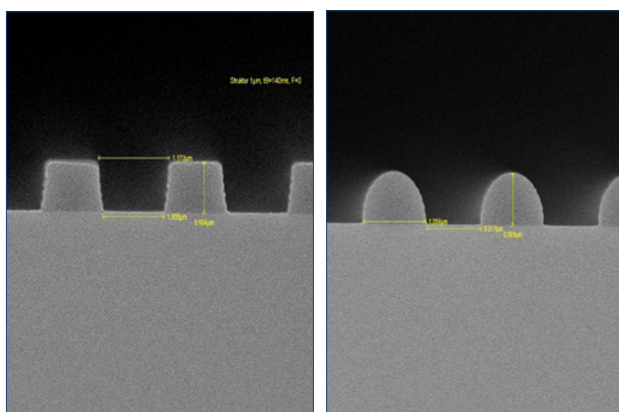
Focus variation (with and without PEB)



Optimum exposure dose



Thermal properties of resist structures



Untempered

Hard bake 115 °C