HF-stable Positive Photoresist AR-P 5900

AR-P 5910 photoresist for hydrofluoric acid etchings up to 5 %

Adhesion-enhanced positive-tone resist for complicated patternings with HF etching mixtures

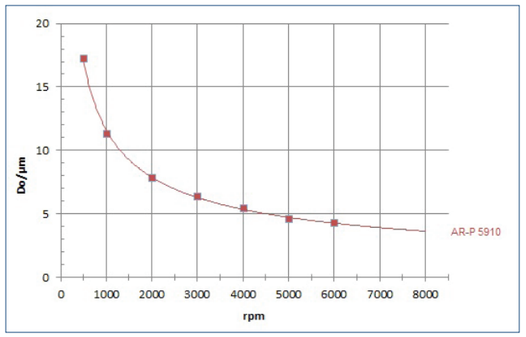
Characterisation

- broadband UV, i-line, g-line
- highly enhanced adhesion, retarded diffusion of hydrofluoric acid in BOE-mixture 5 : 1 (> 1 h)
- stable against 5 % hydrofluoric acid (> 15 min)
- plasma etching resistant up to 120 °C
- combination of novolac and naphthoquinone diazide, crosslinking agent, adhesion promoter; safer solvent PGMEA

Properties I

Parameter / AR-P	5910
Solids content (%)	39
Viscosity 25°C (mPas)	250
Film thickness/4000 rpm (µm)	5
Resolution (µm)	2.0
Contrast	2.0
Flash point (°C)	42
Storage 6 month (°C)	10 - 18

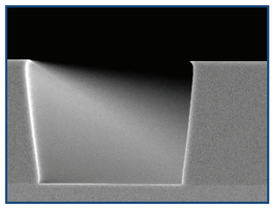
Spin curve



Properties II

Glass transition temperature	108	
Dielectric constant	3.1	
Cauchy coefficients	N_0	1.623
	N_1	166.8
	N_2:	10
Plasma etching rates (nm/min) (5 Pa, 240-250 V Bias)	Ar-sputtering	7
	O_2	161
	CF_4	38
	80 CF_4 + 16 O_2	89

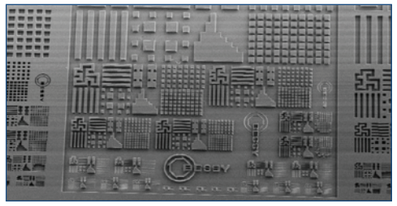
Structure resolution



AR-P 5910

3 µm-bars at a film thickness of 5 µm

Resist structures



Resist structures of AR-P 5910

Process parameters

Substrate	Si 4" wafer
Tempering	90 °C, 2 min, hot plate
Exposure	Maskaligner MJB 3, contact exposure
Developm.	AR 300-26 undil., 90 s, 22 °C

Process chemicals

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

Innovation
Creativity
customer-specific solutions
ALLRESIST

HF-stable Positive Photoresist AR-P 5900

Process conditions

This diagram shows exemplary process steps for resist AR-P 5910. 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".

Pre-coating with AR 300-80	Adhesive bonding, resulting film thickness 15 nm
1. Tempering	180 °C, 2 min hot plate or 180 °C, 25 min convection oven
Coating	AR-P 5910 4000 rpm, 60 s , 5.0 µm
2. Tempering (± 1 °C)	90 °C, 2 min hot plate or 85 °C, 25 min convection oven
UV exposure	Broadband UV, 365 nm, 405 nm, 436 nm Exposure dose (E_0, broadband UV stepper): 380 mJ/cm², 5.0 µm
Development (21-23 °C ± 0,5 °C) puddle	AR 300-26 60 s
Rinse	DI-H_2O, 30 s
Post-bake	110 °C, 2 min hot plate or 105 °C, 25 min convection oven
Customer-specific Technologies	Etching with hydrofluoric acid
Removal	AR 300-76 or O_2 plasma ashing

Processing instructions

Etching process: The resist is able to withstand 5 % HF or HF/isopropanol mixtures for some time (up to 15 minutes). Stability is increased if a pre-treatment with AR 300-80 is performed. A hydrofluoric acid solution buffered with ammonium fluoride (5 % HF, 5 % NH_4F) etches about as fast as 5 % HF alone, but resist structures are stable for up to one hour in this case. If BOE-mixtures of 5 : 1 (40 % NH_4F : conc. HF) are used, etching is possible for an even longer period of time.

Development recommendations

Resist / Developer	AR 300-26
AR-P 5910	undil.