



Protective Coatings AR-PC 500(0)

AR-PC 503, 504(0) adhesion-enhanced KOH-resistant resists

Wafer backside protection during front side etchings for the production of deep structures in silicon

Characterisation

- not light-sensitive > 300 nm, no yellow light required
- protection of wafer backside when etching the front side
- offers reliable protection against mechanical damage during handling and transport
- temperature-stable up to 250°C
- PMMA with different molecular weights, 503 in addition dyed dark
- solvent 503, 504 chlorobenzene; 5040 anisole

Spin curve

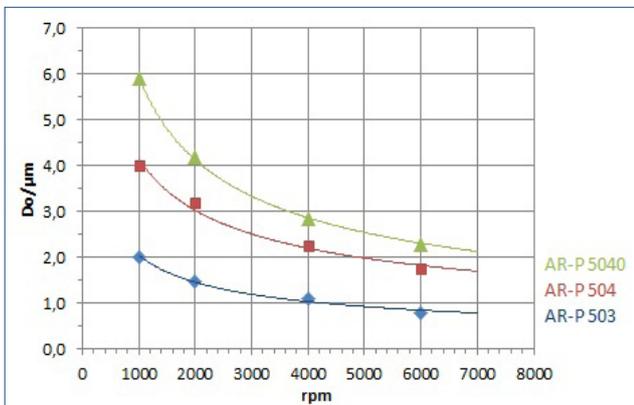
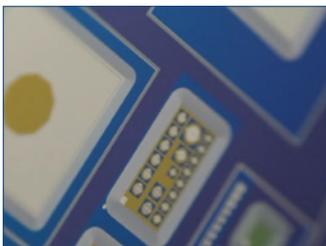
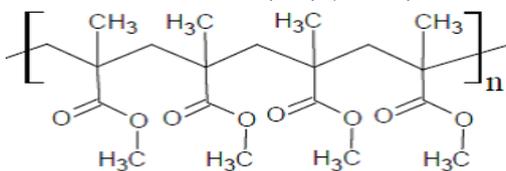


Photo of coated wafer



Protective coating AR-P 503 covering sensitive structures

Structural formula poly(methyl methacrylate)



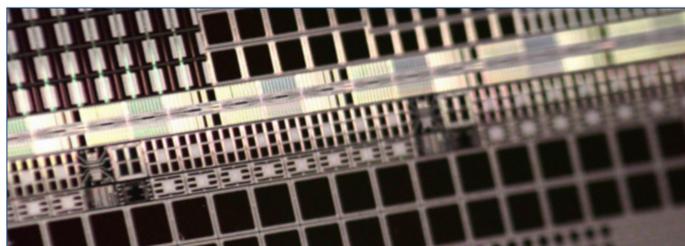
Properties I

Parameter / AR-PC	503	504	5040
Solids content (%)	10	13	17
Viscosity 25 °C (mPas)	190	350	550
Film thickness/4000 rpm (µm)	1.0	2.2	2.8
Resolution (µm)	-	-	-
Contrast	-	-	-
Flash point (°C)	28		42
Storage 6 month (°C)	10 - 25		

Properties II

Glass transition temperature	105	
Dielectric constant	2.6	
Cauchy coefficients AR-PC 503	N ₀	1.528
	N ₁	34.6
	N ₂	0
Plasma etching rates (nm/min) (5 Pa, 240-250 V Bias)	Ar-sputtering	20
	O ₂	340
	CF ₄	61
	80 CF ₄ + 16 O ₂	160

Topology of the backside



Process chemicals

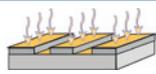
Adhesion promoter	AR 300-80
Developer	-
Thinner	AR 600-01
Remover	AR 300-76, AR 600-71

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Process conditions

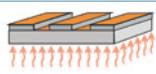
This diagram shows exemplary process steps for AR-PC 500(0) resists. All specifications are guideline values which have to be adapted to own specific conditions. For further information on processing, see "Detailed instructions for optimum processing of photoresists". For recommendations on waste water treatment and general safety instructions, see "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

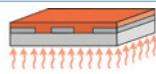
Coating protective film



AR-PC 503
1000 rpm, 60 s,
2.0 µm

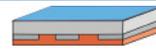
AR-PC 504
1000 rpm, 60 s,
4.5 µm

2. Tempering (± 1 °C)



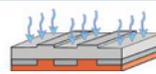
140 °C, 1.5 min hot plate or
135 °C, 60 min convection oven

Fabrication of etch mask
on the backside



Customer-specific process to generate the hard mask

Customer-specific
technologies



Etching: 40 % KOH, 85 °C

Removal of protective
coating



AR 300-76 or O₂ plasma ashing

Processing instructions

Pre-treatment prior to coating: The protective effect during etching can be extended to up to 8 hours if the surface is pre-treated with adhesion promoter AR 300-80. The coating is preferably performed at 4000 rpm. After tempering at 180 °C for 2 min (hot plate), a uniform, 15 nm thin layer of adhesion promoter is formed (-> Product information AR 300-80).

Coating: A rotational speed of 1000 rpm is recommended for protective coatings, since at a film thickness of 2-5 µm wafer edges are best protected due to a certain "edge wrapping" of the resist. At higher spin speeds or if 6-inch wafers and above are used, the relatively high amount of resist which is deposited on the wafer may cause the so-called candy-floss effect. Low spin speeds, local exhaustion or removal of the "candy floss" with a glass rod during coating reduces these highly disturbing effects.

Tempering: To obtain a particularly high protective effect for the fabrication of hard-baked films, tempering temperatures of 190 °C are recommended.

Etch process: The protective coating is even after hours not attacked by 40 % KOH. Possibly occurring problems only derive from insufficient adhesive strength and can be significantly reduced with a pre-treatment with AR 300-80.