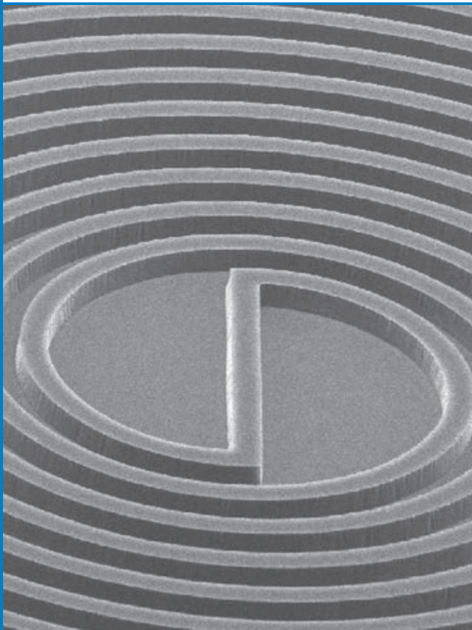
micro resist technology

Positive Photoresists



- **ma-P 1200 series**
- **Thick resists ma-P 1275, ma-P 1275HV**
- **ma-P 1275G for greyscale lithography**

Unique features of the positive photoresists

- Sensitivity to g-line, i-line or broadband exposure
- No post exposure bake
- Easy removal
- Ready-to-use resist solutions in a variety of viscosities
- Broad process window and easy to handle

- Made in Germany -

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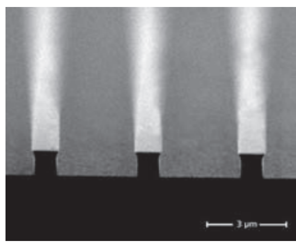
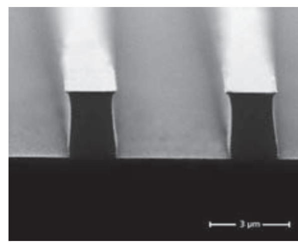
Positive Photoresist Series for UV lithography

Resist		ma-P 1205	ma-P 1210	ma-P 1215	ma-P 1225	ma-P 1240	ma-P 1275
Spectral sensitivity	nm	330 - 450					
Film thickness	µm	0.5	1.0	1.5	2.5	4.0	7.5
Spin coating	rpm s	3000 30					
Dose @ 365 nm (broad-band exposure)	mJ cm^{-2}	35	35	45	55	110	150
Developer		ma-D 331, ma-D 331/S (NaOH based), mr-D 526/S (TMAH based)					

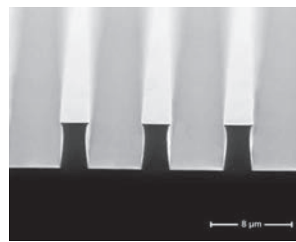
Resist patterning with mask aligner broadband exposure



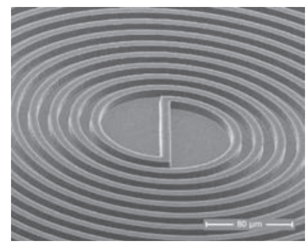
1 µm ma-P 1210,
1 µm lines/ 3 µm spaces



2.5 µm ma-P 1225,
2 µm lines/ 4 µm spaces



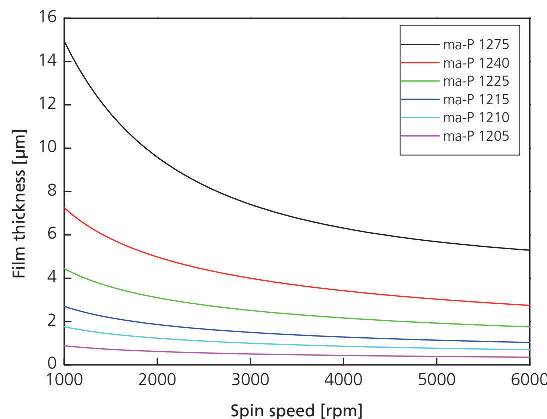
4 µm ma-P 1240,
3 µm lines/ 5 µm spaces



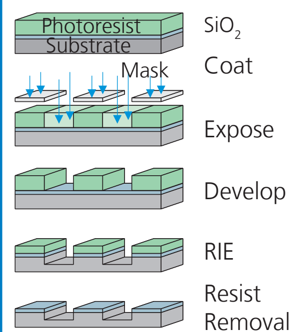
7.5 µm ma-P 1275,
coil, 10 µm trace width

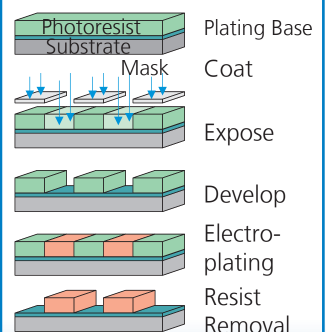
ma-P 1200 series
for microelectronics and microsystems technology

ma-P 1200 is a positive tone photoresist series designed for the use in microelectronics and microsystems technology.
The resists are available in a variety of viscosities for film thicknesses of 0.3 – 40 µm in one spin-coating step.



Spin curves, 30 s spin time





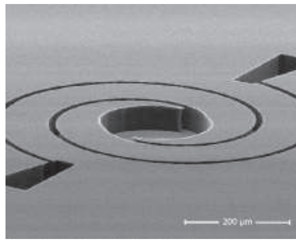
- Broadband, g-, h- and i-line exposure
- Very good pattern stability in wet etch processes and acid and alkaline plating baths
- Highly stable in dry etch processes e.g. CHF_3, CF_4, SF
- Aqueous alkaline development

Main applications
- Mask for etching e.g.Si, SiO_2, Other semiconductors, Metals
- Mask for ion implantation
- Mould for electroplating

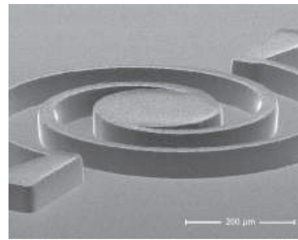
Thick Positive Photoresists for UV lithography

Film thickness		7.5 µm	11 µm	20 µm	30 µm	40 µm	50 µm
Spectral sensitivity	nm	350 - 450					
ma-P 1275	rpm s	3000 30	-	500 60	350 60	250 60	-
ma-P 1275HV	rpm s	-	3000 30	1000 60	600 60	450 60	400 60
Developer		ma-D 331, ma-D 331/S (NaOH based), mr-D 526/S (TMAH based)					

Resist mould for electroplating

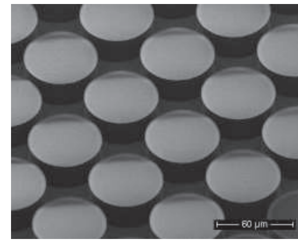


50 µm ma-P 1275HV mould

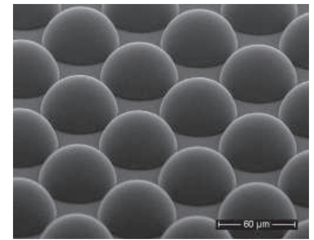


40 µm electroplated Ni

Resist pattern reflow



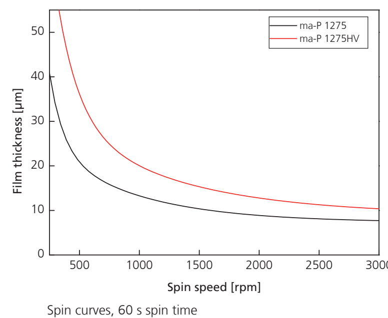
20 µm ma-P 1275, 60 µm diameter pillar



30 µm reflowed ma-P 1275, 60 µm diameter

ma-P 1275 & ma-P 1275HV
for microsystems technology

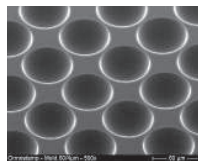
ma-P 1275 & ma-P 1275HV are high viscosity positive tone photoresists for film thicknesses of up to 60 µm.



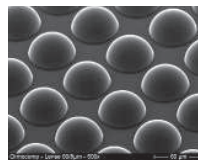
Spin curves, 60 s spin time

- Broadband, g-, h- and i-line exposure
- High stability in acid and alkaline plating baths
- High dry and wet etch resistance
- Good thermal stability of the resist patterns attainable
- Aqueous alkaline development
- Side wall angle up to 87° with mask aligner broadband exposure
- Suitable for pattern reflow

UV moulding after reflow

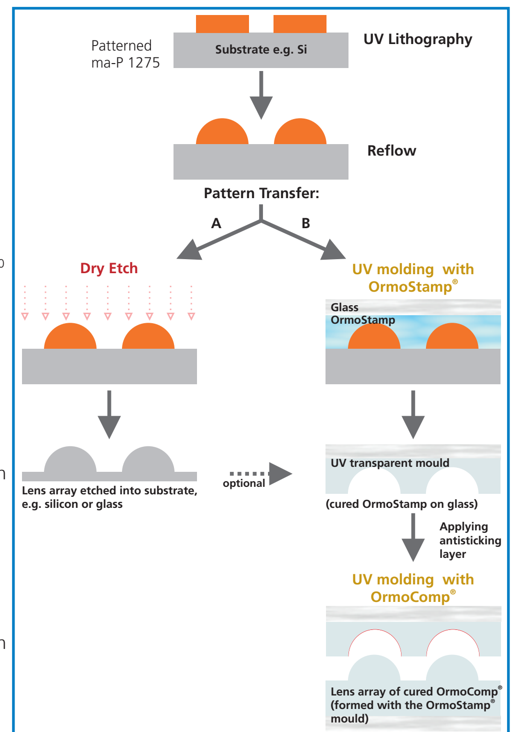


UV moulding with OrmoStamp® concave lenses, working stamp



UV moulding with OrmoComp®, convex lenses, final structure

Reflow of ma-P 1200 and pattern transfer



Main applications

- Mould for electroplating – e.g. for micro coils, micro springs
- Fabrication of micro optical components – e.g. micro lenses by pattern transfer from reflowed resist patterns
- Etch mask for metal and semiconductor substrates
- Mask for ion implantation

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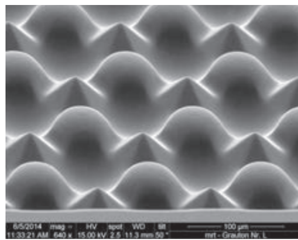
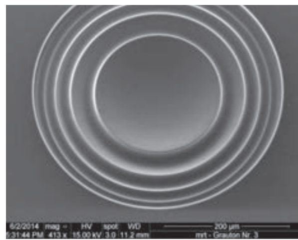
Thick Positive Photoresist for Greyscale Lithography

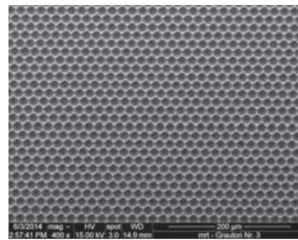
Film thickness* ma-P 1275G		20 µm	30 µm	60 µm
Spectral sensitivity	nm	350 - 450		
Spin coating	rpm s	900 60	500 60	1000 4
Developer		ma-D 532/S, mr-D 526/S (TMAH based)		

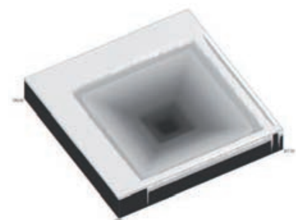
* resists with lower viscosities available as custom-made products

Resist patterning with Laser Direct Writing


Convex and concave hexagonal lenses, 60 µm diameter*


Fresnel lens*

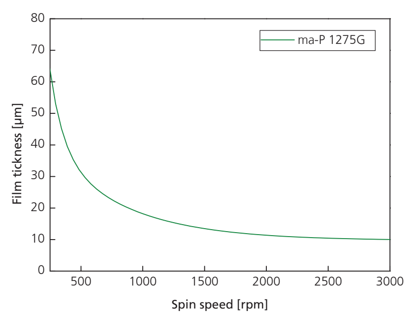

Hexagonal concave lenses, ~ 17 µm width*


53 µm pattern depth in 58 µm thick resist*

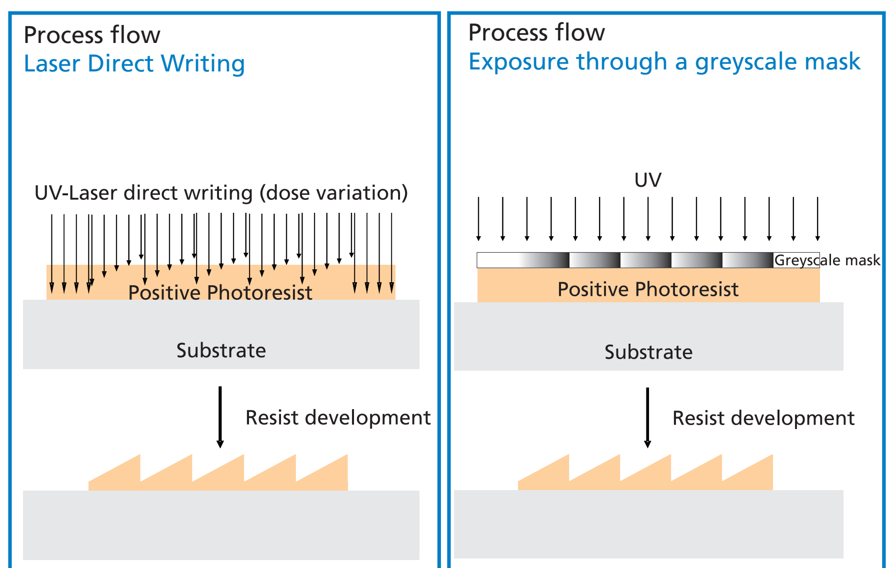
* Courtesy of Heidelberg Instruments

ma-P 1275G for greyscale lithography

ma-P 1275G is a high viscosity positive tone photoresist specifically designed for the requirements of grayscale lithography.



Spin curve, 60 s spin time



- Film thickness up to 60 µm and higher
- Reduced contrast
- High intensity laser exposure possible without outgassing
- 50…60 µm pattern depth possible
- Aqueous alkaline development with TMAH based developers

Main applications

Use of manufactured 3D patterns in micro-optics, MEMS and MOEMS, displays

Pattern transfer by
- Electroplating
- Etching
- UV moulding

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