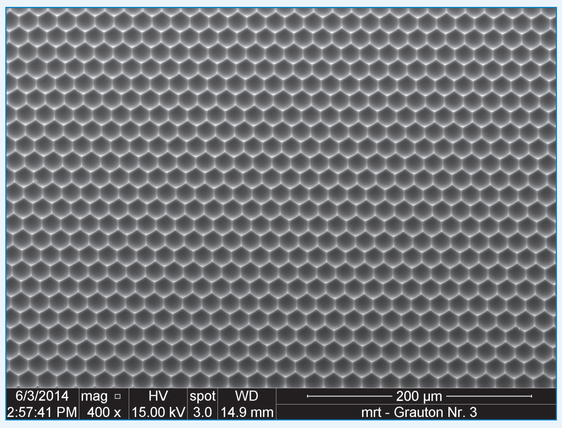
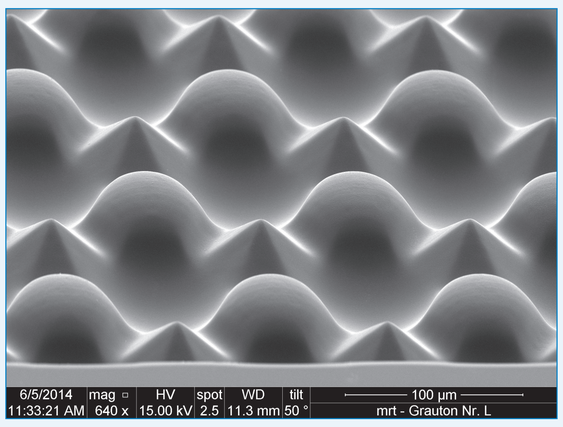
micro resist technology GmbH
Köpenicker Straße 325
12555 Berlin
Germany
Tel.: +49 (0) 30 641670100
Fax: +49 (0) 30 641670200
info@microresist.de
www.microresist.com

ma-P 1200G — Positive Greyscale Photoresist

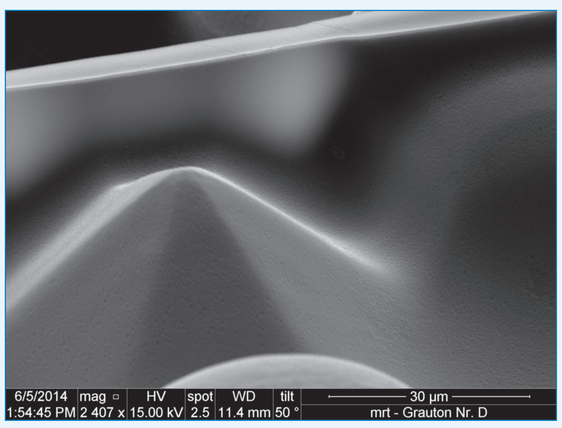
Positive Photoresists for Greyscale lithography



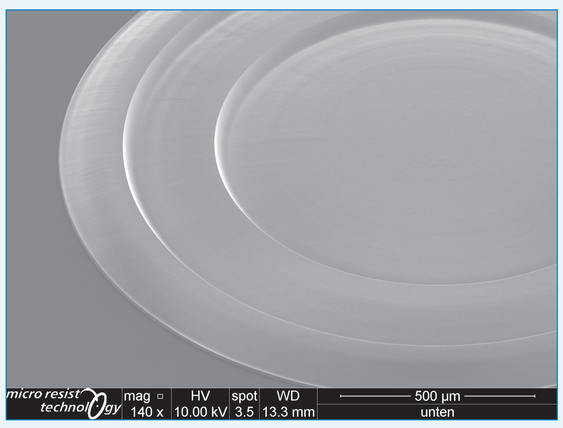
Hexagonal concave lenses, ~ 17 µm width



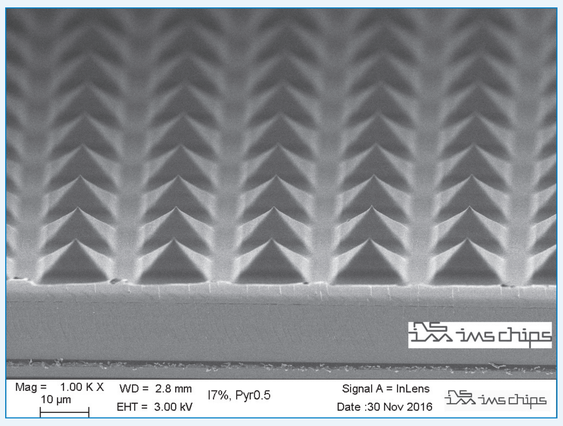
Convex and concave lenses and hexagonal pyramids in a honeycomb arrangement (hexagon diameter = 80 µm)



Straight line among greyscale patterns



48 µm high Fresnel lens, 2 mm diameter



Pyramids - 10µm base, 5µm height, 45° angle

Exposures with DWL66+ at 405nm at Heidelberg Instruments; bottom picture courtesy of IMS Chips, exposure with VPG400 at 355nm; Fresnel lens with LED exposure through HEBS glass grey-scale mask by Canyon Materials Inc.

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Characteristics

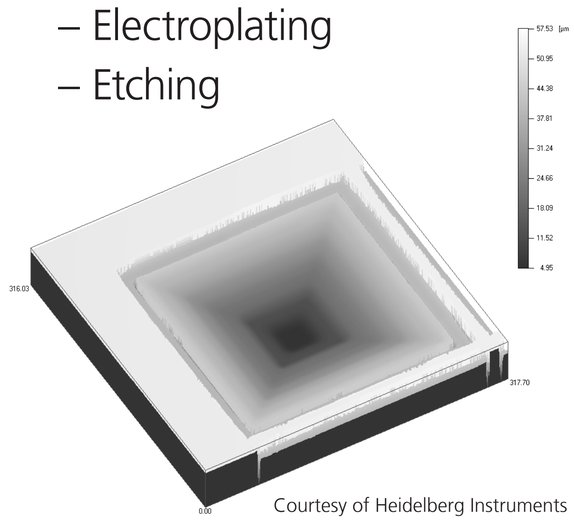
Positive tone photoresist series specifically designed for the requirements of greyscale lithography. An application in standard binary lithography is also possible.

– Reduced contrast
– Film thickness up to 60 µm and higher
– 50 - 60 µm depth range of the patterns possible in greyscale lithography
– Spectral sensitivity 350…450 nm
– High intensity laser exposure possible without outgassing
– Aqueous alkaline development, for greyscale lithography with TMAH based developers, for standard binary lithography also with metal ion bearing developers
– Suitable for electroplating
– Suitable for dry etch processes e.g. with CHF3, CF4, SF6
– Suitable for pattern reflow after standard binary lithography

Applications

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

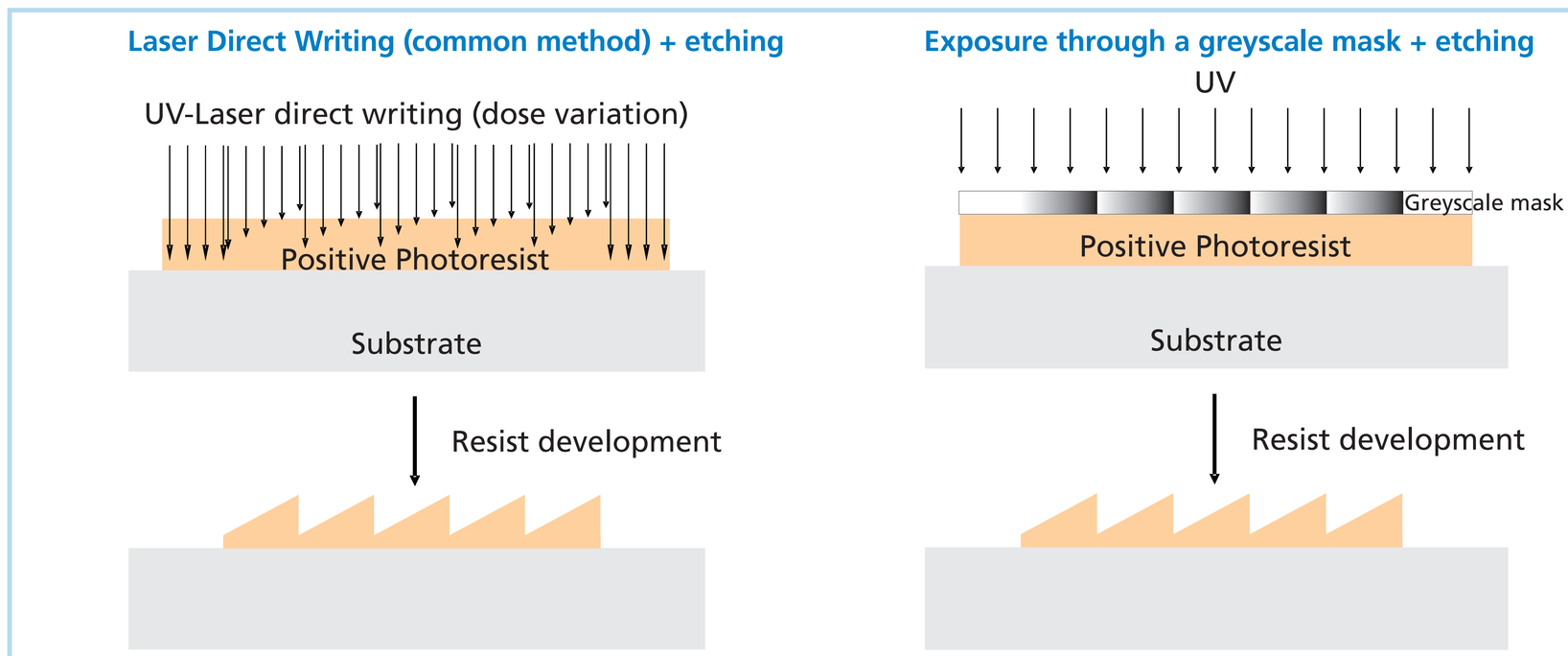
Pattern transfer by
– UV or thermal moulding
– Electroplating
– Etching



Courtesy of Heidelberg Instruments

~ 53 µm pattern depth in
~ 58 µm thick ma-P 1275G
Exposure with µPG301 at 390 nm at Heidelbberg Instruments

Process flow



Film thickness

Resist	ma-P	1215G	1225G	1240G	1275G			
Film thickness	µm	1.5	2.5	4.0	9.5	15	30	60
Spin-coating	rpm	3000	3000	3000	3000	1500	500	1000
Time	s	30	30	30	30	30	60	4