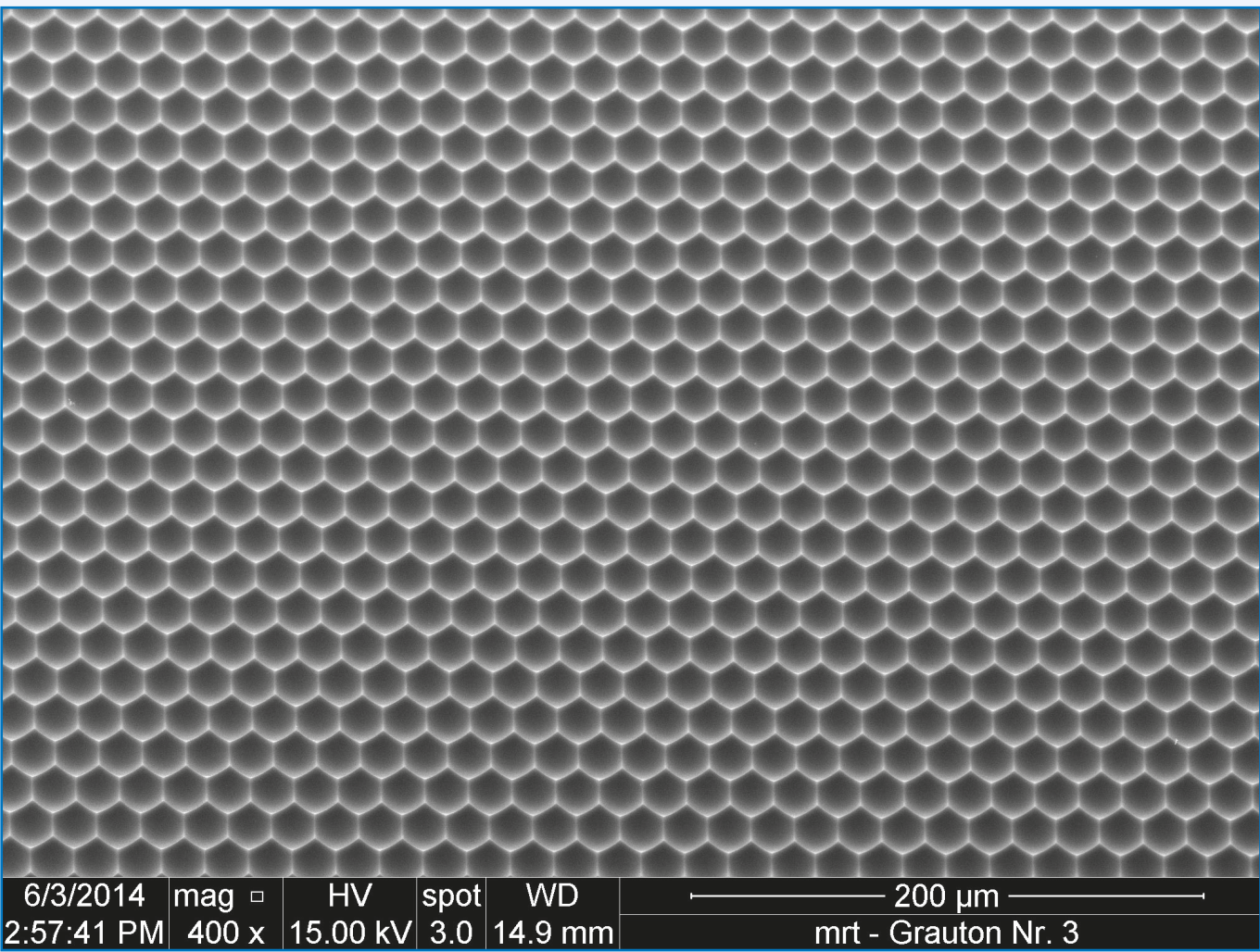
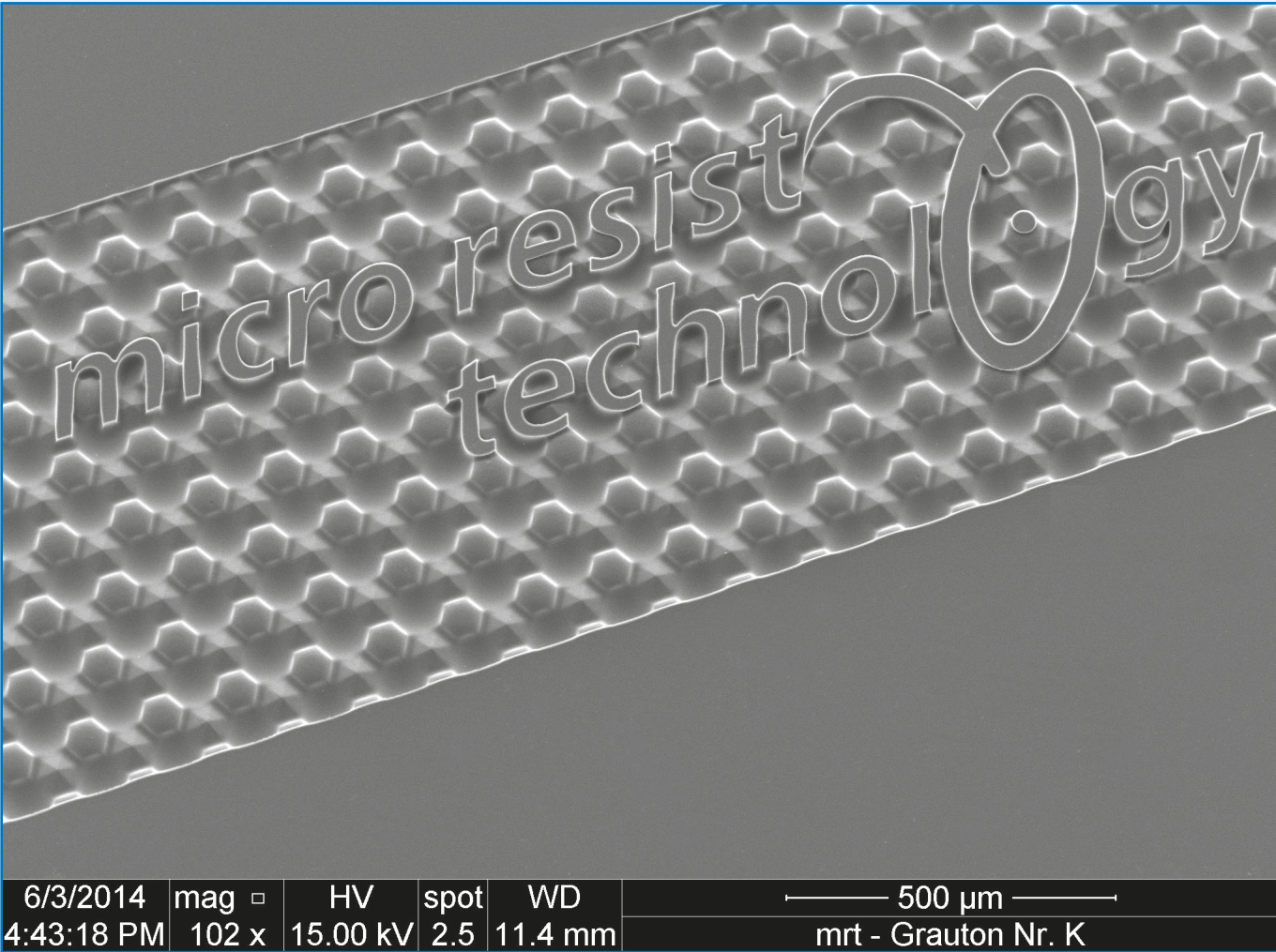


# ma-P 1200G — Positive Greyscale Photoresist Series

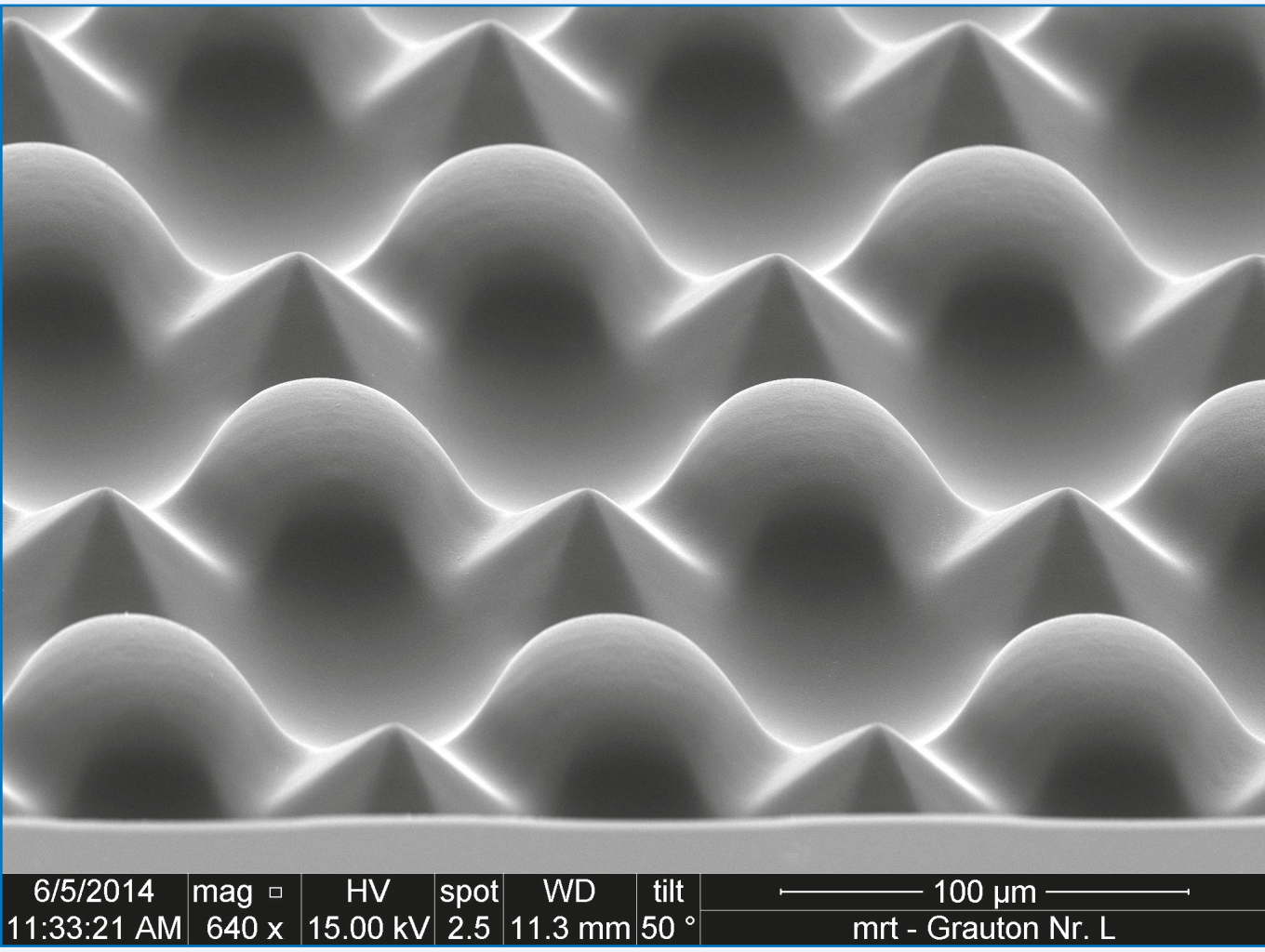
## Positive Photoresists for Greyscale lithography



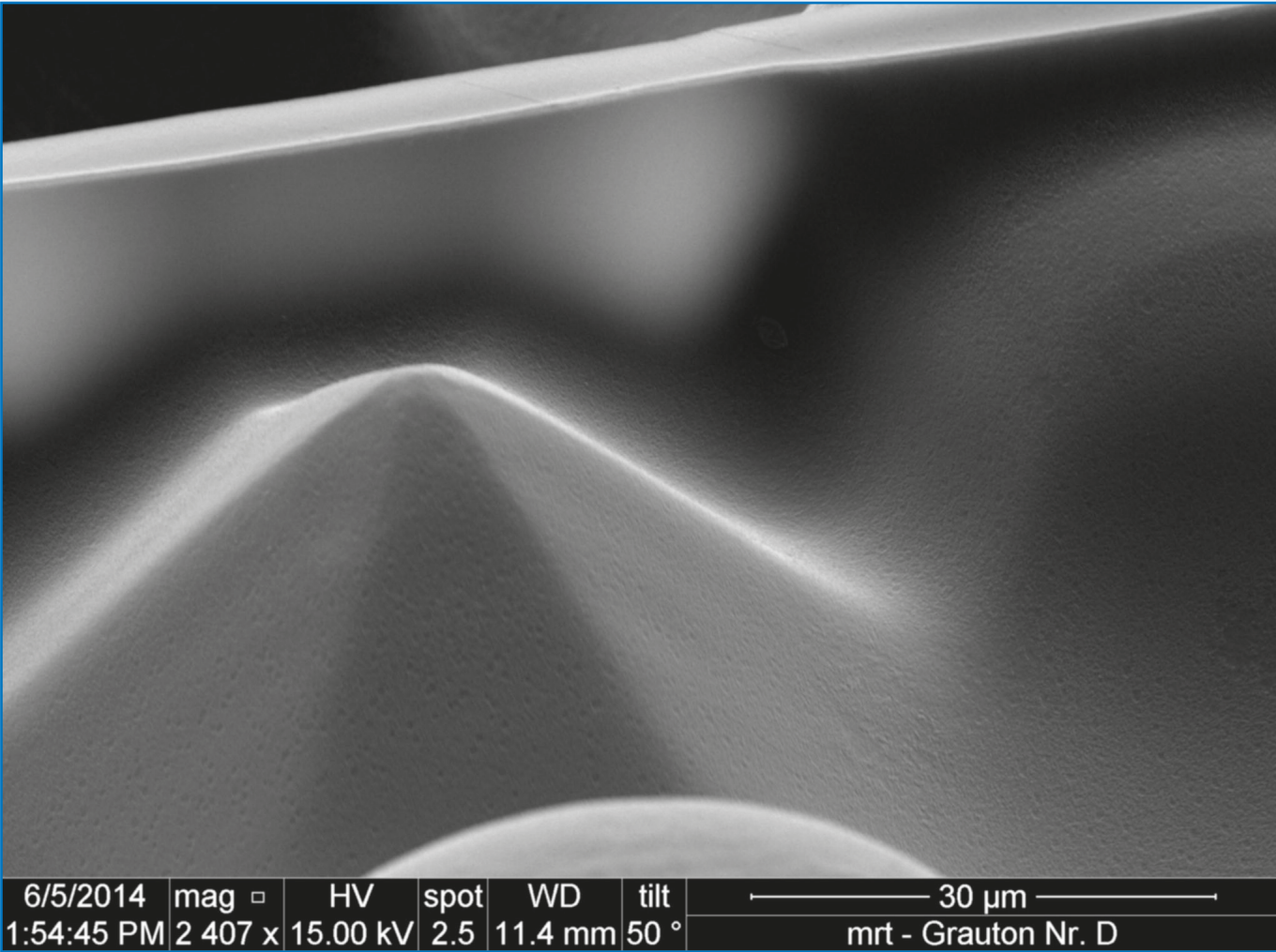
Hexagonal concave lenses, ~ 17 µm width



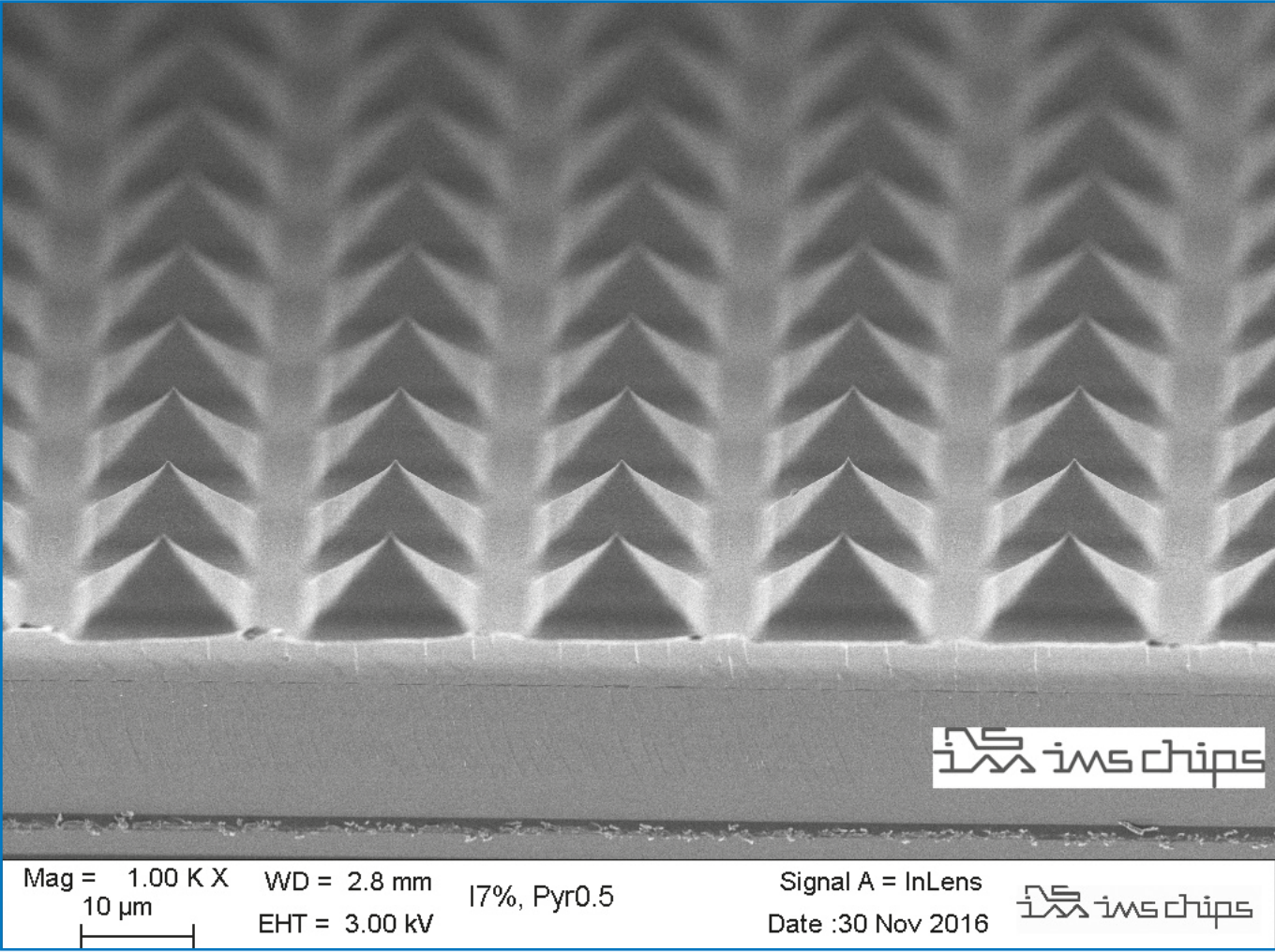
Convex and concave lenses and hexagonal pyramids in a honeycomb arrangement (hexagon diameter = 80µm)



As above, detailed view



Straight line among greyscale patterns



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

### Characteristics

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

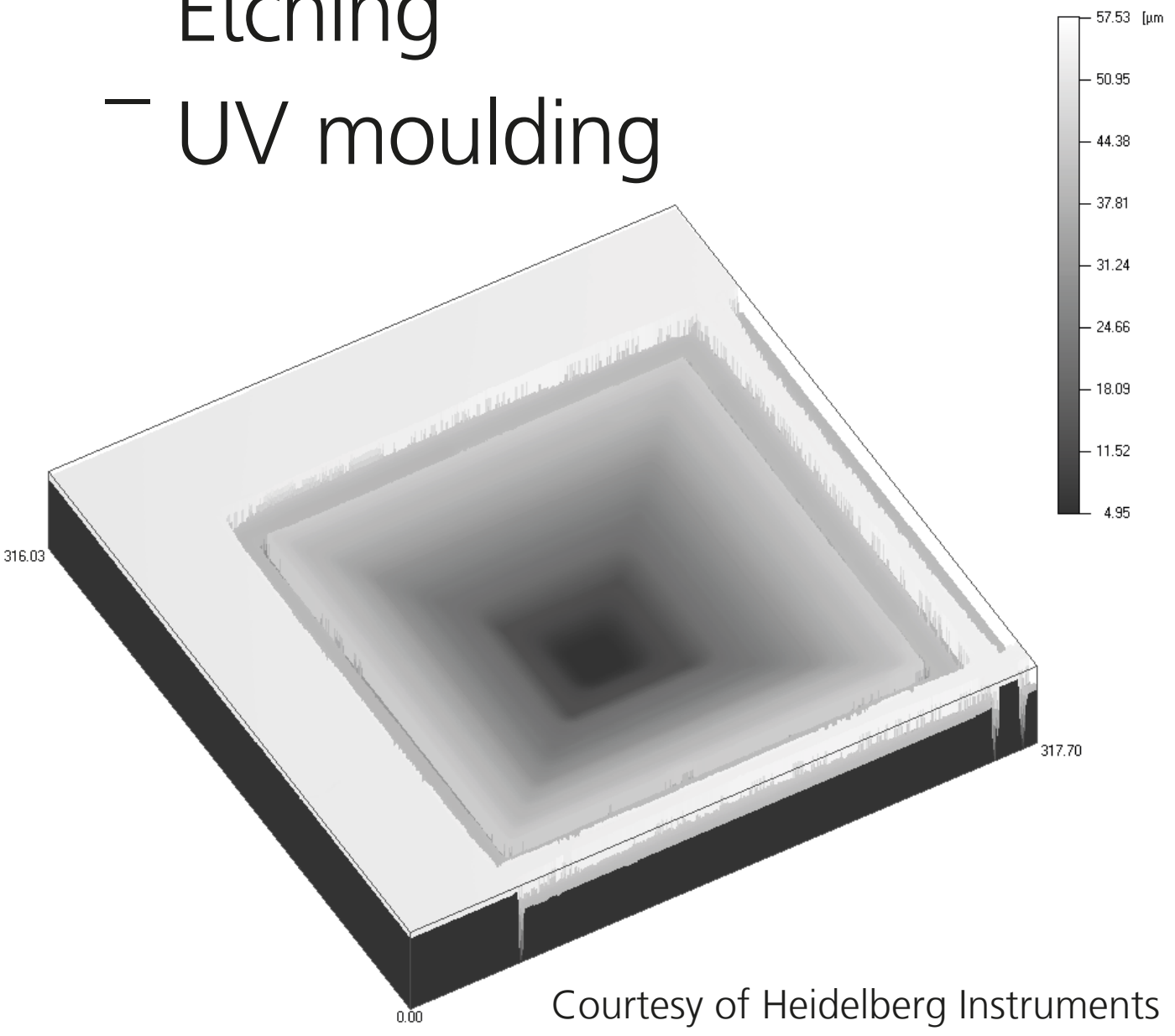
- Reduced contrast
- Film thickness up to 60 µm and higher
- 50 - 60 µm depth range of the patterns possible in greyscale lithography
- Spectral sensitivity 350...450 nm
- High intensity laser exposure possible without outgassing
- Aqueous alkaline development, for greyscale lithography with TMAH based developers, for standard binary lithography also with metal ion bearing developers
- Suitable for electroplating
- Suitable for dry etch processes e.g. with  $\text{CHF}_3$ ,  $\text{CF}_4$ ,  $\text{SF}_6$
- Suitable for pattern reflow after standard binary lithography

### Applications

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

Pattern transfer by

- Electroplating
- Etching
- UV moulding

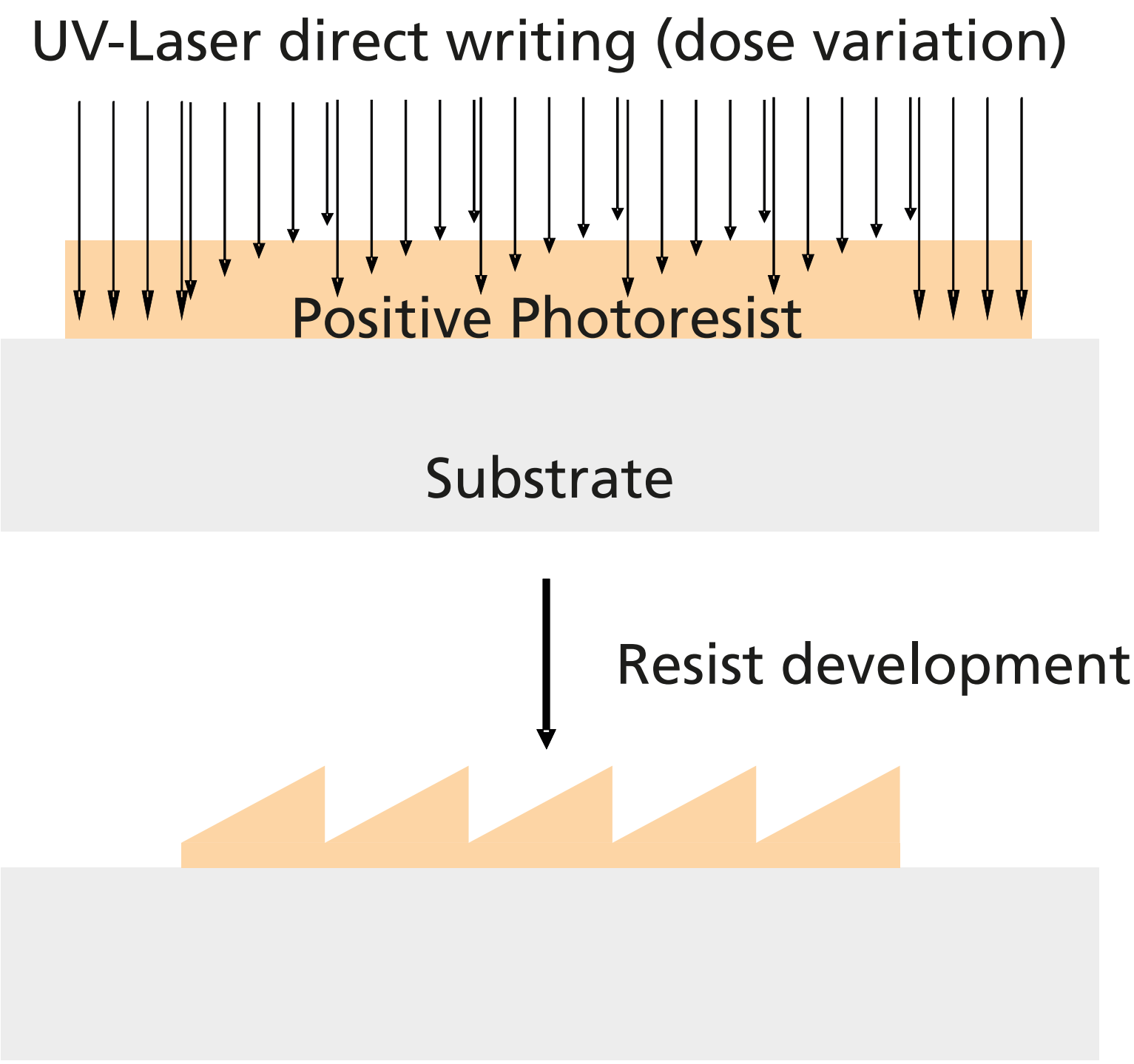


~ 53 µm pattern depth in  
~ 58 µm thick ma-P 1275G

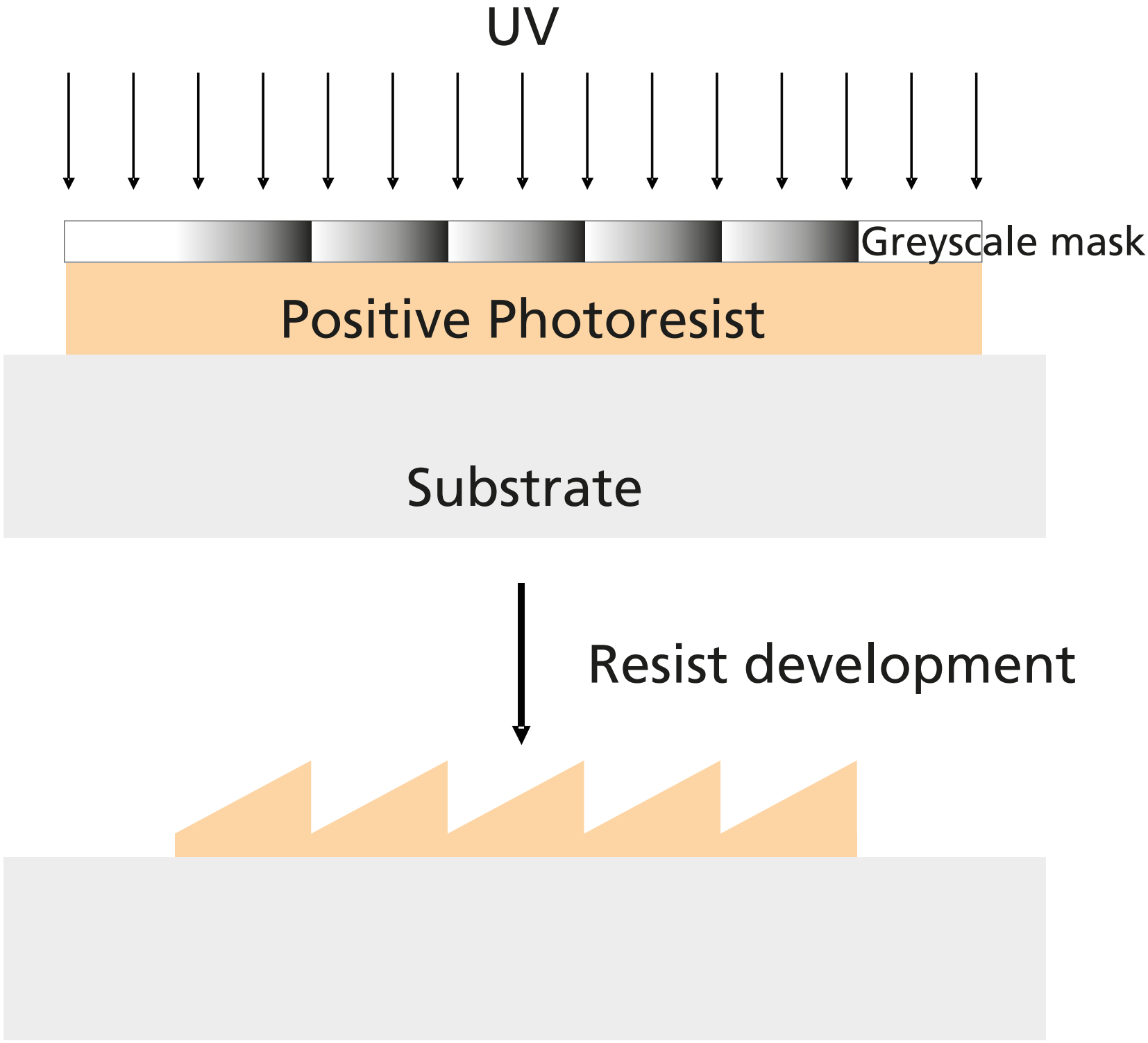
Exposure with µPG301 at 390 nm at Heidelberg Instruments

### Process flow

#### Laser Direct Writing (common method) + etching



#### Exposure through a greyscale mask + etching



### Film thickness

Resist	ma-P	1215G	1225G	1275G			
Film thickness	µm	1.5	2.5	9.3	15	30	60
Spin-coating	rpm	3000	3000	3000	1500	500	1000
Time	s	30	30	30	30	60	4

