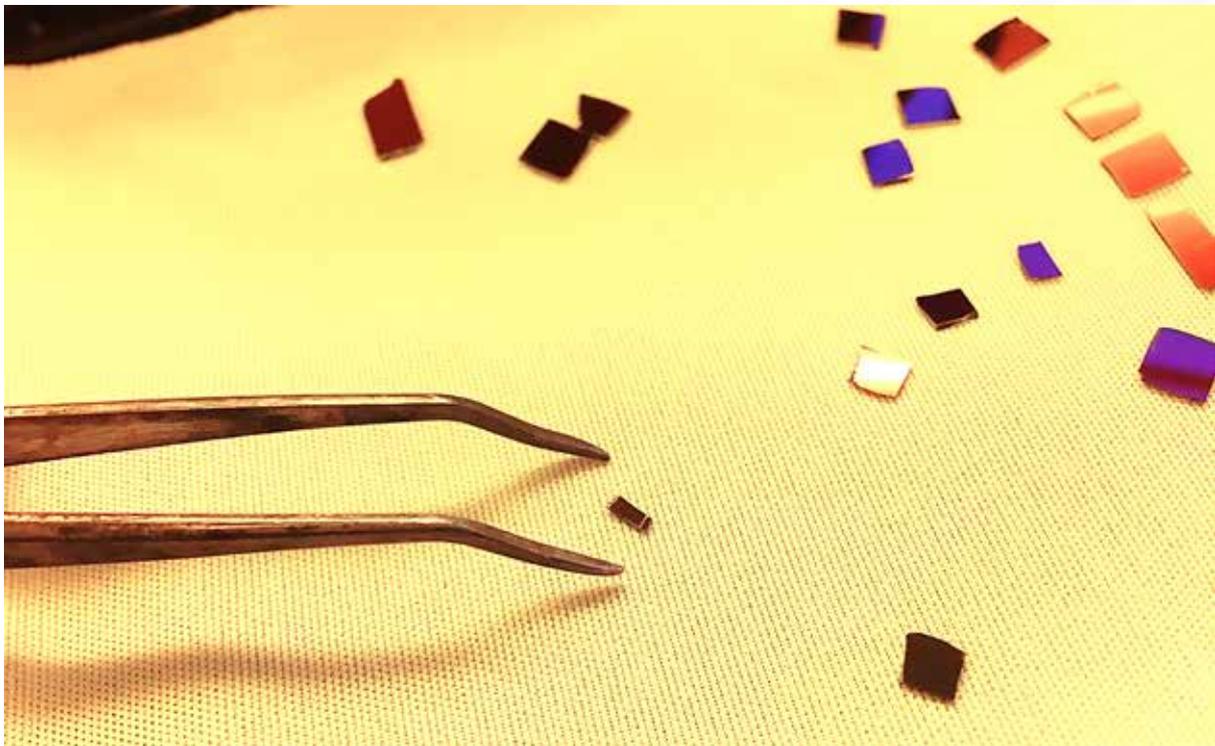


# Application Note

## Small Sample Handling

by Jochen Hermann, Heidelberg Instruments



In academic research, microfabrication is often done on small samples just few mm in size. Heidelberg Instruments systems are designed with this need in mind, as we show here on a test exposure done with MLA150.

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## CONSIDERATIONS FOR SMALL SAMPLE HANDLING

Patterning of small samples is not trivial for two reasons:

- Resist thickness varies at the edges, depending on spinning conditions, which complicates assigning the correct dose.
- Edges are not flat so the focus next to them can be lost;

Uniform resist thickness can be achieved either by spinning resist before cutting the wafer, or by optimizing the spinning conditions.

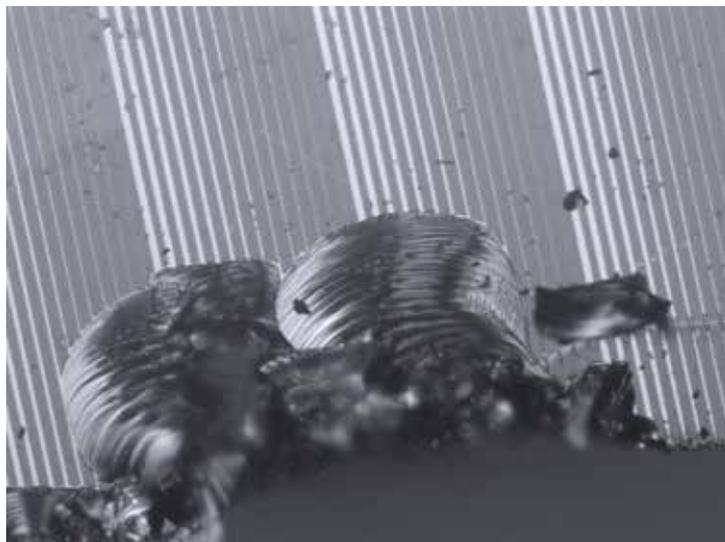
The correct focus during the exposure relies on autofocus technology.

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## OPTICAL AUTOFOCUS

There are two types of autofocus mechanism realized in Heidelberg Instruments systems: pneumatic and optical. For small samples, optical autofocus is preferable due to small focusing area (less than 1x1 mm).

In combination with the overview camera for primary alignment, optical autofocus adjusts the height of the laser write head and detects the edges.

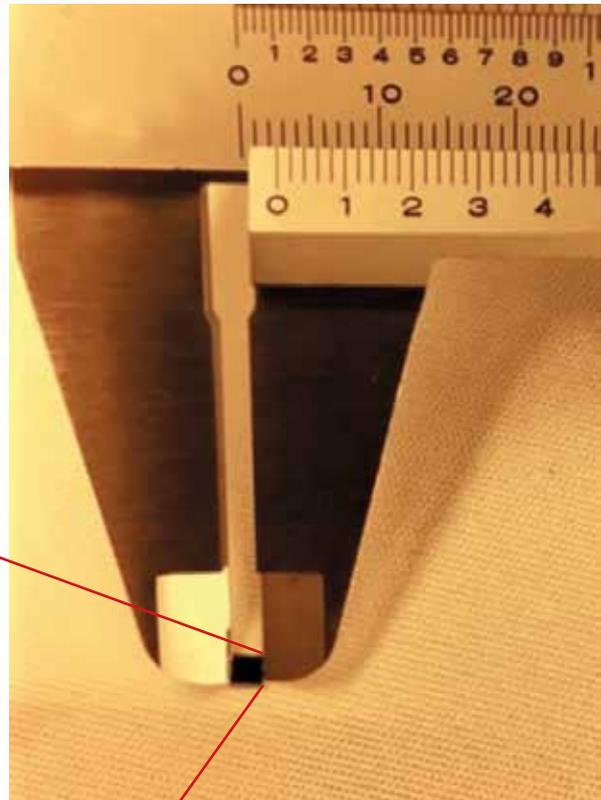
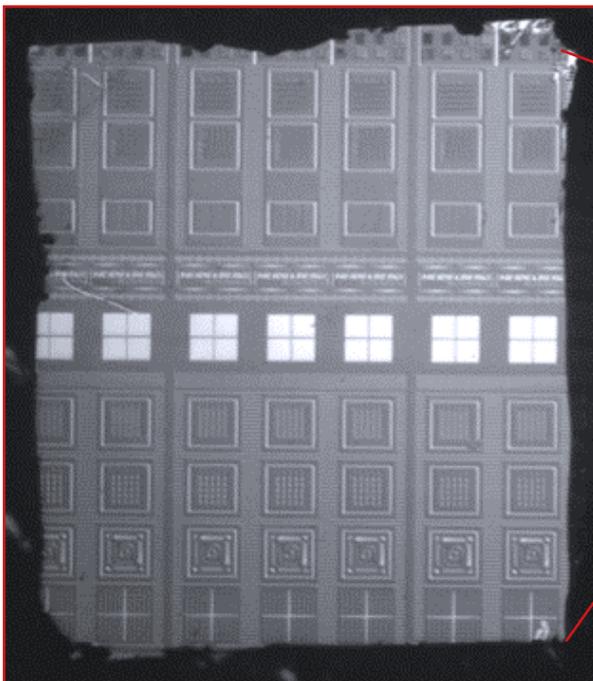


*Example of the successful exposure of the sample edges by MLA150*

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## PROCESS FLOW

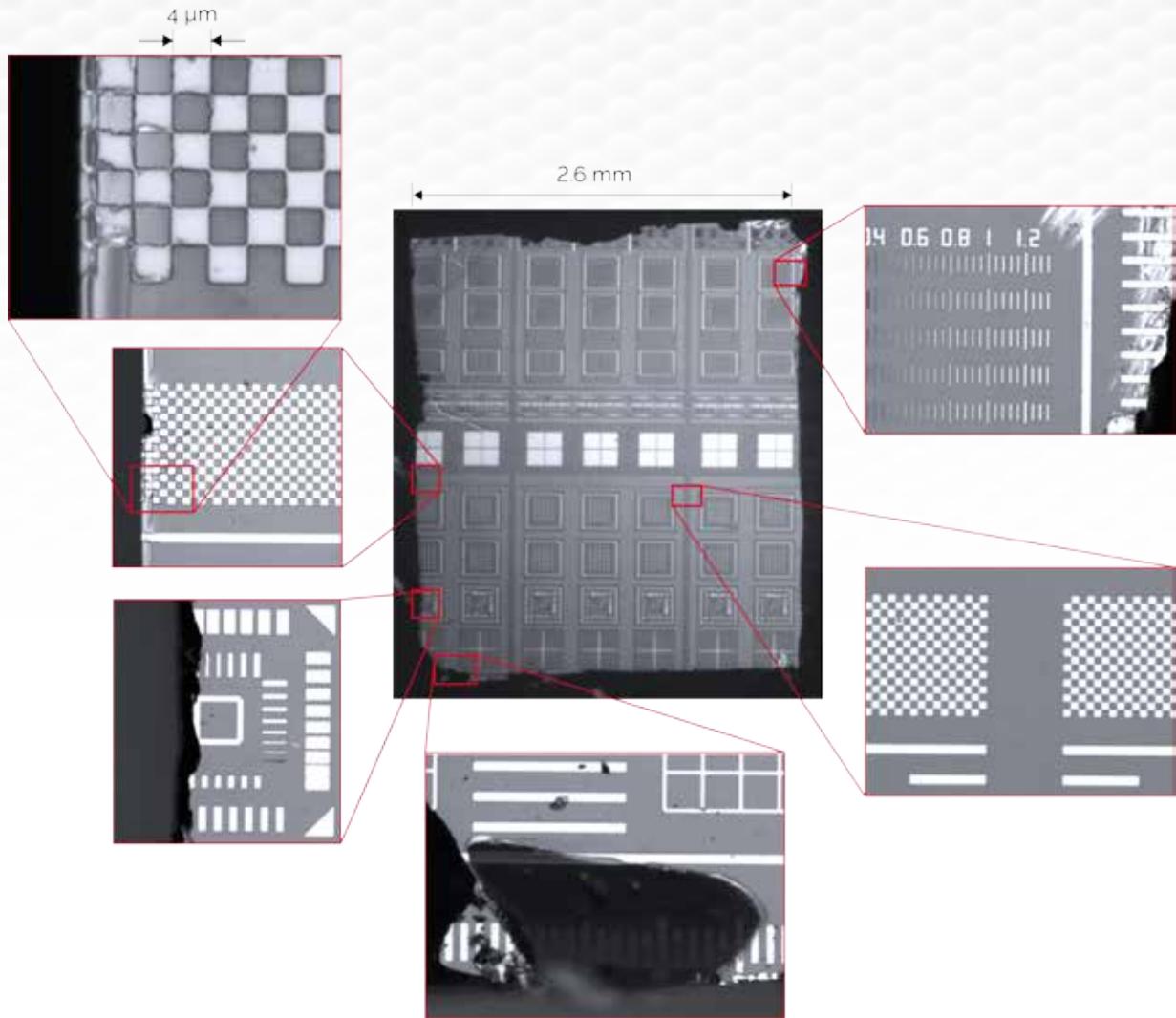
1. Mount the sample directly over the vacuum inlet or on a chuck of a suitable size
2. Find the sample with the overview camera and select the area for focusing
3. Use autofocus to adjust the laser height with respect to the sample surface and detect the edges position
4. Preview the overlay of the pattern on the sample, select optimal exposure parameters
5. Expose
6. Develop, evaporate metal, lift-off



*Sample 2.6 x 2.8 mm exposed by MLA150,  
Write Mode I, laser 8W @ 405 nm*

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## EXCELLENT EXPOSURE QUALITY RIGHT UP TO THE EDGE



*Developed pattern: quality of the exposure is maintained even in the vicinity of non-flat sample edges*

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