

Chessy Calibration Specimen

AGS171

The Structure

There are more than 1.6 million gold squares of $1\mu\text{m}$ size on silicon forming a 4-fold checkerboard pattern in an area of 5mm square. The smallest metric checkerboard has a size of $10 \times 10\mu\text{m}$. Such checkerboards form larger metric checkerboards of $100 \times 100\mu\text{m}$ – these again form checkerboards of 1mm square. Finally such 1mm squares are arranged in the same manner covering a field of 5mm square.

The edges of the empty corners in $100\mu\text{m}$ checkerboards are additionally marked. The surrounding frame is $10\mu\text{m}$ wide and has an outer side length of 5.04mm.

The pattern was directly written in a resist by e-beam lithography using the ZBA 23H from Leica Microsystems Lithography GmbH, and pattern transfer in the gold layer was done by ion beam etching.

Applications

Imaging:

- Calibration of SEM magnification in all ranges between 20x and 50.000x
- Check of equal scaling in X and Y
- Check of orthogonality and distortion
- Resolution test at high magnification on the edges of the gold squares

Motorised Stages:

- Measurement of reproducibility using stored positions
- Calibration of readings in X and Y
- Calibration of stage orthogonality
- Measurement of absolute positioning accuracy

Experimental Electron Lithography

- Generation of metric writing fields between $10\mu\text{m}$ and 5mm square via mark recognition and alignment
- Measurement of SEM distortion at any magnification via mark recognition on different places
- Check of defocusing in outer areas

