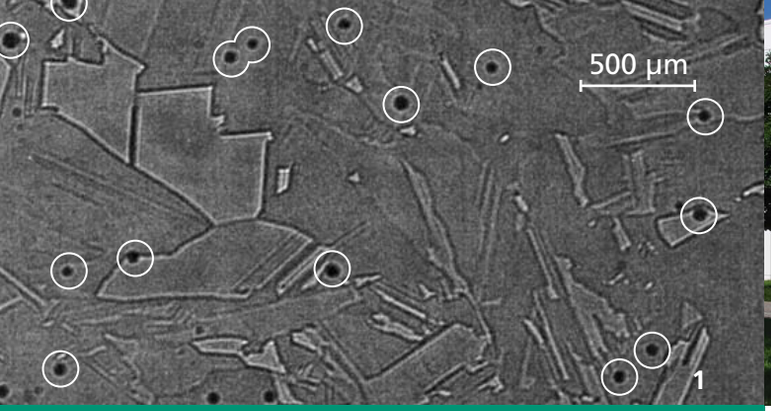

1

APPLICATIONS

Semiconductor industry

- Control of wafer flatness
- Defect detection
- Inspection of nanotopography
- Support for CMP processes

→ Integrated metrology for advanced process control

Material testing

- Inspection of reflecting surfaces e.g. mirrors, polished metal surfaces, glass plates, etc.
- Determination of surface accuracy

What is your application?

1 *Makyoh image of a polycrystalline Si plate with surface defects*

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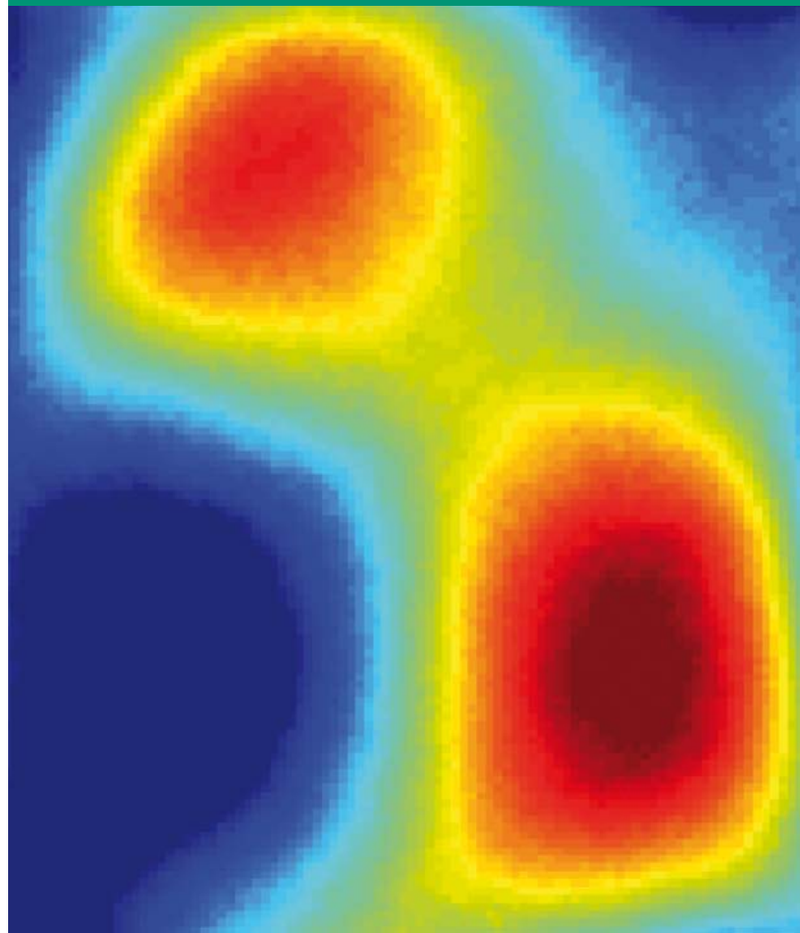
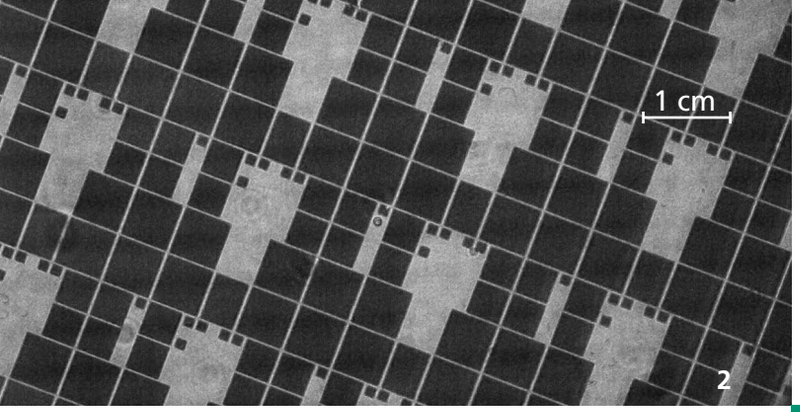
INTEGRATED SYSTEMS AND
DEVICE TECHNOLOGY IISB

NANOTOPOGRAPHY INSPECTION OF REFLECTING SURFACES





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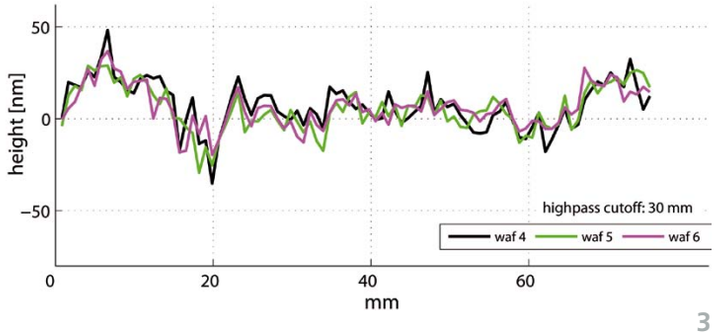

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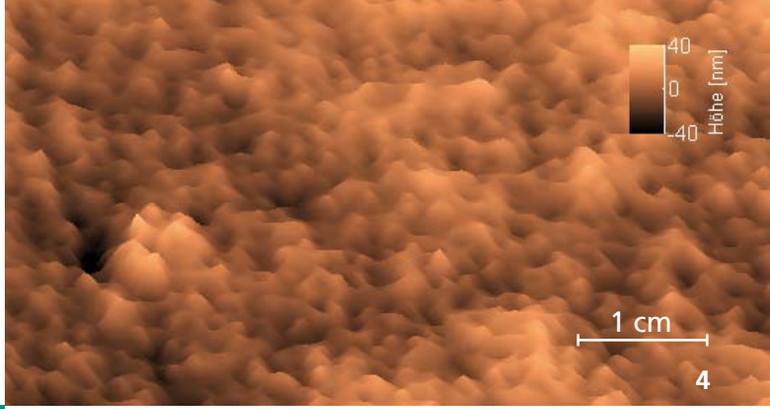

4

PRINCIPLE

Wavefront sensing according to Makyoh

- A plane wavefront provided by a light source is projected on the sample surface
- The topography of the surface determines the deformation of the reflected wavefront
- The intensity distribution of the reflected wavefront is captured by a camera (Makyoh image)
- Using structured illumination, the deformation of the reflected wavefront can be detected
- Thereby, the gradient of the sample surface is calculated
- The sample topography can then be reconstructed from the gradient field using integration algorithms

2 *Makyoh image of semiconductor structures on a Si wafer*

CHARACTERIZATION

Recent specifications

- Resolution: < 20 nm vertical, down to 500 µm lateral (ongoing R&D)
- Field of view: 135 mm in diameter
- Large vertical range: height deviations from 20 nm up to 100 µm
- Sufficient reflectivity of the surface is required, however uniform reflectivity is not necessary

Benefits

- Compact sensor (prototype available)
- Fast surface analysis
- Contactless and non-destructive
- Simple setup and cost-saving implementation

3 *Height profile of a polished Si wafer*

SOFTWARE

Topography reconstruction

- Full 3D reconstruction of sample surface
- Height profile analysis
- Defect detection

Filtering

- Algorithms for extracting the desired spatial wavelength range from the topography data
- Nanotopography analysis

Stitching

- Software for stitching together adjacent topography maps

4 *Reconstructed nanotopography of a polished Si wafer*