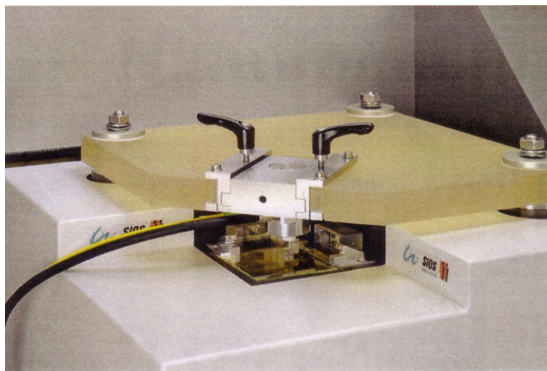


Nano Positioning and Nano Measuring system

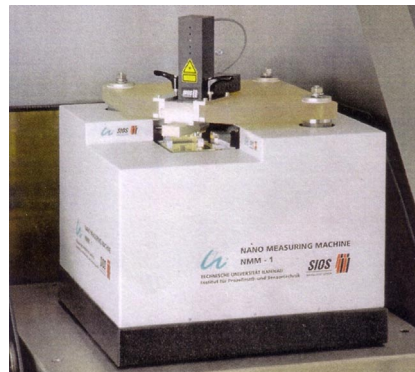
NMM-1

The NMM1 nanopositioning and nanomeasurement system allows the positioning, manipulation, analysis and measurement of components from microelectronics, micromechanics, optics, microsystem technologies, microbiology and genetics with a resolution of 0.1nm in a measurement volume of 25 x 25 x 5mm.

A variety of probing devices can be integrated into the system depending on the application including AFM, autofocus, fixed focus, and capacitive & inductive probes.



NMM1 with an AFM probe

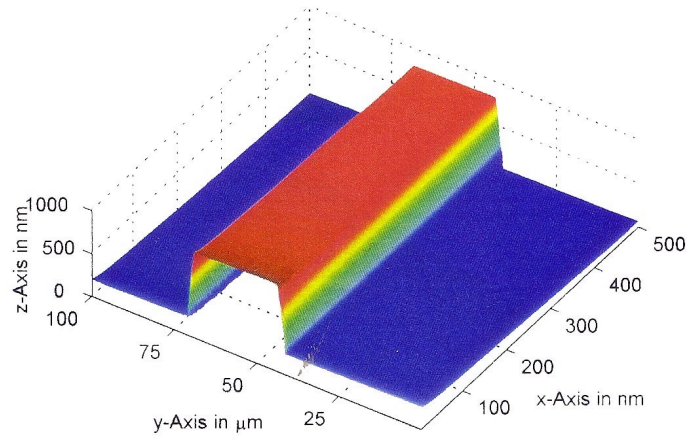


NMM1 with a fixed focus probe

The unique sensor arrangement of the NMM1 provides Abbe error-free measurements in all three coordinate axes. The measurement axes of three miniature plane mirror interferometers intersect with the contacting point of the probe sensor with the object to be measured at a single point.

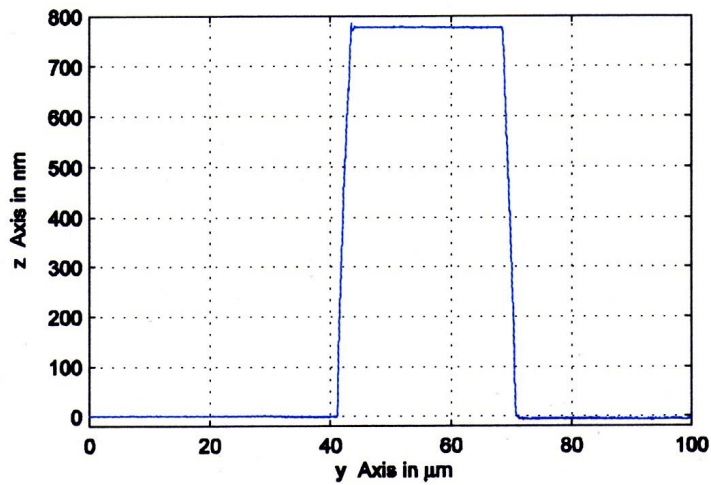
The object to be measured is placed directly onto a moveable mirror corner. The position of this mirror corner is monitored by the three fixed Series SP 500 miniature interferometers, and is positioned by a three axis electrodynamic driving system. Any angular deviations during the positioning process are measured and corrected by the angle sensors. Light from three stabilized HeNe lasers is routed from the electronics unit to the interferometer heads by fibreoptic cabling providing a compact, thermally stable set-up. The heart of the electronics unit is a digital signal processing system that processes all incoming signals, controls the drive system and governs the course of the measurement procedures.

Comparison of Height Standards from PTB



3D scan of a calibrated step (C12R01)

	PTB		TUI, IPMS	Using NMM1 focus	with fixed probe
	Height nm	Uncertainty nm	Height nm	Uncertainty nm	ΔH nm
C26R18	7.4	1	7.8	0.7	0.4
C18R18	21.2	1.1	22.1	0.8	0.9
C17R27	69.1	1.2	68.4	0.8	-0.7
C19R26	294.2	2	294.7	1.1	0.5
C12R01	778.4	3.5	777.1	2	-1.3

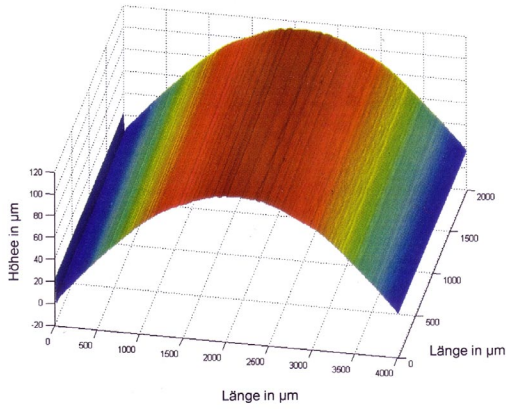


Multiple linear scans of a calibrated step (C12R01)

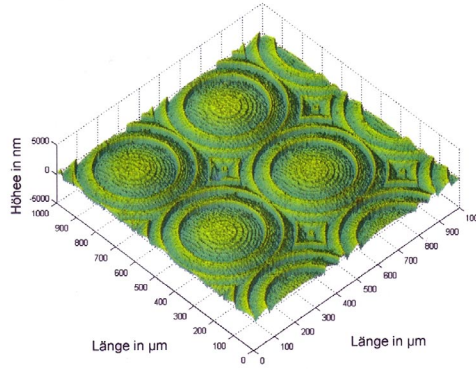
	PTB		TUI, IPMS	Using NMM1 focus	with fixed probe
	Height nm	Uncertainty nm	Height nm	Uncertainty nm	ΔH nm
C12R01	778.4	3.5	779.0	0.4*	0.6

* Standard deviation of 30 scans

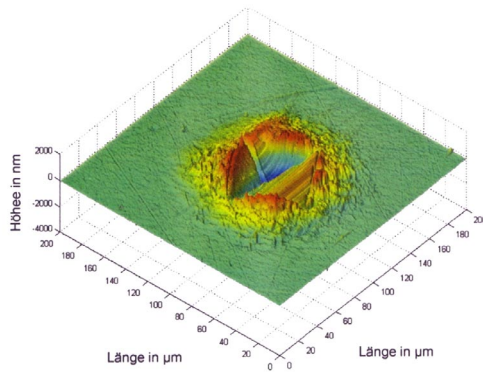
Application examples



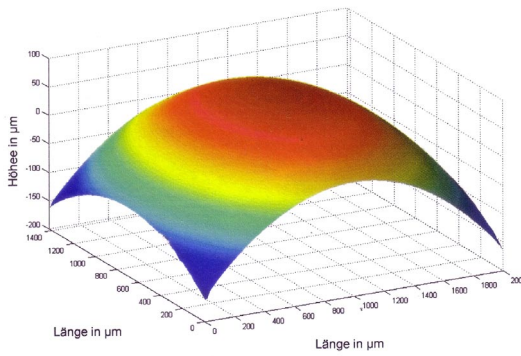
Aspheric lens



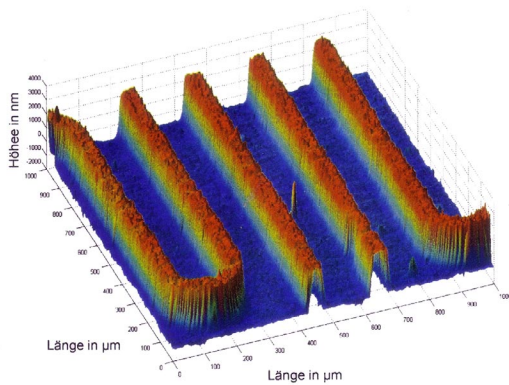
Microlens array



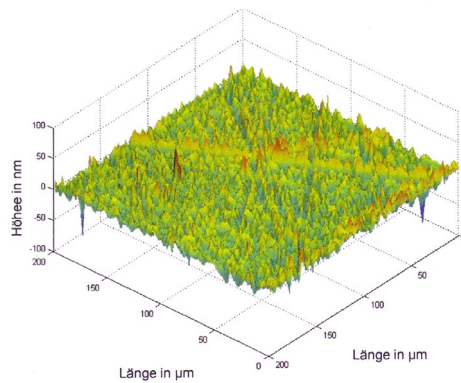
Hardness tester indentation



Spherical lens



Measurement stripes



Silicon wafer surface

Technical Specification

Measuring and positioning range:	25 x 25 x 5mm
Resolution:	0.1 nm
Driving system:	electromagnetic
Driving speed (not in measurement mode):	X,Y axis <= 2 mm/s Z axis <= 50 mm/s
Probe sensors:	External analog interface for customised probe sensor system is provided (input voltage max. $\pm 10V$, resolution 16 bit)
Dimensions (HxWxD)	NMM-1: 340x420x420mm Electronics unit: 700x553x600mm
Weight:	NMM-1: 95kg Electronics unit: 75kg

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