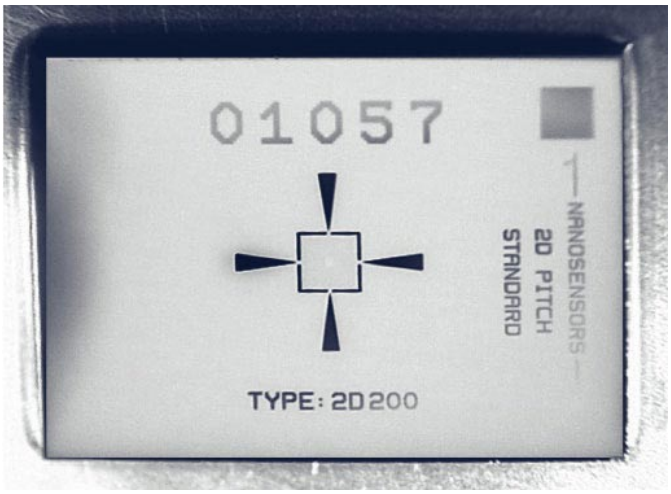
Metrology Standards and Accessories

for Scanning Probe Microscopy

In close cooperation with national technical authorities for metrology in Europe, NANOSENSORS™ has developed a set of calibration standards for SXM applications.
These standards allow the calibration of the X, Y and Z axis of an SXM machine. In addition certain system-induced limitations of such apparatus can be revealed and compensated.



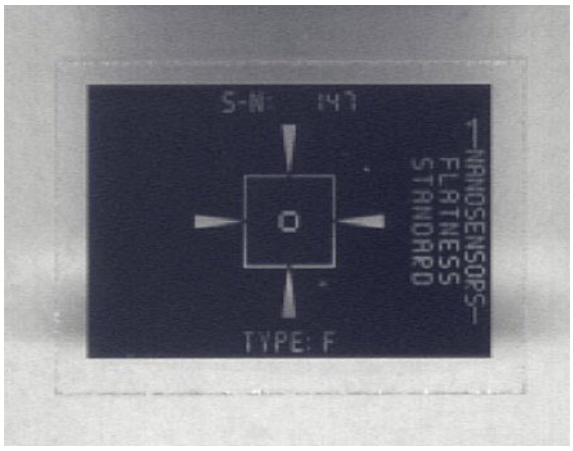
2D200 Standard Chip Mounted on the Metallic Holder

The German PTB (Physikalisch Technische Bundesanstait), Great Britain NPL (National Physical Laboratory) and the Danish Institute of Fundamental Metrology (DFM) participated already in the product definition phase. However their main task was the development of measurement technology for calibrating the standards. These institutions ensure the traceobility not only to national standards. Through European (EUROMET) and international cooperations (Metre Convention) traceability to other worldwide metrology standards is achieved.
For NANOSENSORS™ standards calibration certificates of one of the above institutions are optionally available.

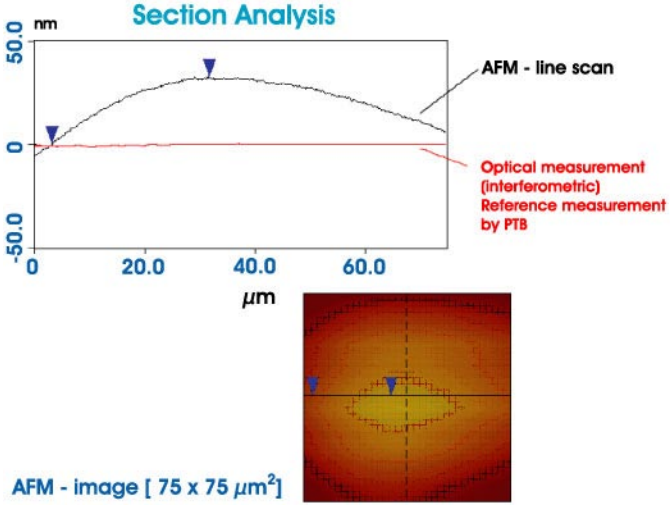
The following standards are currently available:

Flatness Standard: FLAT

The flatness standard consists of a superflat plane and is intended to be used to analyze and correct the scanner bow of the piezo-scanner used in most Scanning Force Microscopes. The standard consists of a quartz substrate with a chromium layer. The standard is specified to offer a maximum peak to valley (p-v) distance of 10 nm on a 100 by 100 μm^2 area.



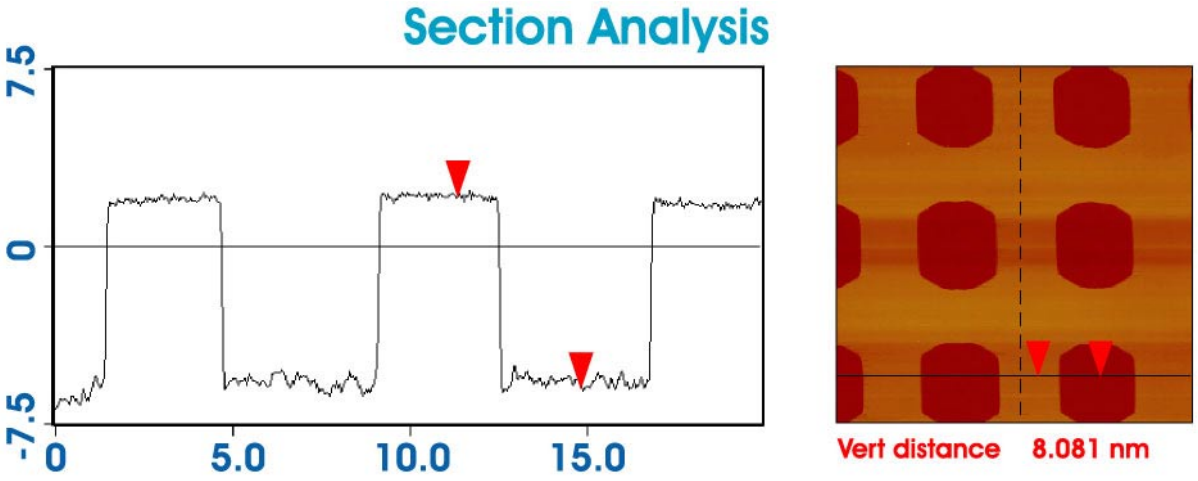
Photograph of Flatness Standard



AFM Linescan of Flatness Standard Compared with an Interferometrical Measurement of the Flatness Standard

Step Height (z) Standard with 8 nm Nominal Step Height: H8

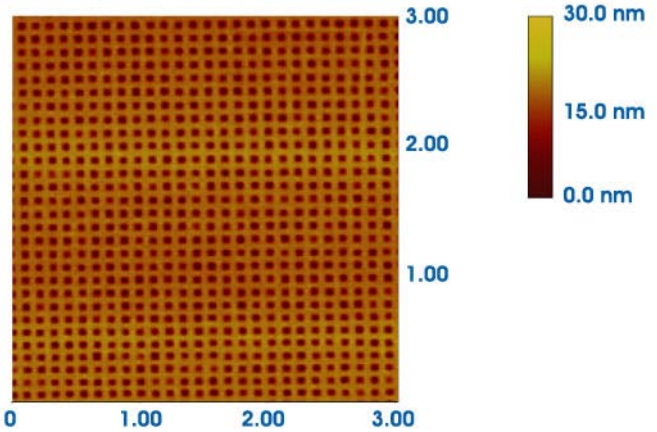
The standard H8 is used for a very precise z-calibration of the scanning mechanism of a Scanning Probe Microscope, The standard consists of multiple areas of hole and stripe arrays etched into silicon. The z-height of these structures Is In the range of 8 nm.



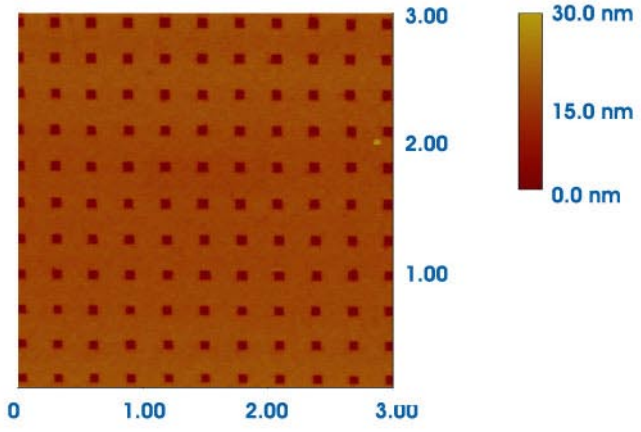
AFM-Image and Linescan of the H8 Standard

2 Dimensional Lateral (xy) Standards 2D100 / 2D200 / 2D300

These standards are used for a very precise x-y-calibration of the scanning mechanism. The standards consist of 2-dimensional lattices of inverted square pyramids with 100 nm (for the 2D100) 200 nm (for the 2D200) and 300 nm (for the 2D300) pitch, etched Into a silicon chip.



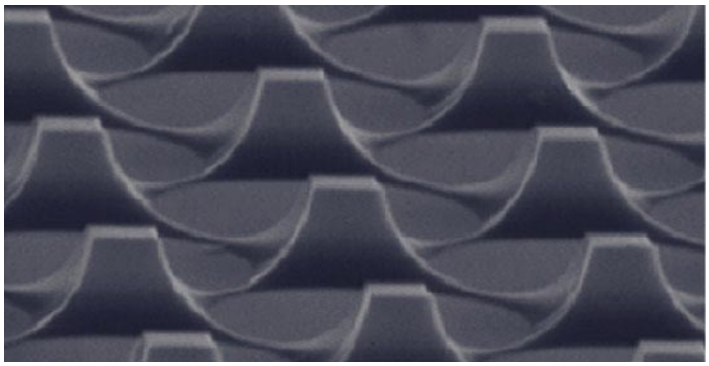
AFM-Image of the 2D100 Standard



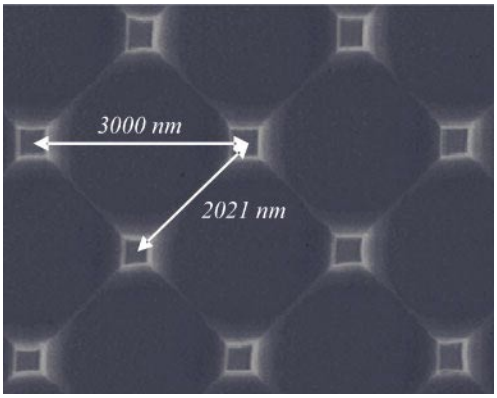
AFM-Image of the 2D300 Standard

2 Dimensional Lateral (xy) Standards 2D1000 / 2D3000 / 2D10000

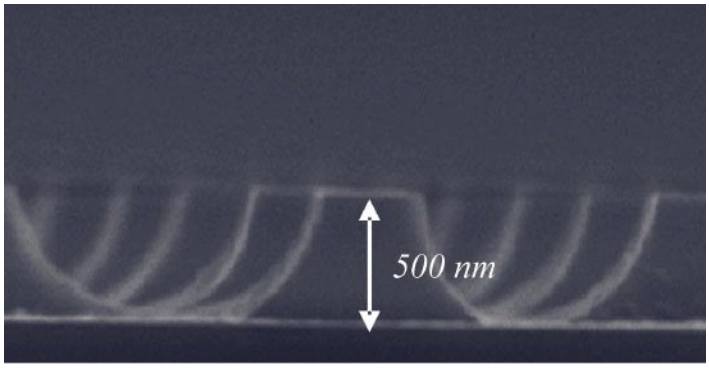
These standards are used for a very precise x-y-calibration of the scanning mechanism in the micrometer regime. They consist of 2-dimensional lattices produced by etching an interference-pattern into silicon. The structures are gold coated.
The horizontal pitch is 1000 nm, 3000 nm and 10000 nm respectively
These three standards are supplied by Ibsen Photonics A/S



Perspectivic SEM-Image of the 2D3000 Standard

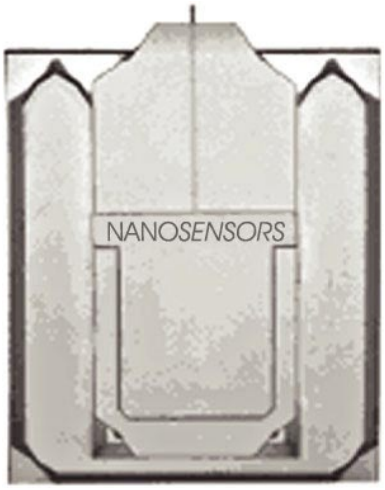


Top View SEM-Image of the 2D3000 Standard



Side View SEM-Image of the 2D3000 Standard

Accessories for Scanning Probe Microscopy



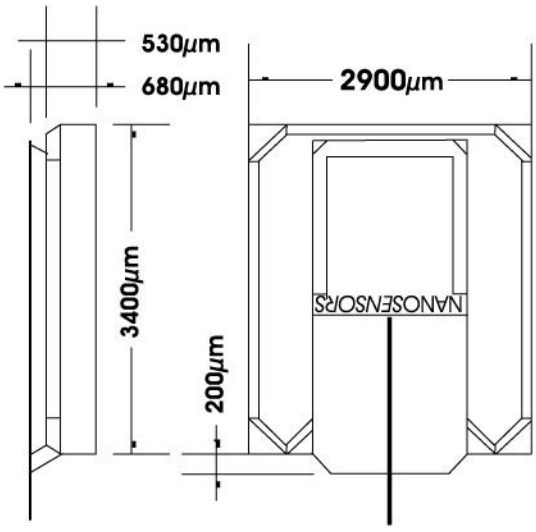
SEM-Picture of Alignment Chip with Mounted POINTPROBE® Sensor

Alignment Chip

The alignment chip (ALIGN) is used for a reproducible alignment between POINTPROBE® SPM-Sensors and the AFM detection system. The chip has three ridges that fit exactly into corresponding grooves at the backside of each of our sensors (Exception: We produce some OEM products which do not show this feature!). Due to this alignment mechanism the SPM-Sensor can be exchanged with precise repositioning of the tip within ± 2 µm.

SEM-Picture of Alignment Chip and Backside of POINTPROBE® Holder

Dimensions



Sketch of Alignment Chip with Mounted POINTPROBE® Sensor

over all length: 3400 ±50 µm
over all width: 2900 ±50 µm

Please note: The alignment chip is only usable for our POINTPROBE® technology sensors until further notice!