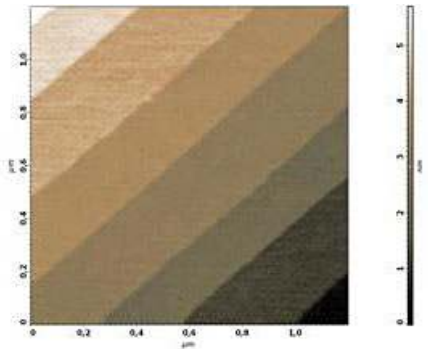
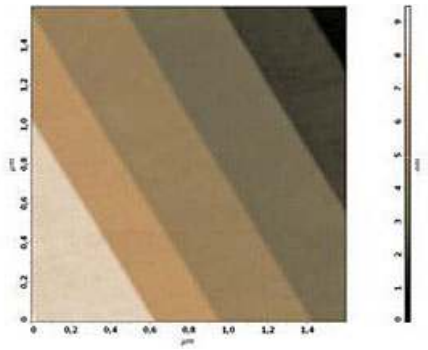
SiC-STEP Calibration Samples



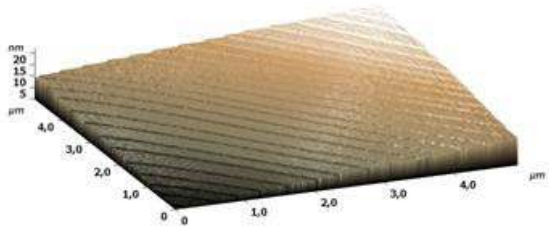
SiC/0.75

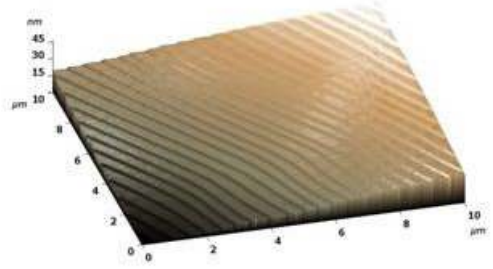


SiC/1.5

6H-SiC (0001) based calibration sample which is designed to perform easy calibrations of an AFM scanner vertical movements in several nanometers interval. The simplicity of calibration of the calibration process is provided by the nearly uniform distribution of half-monolayer high steps (either 0.75 or 1.5nm) on the sample surface demonstrating both chemical and mechanical stability. The step height corresponds to the half of the lattice constant of the 6H-SiC crystal in the (0001) direction.

Specifications:	**SiC / 0.75**	**SiC / 1.5**
Structure:	SiC with Steps	
Single Step height:	0.75nm	1.5nm
Average inter step distance:	0.15-0.4µm	0.2-0.5µm
Misorientation of surface:	~0.2°	~0.3°
Average roughness of area between steps (terraces):	0.09nm	
Chip size:	5 x 5 x 0.3mm	





Calibration in 3 Steps

To calibrate AFM scanner movements along the Z axis the following operations are to be performed:

- Place the SiC-Step calibration sample on the flat horizontal working area under the AFM probe.
- Approach the AFM probe to the sample surface and make topography scanning in the height measure mode using the scan size of about 5µm (Fig. 1) for 0.75nm step height or 10µm for 1.5nm step height.

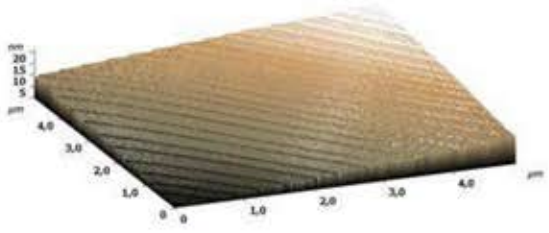


Fig.1A 3D AFM image 5x5µm

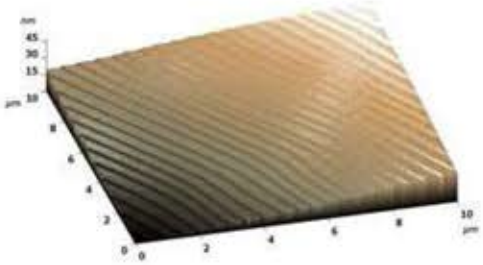


Fig.1B 3D AFM image 5x5µm

Make sure that there are no impurities on the image and choose for further measurements the area about 1.5x1.5µm2.

- After obtaining good quality AFM-image of the sample surface with several steps use the software filter to flatten image so that every single step becomes horizontal (Fig. 2A and 2B). Choose the area on AFM-image for obtaining height spectra by using possibilities of AFM software. Please, choose the area with maximum number of steps for better statistics. After obtaining height spectra with peaks corresponding to each step, measure the interpeak distances. Note that distances between neighboring peaks may vary a little (see Fig.3A and 3B), so it is useful to average distances between peaks by measuring distance between far standing peaks and dividing the measured value by the number of included interpeak distances (A-A on Fig. 3A and 3B). Change the scanner calibrating constant while average interpeak distance becomes 0.75 nm.

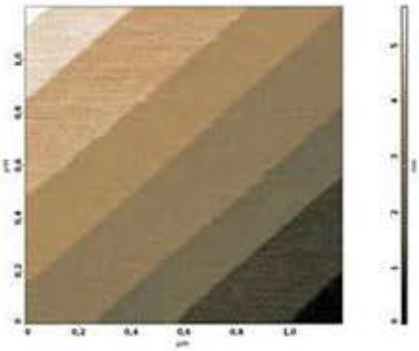


Fig.2A AFM image 1,2X1,2µm

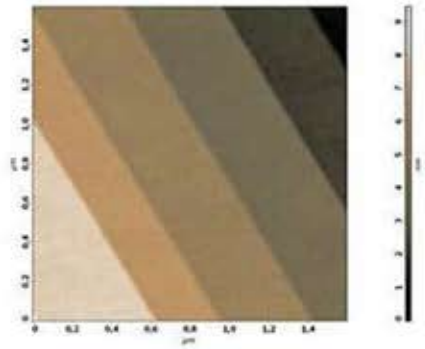


Fig.2B AFM image 1,6X1,6µm

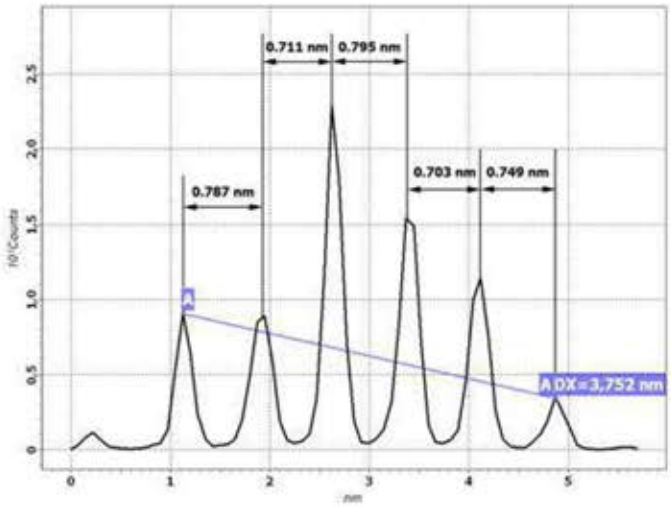


Fig.3A Height spectra

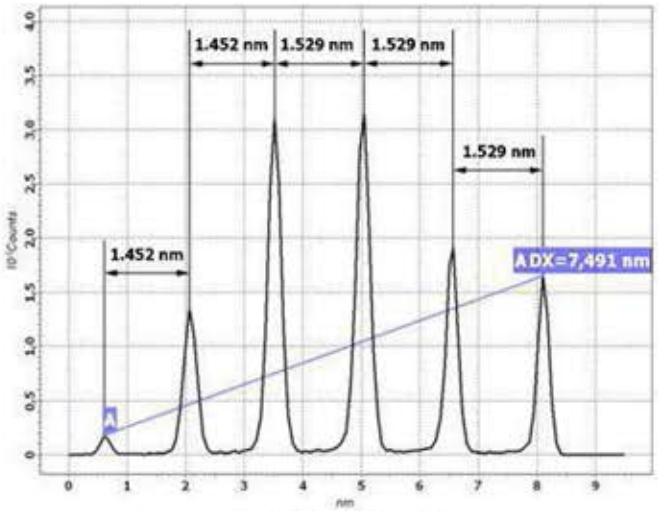


Fig.3B Height spectra

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