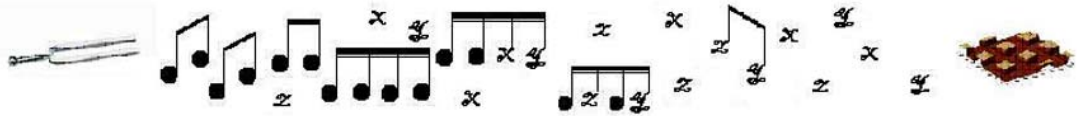




## How to tune the music of SPM



### TUNING FORK FOR MUSIC = CALIBRATION GRATINGS FOR SCANNING PROBE MICROSCOPE

Scanning probe microscopy has something in common with the sphere of music. None of musical instruments can play without preliminary adjustment through tuning fork that is the all-known gold standard of a sound in the field of music.

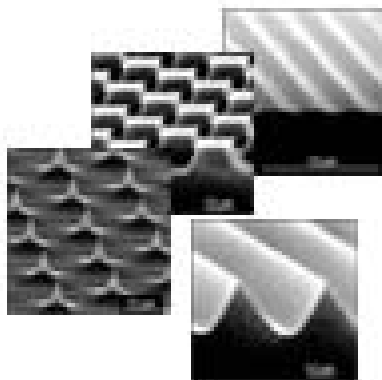
The only error can easily spoil the whole process in music and science alike. SPM doesn't yield to any musical instruments in respect of complicity. And for exact and correct operating it also should be adjusted at least once in half a year. In the world of scanning probe microscopy the gold standard of adjustment is the calibration grating.

Everyone involved in nanotechnology knows the price of mistake occurred due to uncalibrated or improper calibration of SPM. With the help of NT-MDT [test samples](#) and [calibration gratings](#) it's possible to verify indications accuracy and to find errors in SPM calculations. The calibration gratings are made of silicon, thus instrument readings accuracy is achieved due to absolute predictability of silicon natural structure.

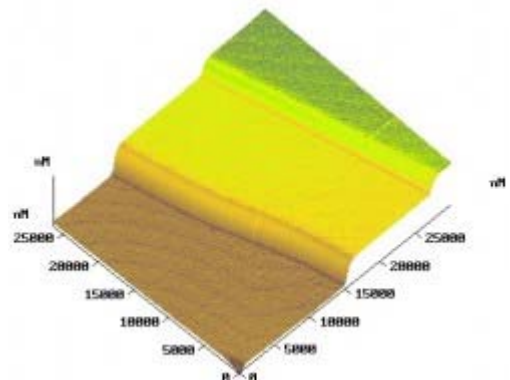
NT-MDT Co. and its' productions including accessories are [certified by ISO 9001:2008](#). Moreover all NT-MDT calibration gratings are included in [Russian public register](#) as measurement instrumentations, have Europe (PTB) certifications and can be supplied with calibration certificate of international standard as well.

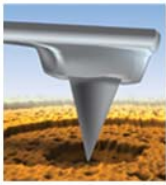
Enjoy correct measurements with NT-MDT calibration gratings.

#### CALIBRATION GRATINGS

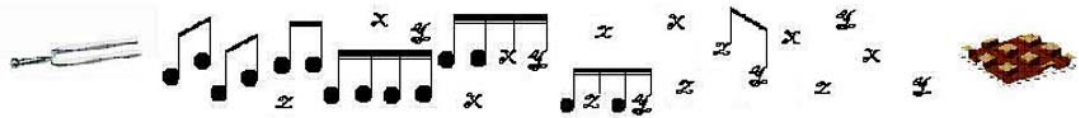


#### NATURAL TEST SAMPLES

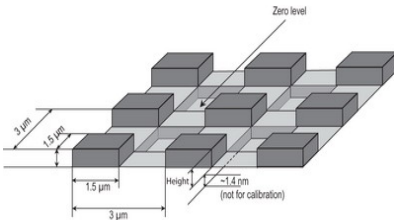




# How to tune the music of SPM

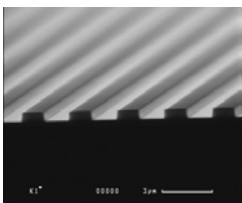


## CALIBRATION GRATINGS



[TGQ1 grating](#) is intended for:

- simultaneous calibration in X, Y, Z directions,
- lateral calibration of SPM scanners,
- detection of lateral non-linearity, hysteresis, creep and cross-coupling effects.

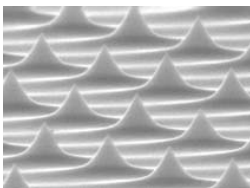


TGZ grating series are intended for Z-axis calibration of scanning probe microscopes and nonlinearity measurements.

[TGZ1](#) calibration grating ( $20 \pm 1.5$  nm)

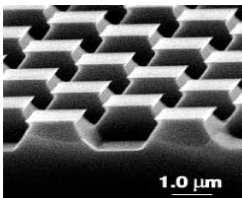
[TGZ2](#) calibration grating ( $100 \pm 2$  nm)

[TGZ3](#) calibration grating ( $500 \pm 3$  nm)



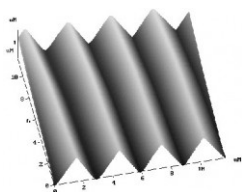
Unique [TGT grating](#) for is intended for:

- tip characterization,
- 3-D visualization of the scanning tip,
- determination of tip sharpness parameters (aspect ratio and curvature radius),
- tip degradation and contamination control.



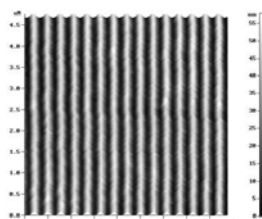
[TGX1 square grating](#) with negative angles is intended for:

- lateral calibration of SPM scanners,
- detection of lateral non-linearity, hysteresis, creep, and cross-coupling effects;
- determination of the tip aspect ratio.



[TGG1 triangular grating](#) is intended for:

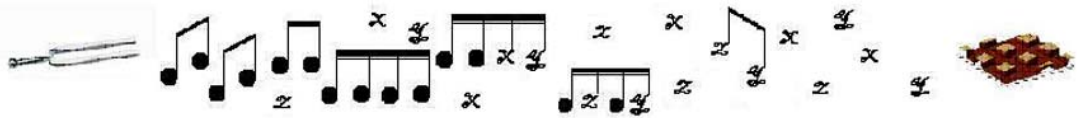
- calibration SPM in X or Y axis,
- detection of lateral and vertical nonlinearity,
- detection of angular distraction,
- tip characterization.



[TDGO1 diffraction grating](#) is intended for submicron calibration of scanning probe microscopes in X or Y direction.



## How to tune the music of SPM

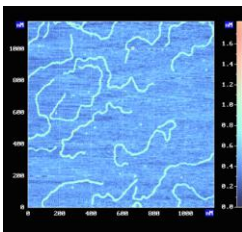


## Natural test samples



Highly Oriented Pyrolytic Graphite (HOPG) for SPM applications is intended for obtaining:

- critical Z resolution;
- atomic resolution;
- atomic smooth substrate for customer's objects;
- conductive samples for STM.

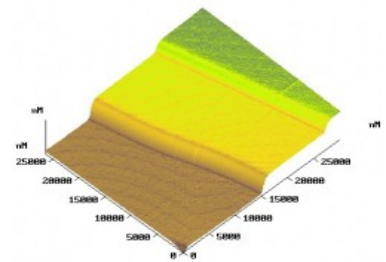


DNA Test Sample is intended for:

- getting started with AFM operation;
- example of how to prepare your own DNA samples;
- estimation of probe tip curvature;
- humidity test;
- Z-resolution test.

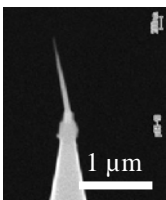
Silicon Test Echeloned Pattern (STEPP) for AFM is designed on the base of silicon (111) surface with verified distribution of monatomic steps as main calibrating units for the complex control of AFM set up:

- height calibration in angstrom and single nanometer intervals on the monatomic steps;
- using as a substrate for investigations of bio and other objects;
- precision imaging of nanoobjects.



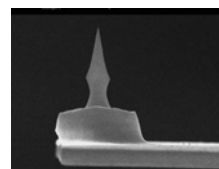
## Related probes:

### Whisker-type sharp AFM probes



1 micron-long whisker tip grown on silicon probe apex provides extremely high aspect ratio (tip radius is about 10 nm).

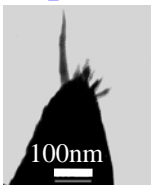
### Brand new ETALON probes



High accuracy polysilicon AFM probes with high aspect ratio tip (curvature radius 10 nm) and high accuracy resonant

frequency (typical dispersion  $\pm 20\%$ ).

### Super-sharp DLC AFM probes



Tip made of diamond-like carbon (DLC) grown on the probe apex is shorter and much sharper (tip radius  $< 1$  nm).