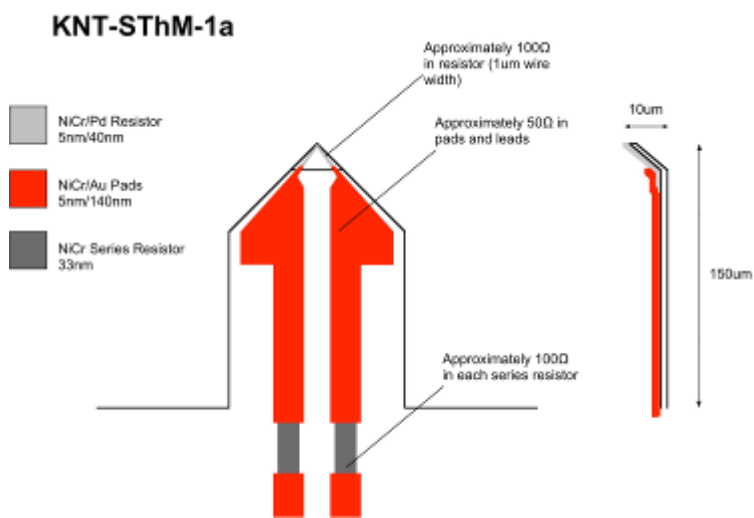
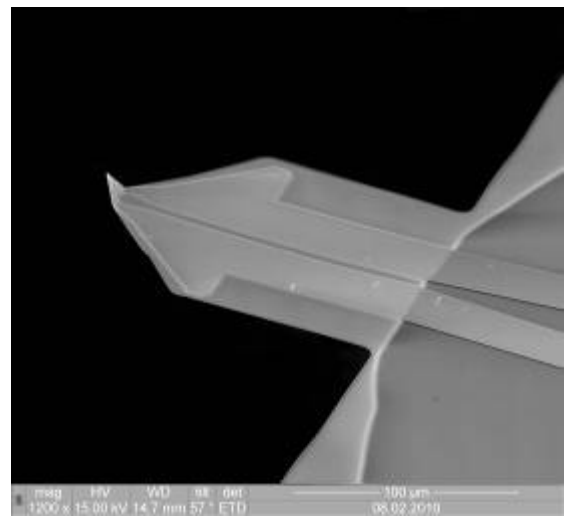


SThM – Scanning Thermal Microscopy

Scanning Thermal Microscopy (SThM) is an advanced SPM mode intended for simultaneous obtaining nanoscale thermal and topography images. NT-MDT's SThM kit is able to visualize temperature and thermal conductivity distribution at the sample surface. The SThM system hardware includes electronic controller, software, and probes.



SThM probe scheme



SEM image of the SThM probe

Probes

SThM mode of operation with an AFM requires a specialized probe with a resistor built into the cantilever. NT-MDT's SThM module allows one to monitor the resistance changes correlated with the temperature at the end of the probe. So the system is able to monitor relative changes of sample temperature and thermal conductivity. NT-MDT's thermal probes provide better than 100 nm lateral resolution for both topography and thermal images.

The specialized SThM cantilever, made of SiO_2 with a thin metal layer, is deposited on the probe in such a way that the highest resistance portion of the layer is concentrated near the tip apex.



SThM – Scanning Thermal Microscopy

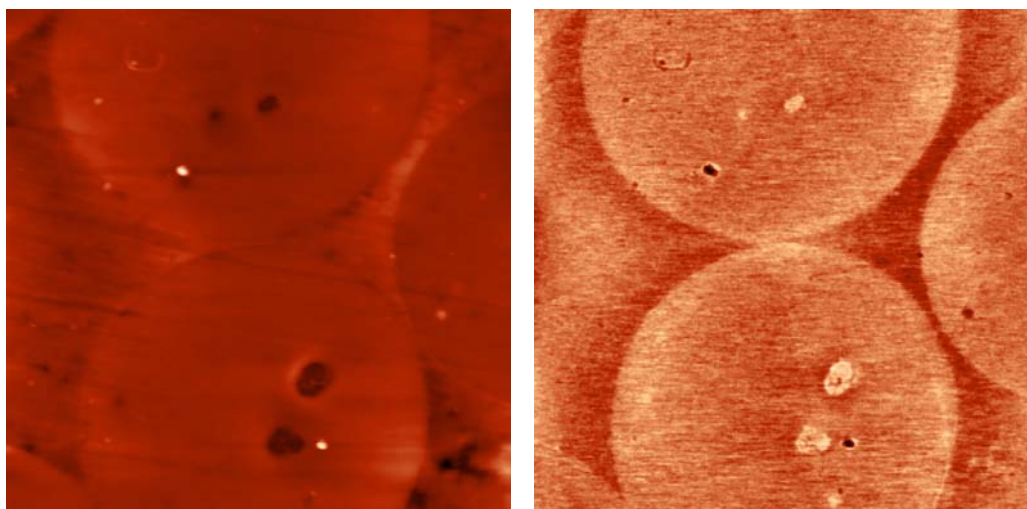
Controller and software

The SThM controller is connected to the main AFM electronics via standard extension socket.

The system is easily adjusted through the user-friendly software interface. For ease of use the SThM control program is integrated in the main NT-MDT AFM software as one of the contact mode methods.

Due to high sensitivity of the system and low noises of the output voltage, the electronic controller provides high signal resolution.

An additional advantage, the compact size of electronics hardware simplifies the setup and maximizes your time scanning high resolution SThM images.



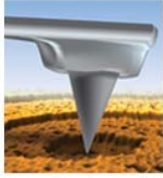
Scanning Thermal Microscopy allows one to obtain images of < 100 nm lateral resolution.

Sample: Optical Fiber in Epoxy.

Left – topography image,

Right – thermal conductivity image.

Scan size: 6×6 μm .



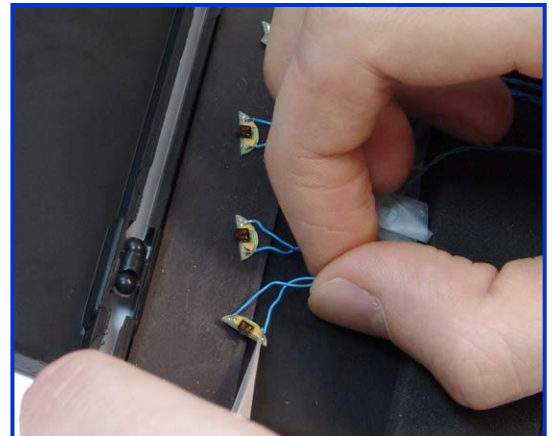
SThM – Scanning Thermal Microscopy

Specifications:

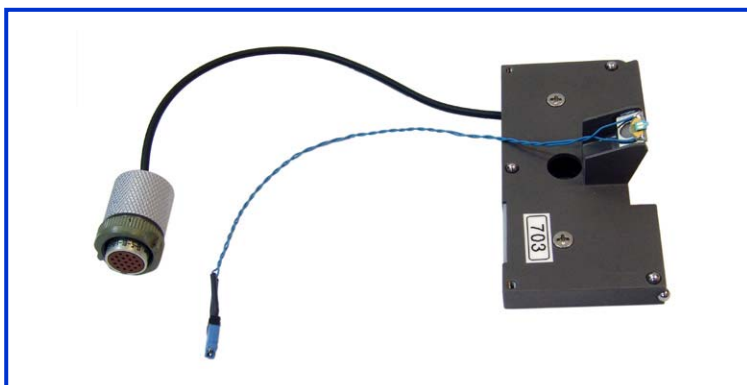
Probe base	2 mm x 3 mm
Cantilever (thermal SiO ₂)	150 µm x 60 µm x 1 µm
Resistor metal	5 nm NiCr ÷ 40 nm Pd
Track and pad metal	5 nm NiCr ÷ 140 nm Au
Resistance	300-500 Ω
Tip radius	≤ 100 nm
Maximum temperature	160°C
Tip height	~ 10 µm
SiO ₂ Spring Constant	0.45 N/m
Resonance Frequency	~ 48 kHz
Sensitivity	app. 1 Ω / deg C
Series resistors	2 x 100 Ω (± 25 Ω)



Electronic controller



Kit of probes



Cantilever holder



AFM head