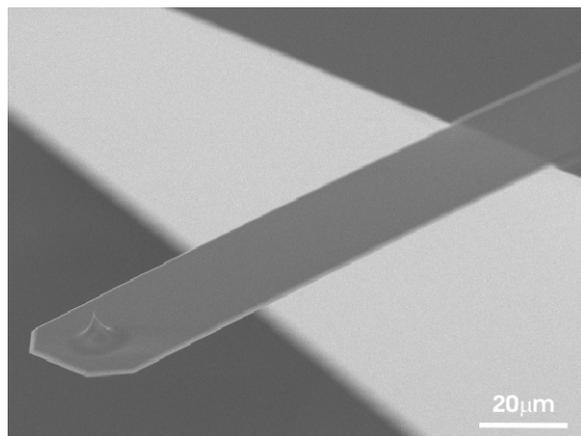




uniqprobe®

uniform quality SPM probes

■ Unsurpassed uniformity of cantilever force constant and resonance frequency range



SEM image of a uniqprobe cantilever.

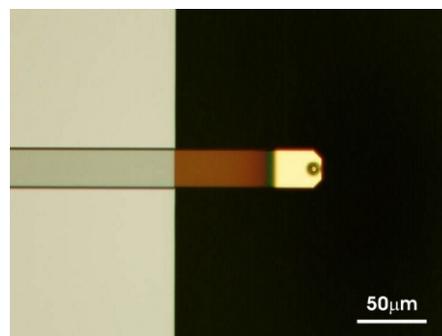
The key feature of the uniqprobe Scanning Probe Microscopy (SPM) series is the outstanding uniformity of the cantilever thickness. This uniformity provides the possibility of realizing very soft cantilevers and leads to a strongly reduced dispersion of force constants and resonance frequencies compared with standard silicon probes.

The uniformity of the mechanical characteristics of the uniqprobe series is particularly important for applications where a large number of probes with known and near identical force constants or resonance frequencies are needed. In order to collect reproducible data for quantitative measurements of nano-mechanical properties such as elasticity or adhesion forces, accurate determination of the spring constant is essential. The sensors of the uniqprobe series are especially adapted for molecular biology, biophysics and quantitative nano-mechanical studies.

■ uniqprobe Cantilever with reduced drift

The uniqprobe series consist of cantilevers with monolithically integrated tips made out of a quartz-like material. The combination of the new intrinsic mechanically stress free material with a novel fabrication technology leads to absolutely straight cantilevers, even if they are very long, thin and soft. The chemical inertness allows application in fluids or electrochemical cells.

A chromium/gold layer of approximately 60 nm is deposited on the detector side of the cantilever covering only the free end above where the tip is located. Conventionally coated SPM probes employ a metal coating over the entire cantilever. In contrast the coating of the uniqprobe has the advantage of preserving the mechanical properties of the cantilevers while maintaining high optical reflection. Further benefits of the uniqprobe coating are stress free cantilevers with considerably less bending and reduced drift particularly for measurements in liquid environments.



uniqprobe SCANT with Au covering only the free end of the cantilever.

■ Support Chip

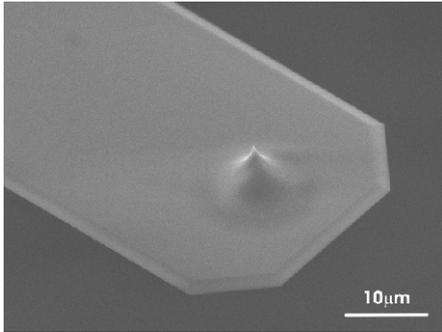
The cantilevers of the uniqprobe series are integrated on standard highly doped, single crystal silicon support chips ensuring their compatibility with most commercial Scanning Probe Microscopes. The support chip as an integral part of the probe is designed for manipulating the probe and fixing it to the SPM. The geometric dimensions of the support chip are very reproducible (1.6 mm x 3.4 mm x 0.3 mm) enabling the replacement of probes without major readjustment of the laser.

Placement reproducibility is further improved by alignment grooves on the backside of the support chip (compare also PointProbe® Plus X-Y Alignment Series flyer). The chamfered edges of the support chip avoid any contact between support chip and sample if either is tilted.

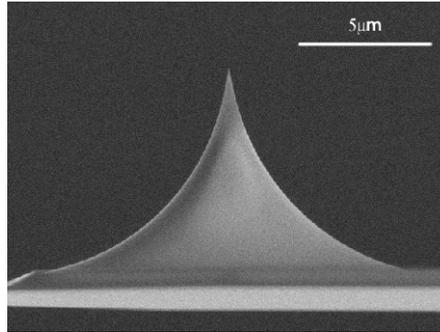


uniqprobe Tip Properties

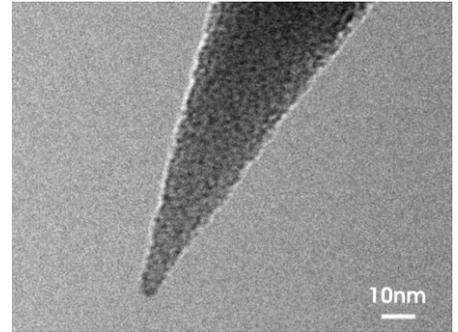
The tip of the uniqprobe is monolithically integrated onto the cantilever. The tip shape is circular symmetric with a hyperbolic profile, a small tip radius < 10 nm and a typical tip height of about $7 \mu\text{m}$. In the first 200 nm of the tip apex the half cone angles are comprised between 12° and 18° . Due to the hyperbolic tip shape the macroscopic cone angle is a function of the distance from its apex.



SEM image of cantilever and tip.



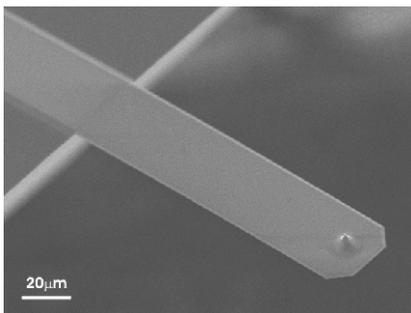
uniqprobe tip side view (SEM image).



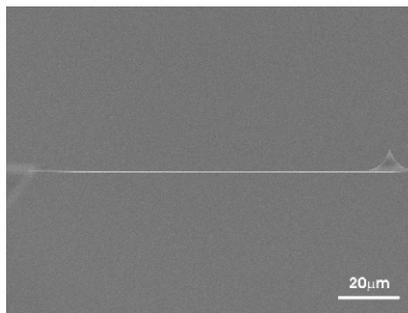
TEM image of an uniqprobe tip apex.

uniqprobe CONT and SCONT cantilevers

The uniqprobe Contact and Soft Contact types are SPM probes with a single rectangular shaped cantilever. They are designed for contact mode measurements in air or liquid environments. The low force constant permits contact mode measurements on soft biological materials.



qp-CONT 3D view (SEM image).

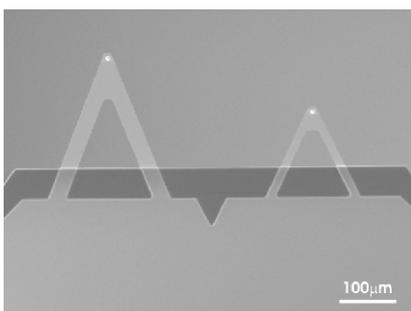


qp-SCONT side view (SEM image).

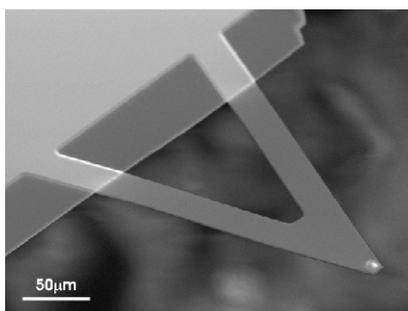
Order code	qp-CONT	qp-SCONT
Thickness	750 nm	350 nm
Length	125 μm	125 μm
Width	35 μm	34 μm
Force constant	0.1 N/m	0.01 N/m
Res. Frequency	30 kHz	11 kHz

uniqprobe BioT cantilevers

The uniqprobe BioT probes have two triangular shaped cantilevers with different geometries on one side of the support chip. These multi-lever probes are designed for various imaging applications in air or liquid environments. Both cantilevers can be used for measurements in contact mode or dynamic mode AFM. The uniqprobe BioT types offer an alternative to silicon nitride probes, with the advantage of taller tips with smaller opening angles and reduced drift.



qp-BioT top view (SEM image).



qp-BioT long cantilever 3D view (SEM image).

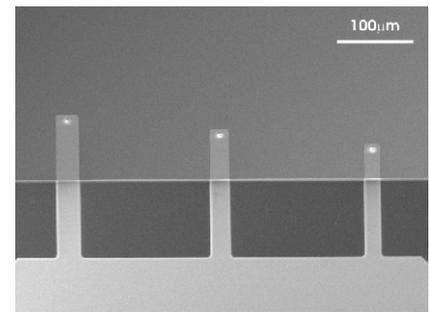
Order code	qp-BioT	
Cantilever #	1	2
Thickness	900 nm	900 nm
Length	100 μm	200 μm
Width	2x14 μm	2x28 μm
Force constant	0.3 N/m	0.08 N/m
Res. frequency	50 kHz	20 kHz



uniqprobe BioAC cantilevers

The uniqprobe BioAC probes have three rectangular shaped cantilevers with different geometries on one side of the support chip. These multi-lever probes are designed for various imaging applications in air or liquid environments for mainly dynamic mode AFM.

The uniqprobe BioAC type unites fairly high resonance frequencies with low force constants. The combination of these characteristics leads to stable, low noise and fast measurements with reduced tip-sample interaction. The short cantilever with its length of 40 μm is advantageous for high sensitivity dynamic mode imaging on soft biological samples. The long cantilever with its low spring constant below 0.1 N/m can also be used for contact mode measurements.



qp-BioAC top view (SEM image).

uniqprobe qp-fast cantilevers

The uniqprobe qp-fast AFM probes with its 3 cantilevers are designed for soft-, standard- and fast- Non-Contact or Tapping Mode AFM imaging. This AFM probe combines high operation stability with outstanding sensitivity and fast scanning ability in air and liquid environments. A metallic layer (Au) is coated on the detector side of the whole cantilever.

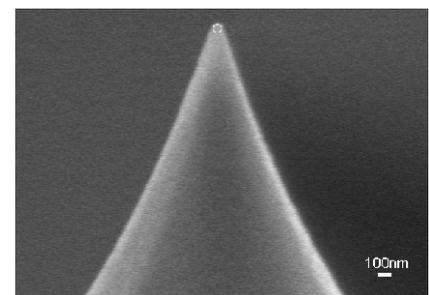
Order code	qp-BioAC			qp-fast		
	1	2	3	1	2	3
Cantilever #						
Thickness	400 nm	400 nm	400 nm	2500 nm	2500 nm	2500 nm
Length	80 μm	60 μm	40 μm	80 μm	60 μm	40 μm
Width	30 μm	25 μm	20 μm	32 μm	27 μm	22 μm
Force constant	0.06 N/m	0.1 N/m	0.3 N/m	15 N/m	30 N/m	80 N/m
Resonance frequency	30 kHz	50 kHz	90 kHz	250 kHz	420 kHz	800 kHz

CELL IMAGING

uniqprobe BioAC-CI with rounded tips

The uniqprobe BioAC-CI probes with Rounded Tips are specially designed for Cell Imaging applications.

The uniqprobe BioAC-CI probes are based on NANOSENORS qp-BioAC probes. For the qp-BioAC-CI type the SPM tips have been rounded to a nominal tip radius of 30 nm for Cell Imaging applications. This probe is dedicated to measurements on soft and life science samples only.

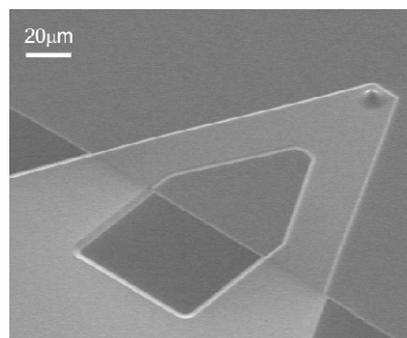


qp-BioAC-CI tip (SEM image).

SCANASYST*

uniqprobe HeartBeatCantilever for ScanAsyst®* and Peak Force Tapping™*

The uniqprobe HeartBeatCantilever (HBC) probes are designed for use in ScanAsyst® or Peak Force Tapping™* in air. The HBC probes are also compatible for contact and non-contact or soft tapping mode AFM imaging. The combination of soft cantilever and fairly high resonance frequency enables stable and fast measurements with reduced tip-sample interaction.



qp-HBC top view (SEM image).

Order code	qp-HBC
Thickness	1000 nm
Length	115 μm
Width	2x 25 μm
Force constant	0.5 N/m
Res. Frequency	60 kHz

*Peak Force Tapping™ and ScanAsyst® are registered trademarks of Bruker Corporation.



Product List

	Order code	Type / Application	Force Constant (nominal)	Resonance Frequency (nominal)	Coating (backside)
Contact	qp-CONT	Contact Mode	0.1 N/m	30 kHz	Partial Au
	qp-SCONT	Contact Mode	0.01 N/m	11 kHz	Partial Au
Non-Contact	qp-BioT	Non-Contact, Cantilever 1 TappingMode (Contact Mode)	0.3 N/m	50 kHz	Partial Au
		Cantilever 2	0.08 N/m	20 kHz	Partial Au
	qp-BioAC qp-BioAC-Cl	Cantilever 1	0.06 N/m	30 kHz	Partial Au
		Non-Contact, TappingMode (Contact Mode) Cantilever 2	0.1 N/m	50 kHz	Partial Au
		Cantilever 3	0.3 N/m	90 kHz	Partial Au
	qp-fast	Cantilever 1	15 N/m	250 kHz	Au
		Non-Contact, TappingMode Cantilever 2	30 N/m	420 kHz	Au
		Cantilever 3	80 N/m	800 kHz	Au
	qp-HBC	ScanAsyst®/ PeakForce Tapping™*	0.5 N/m	60 kHz	Al

Package sizes of 10, 20 and 50 probes are available.

*ScanAsyst® and Peak Force Tapping™ are registered trademarks of Bruker Corporation.

Characterization of Cantilevers (by Thermal Tune, contact free using a Laser Vibrometer)

The Characterization of Cantilevers is a service which can be ordered as add-on to cantilever probes of the uniQprobe, PointProbe®Plus, SuperSharpSilicon™ and tipless cantilevers product range or special developments (force constant < 1 N/m and resonance frequency < 2 MHz) and provides measured Spring Constants, Resonance Frequencies and Quality Factors.

Accuracy	Resonance Frequency: better than 0.03%
	Force Constant: better than 10%
	Quality Factor (Q-Factor): better than 3%
Limitation	Force Constant < 1N/m
Calibration	with certified Force Standard

For more information about this service, please consult our Special Development List:

For more details please refer to the product datasheet on our website
www.nanosensors.com
info@nanosensors.com