NanoWorld AG
Rue Jaquet-Droz 1, C.P. 216
2002 Neuchâtel
Switzerland

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General Description
Pointprobe® Silicon-SPM-Probes

General

- SPM Probe for very high resolution imaging
- fits to all well known commercial SPMs
- monolithic design of support chip, cantilever and tip
- tip is pointing into the <100> direction
- cantilever and tip are supported by a single crystal silicon holder

Material Features

- highly doped, single crystal silicon
- high conductivity of the doped silicon avoids electrostatic charging
- resistively is as low as 0.01-0.025 Ohm*cm
- no intrinsic stress and absolutely straight cantilevers
- no bending of cantilever by changing temperatures
- chemically inert silicon for application in fluids or electrochemical cells

Cantilever

- trapezoidal cross section of the cantilever
- wide detector side for easy laser adjustment
- small width at the tip side reduces the damping

Support Chip

- cantilever is fixed to a silicon support chip
- dimensions of the holder are very reproducible (1.6 mm x 3.4 mm)
- replacement of probe without major readjustment
- etched corners of the holder avoid contact between the holder and the sample

Tip

- tip is shaped like a polygon based pyramid
- macroscopic half cone angle is 20° to 25° viewed along the cantilever axis
- 25° to 30° looked from the side
- virtually zero at the very tip end
- tip radius is typically better than 8 nm
- tip height is 10-15 µm

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General Description
Arrow™ Silicon-SPM-Probes

General

- SPM probes for very high resolution imaging
- fits to all well-known commercial SPMs
- cantilever and tip are supported by a single crystal silicon holder
- monolithic design of support chip, cantilever and tip
- tip is pointing into the <100> direction

Material Features

- highly doped, single crystal silicon
- high conductivity of the doped silicon prevents electrostatic charging
- resistivity is as low as 0.01-0.025 Ohm*cm.
- no intrinsic stress and absolutely straight cantilevers
- no bending of cantilever by changing temperatures
- chemically inert silicon for application in fluids or electrochemical cells

Cantilever

- rectangular cantilever that is shaped like an arrow
- trapezoidal cross section of the cantilever
- wide detector side for easy adjustment of the detection system
- small width at the tip side reduces damping

Support Chip

- cantilever is fixed to a silicon holder
- dimensions of the holder are very reproducible (3.4 mm x 1.6 mm x 0.3 mm)
- replacement of the sensor without major readjustment of the detection system
- etched corners of the holder avoid contact between the holder and the sample

Tip

- tip has a tetrahedral shape and is located at the very end of the cantilever
- macroscopic half-cone angles
    - are 30° to 35° seen along the cantilever axis
    - are 20° to 25° seen from the side
    - taper to virtually zero at the very end of the tip
- tip radii are typically better than 10 nm
- tip height is 10-15 µm

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General Description
Pyrex-Nitride -SPM-Probes

General

- SPM probes for a wide range of applications
- fits to all well-known commercial SPMs
- silicon nitride cantilever and tips
- cantilevers are supported by a support chip made of pyrex glass
- designed for various imaging applications in contact mode or dynamic mode
- single support chips for easy handling

Material Features

- low-stress silicon nitride for lowest cantilever bending
- excellent hardness for wear resistance and extended lifetime

Cantilevers

- multi-lever design with either four rectangular cantilevers or four triangular cantilevers
- reflective chromium / gold coating on the backside of the cantilevers
- stress-compensated with bending below 2º

Support Chip

- support chips made of pyrex material (3.4 mm x 1.6 mm x 0.5 mm)
- easy handling due to single support chips

Tip

- oxide sharpened pyramidal probe tips
- tip height 3.5 15 µ and tip radius of curvature typically < 10 nm
- macroscopic half-cone angles 35°

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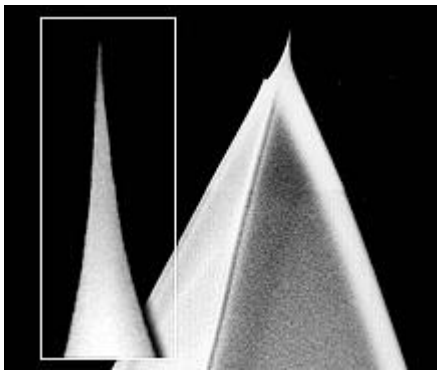
Special Versions

SuperSharpSilicon™ Tip (SSS)

For enhanced resolution of nanostructures and micro roughness we have developed an advanced tip manufacturing process leading to a further improvement of the tip sharpness with radii typically as low as 2nm. With these tips we have pushed back the frontiers of the technology.

The SuperSharpSilicon™ Tip is fabricated on the base of the well established Pointprobe® type.



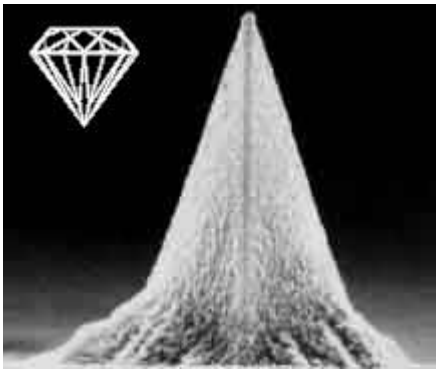
The mechanical properties of the cantilevers are described in the following product descriptions for each SuperSharpSilicon™ Tip respectively. These properties are combined with the advanced SuperSharpSilicon™ Tip shape.

Tip Features
The typical radius of a SuperSharpSilicon™ Tip is about 2nm.
We guarantee a tip radius of smaller than 5nm (guaranteed yield: 80%).
The half cone angle is better than 10° at the last 200nm of the tip.
The tip height is 10 to 15µm allowing measurement on fairly rough surfaces.

Diamond Coated Tip (DT)
Conductive Diamond Coated Tip (CDT)

For SPM applications that require hard contact between probe and sample we recommend our Diamond Coated Tip (DT). Some applications are friction measurements, the measurement of elastic properties of samples as well as wear measurements or nanostructuring. Much more operation modes and applications are feasible which benefit from the hardness of the hardest material in the world - diamond.

The DT and CDT Tips are based on the Pointprobe® Force Modulation Probe, the Pointprobe® Non-Contact / TappingMode high frequency probe or the Pointprobe® Non-Contact / TappingMode low frequency probe.



For an enhancement of the reflectivity the detector side of the cantilever beam is covered by a reflex coating.

Diamond Coating
True polycrystalline diamond coating on the tipside of the cantilever with the unsurpassed hardness of diamond.

The thickness of the diamond layer is approximately 100 nm. The macroscopic tip radius is in the range of 100-200 nm, but the tip often exhibits a nanoroughness in the 10nm regime which improves the resolution on flat surfaces.

Conductive Diamond Coating
In the case of the CDT the conductivity is in the range of 0.003-0.005 Ohm*cm.

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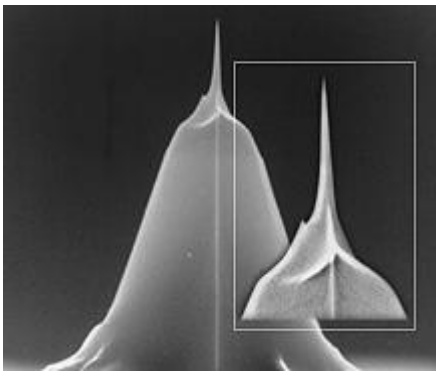
High Aspect Ratio Tip (AR5 and AR10)

For measurements on samples with sidewall angles approaching 90°, e.g. deep trench measurements or other semiconductor applications, we offer two different types of High Aspect Ratio Tips showing near-vertical sidewalls. These tips have an overall height of 10-15 µm which allows measurements on highly corrugated samples. At the last few micrometers the tips show a high aspect ratio portion that is symmetric when viewed from the side as well as along the cantilever axis. The tip radius is typically 10 nm. We guarantee at least 15 nm.

The High Aspect Ratio Tips are fabricated on the base of the well established Pointprobe® type. Thus the geometry of holder and cantilever is equal to that of the Pointprobe® type.

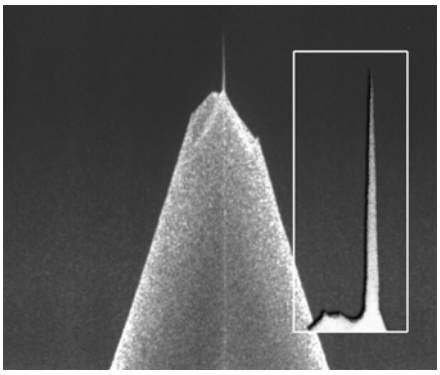
Tip Features AR5

The high aspect ratio portion of the AR5 tip is larger than 2 µm and shows an aspect ratio of typically **7:1**. We guarantee a minimum aspect ratio of **5:1**.
Resulting from this the half cone angle of the high aspect ratio portion is typically smaller than 5°.



Tip Features AR10

The high aspect ratio portion of the AR10 tip is larger than 1.5 µm and shows an aspect ratio of typically **12:1**. We guarantee a minimum aspect ratio of **10:1**.
Resulting from this the half cone angle of the high aspect ratio portion is typically smaller than 2.8°.



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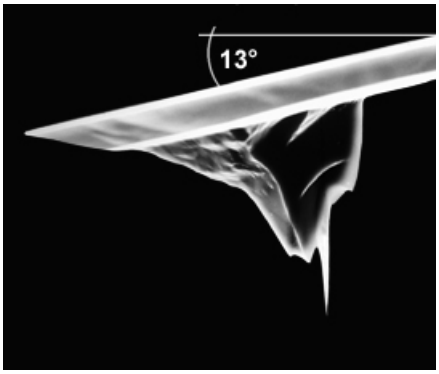
Tilt Compensated High Aspect Ratio Tip (AR5T)

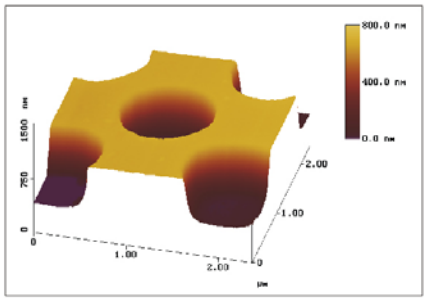
Our Tilt Compensated High Aspect Ratio Tip (AR5T) is similar to our High Aspect Ratio Tip (AR5). However, the high aspect ratio portion of the tip is tilted 13° with respect to the center axis of the tip. This compensates the tilt angle of the cantilever that results from mounting the probe to the AFM head. This unique feature allows absolutely symmetrical imaging of near-vertical sidewalls. Therefore these tips can be perfectly used to characterize the slope of steep sidewalls.

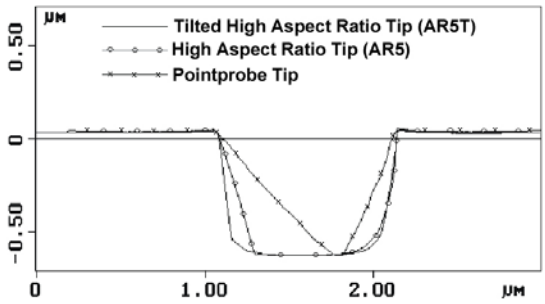
The High Aspect Ratio Tips are fabricated on the base of the well established Pointprobe® type. Thus the geometry of holder and cantilever is equal to that of the Pointprobe® type.

Tip Features AR5T

With an overall tip height of 10-15 µm these tips allow measurements on highly corrugated samples. The tip radius is typically 10 nm.
We guarantee at least 15 nm.
The tip has a high aspect ratio portion that is larger than 2 µm.
This portion is symmetric when viewed from the side as well as along the cantilever axis and shows an aspect ratio of typically **7:1**.
We guarantee a minimum aspect ratio of **5:1**.
Moreover the high aspect ratio portion is tilted 13° with respect to the center axis of the tip allowing absolutely symmetrical imaging.







For high quality deep trench measurements a High Aspect Ratio Tip is highly recommended in order to magnify the region of interest. With a tilted High Aspect Ratio Tip, the performance of the measurement can be enhanced even further by offering a more symmetrically scan.

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Available Coatings

Reflex Coating (for Pointprobe® and Arrow Silicon AFM Probes)

- 30 nm thick aluminum coating on the backside
- enhances reflectivity of the laser beam by a factor of 2.5
- prevents light from interfering within the cantilever
- strongly recommended for thin cantilevers if the coating is compatible with the application

Hard Magnetic Coating (for Pointprobe® AFM Probes)

- 40 nm thick cobalt alloy coating on the tip side
- permanent magnetization of the tip
- tip needs to be magnetized by means of an external strong magnet
- soft magnetic samples may be influenced by the tip

Soft Magnetic Coating (for Pointprobe® AFM Probes)

- Soft magnetic coating on the tip-side
- coercitivity of app. 0.75 Oe
- remancence magnetization of app. 225 emu/cm^3

Diamond Coating / Conductive Diamond Coating (for Pointprobe® AFM Probes)

- 100 nm thick coating of polycrystalline diamond on the tip side
- unsurpassed hardness of the tip
- in case of the CDT the conductivity is in the range of 0.003 - 0.005 Ohm*cm

PtIr5 Coating (for Pointprobe® AFM Probes and for some Arrow™ Probes, others on request)

- 25nm thick double layer of chromium and platinum iridium5
- layer on both sides of the product
- the layer enhances the conductivity and allows electrical contact
- detector side coating enhances the reflectivity of the laser beam by a factor of 2
- the layer is stress compensated and wear resistant
- bending due to stress is less than 2°

Gold Coating (for Pointprobe® AFM Probes on request)

- 70nm thick chromium/gold coating on the backside of the cantilever
- 70nm thick chromium/gold coating on both sides of the probe

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Chromium/Titanium/Gold Coating (for Pyrex-Nitride AFM Probes)

- 70nm thick chromium/titanium/gold coating on the backside (on both sides for tipless version available)
- enhances reflectivity of the laser beam

Titanium/Gold Coating (for Arrow™ Tipless Cantilevers))

- 5 nm titanium / 30 nm gold coating on the top side
- enhances reflectivity of the laser beam

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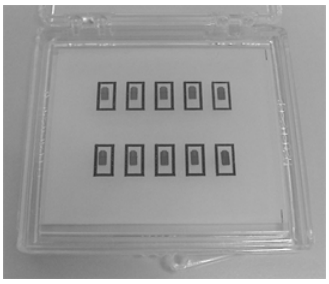
Packaging

10 probes

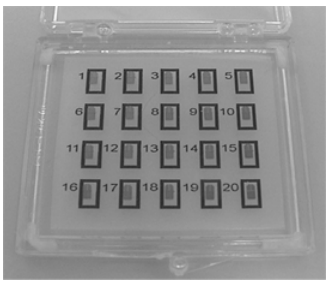
For easy handling our Silicon-SPM-Probes are shipped in a Gel-Pak® box (2” x 2”). These trays are specially designed for easy detaching of the probes.



Datasheet of all 10 Probes contains
Width of cantilever
Length of cantilever
Thickness of cantilever
Calculated Force Constant of cantilever
Calculated Resonance Frequency of cantilever

20 probes

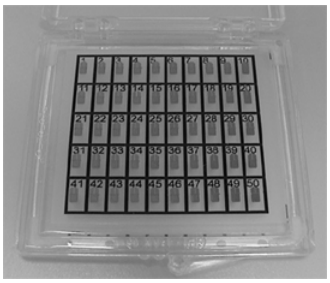
For easy handling our Silicon-SPM-Probes are shipped in a Gel-Pak® box (2” x 2”). These trays are specially designed for easy detaching of the probes.



Datasheet of all 20 Probes contains
Width of cantilever
Length of cantilever
Thickness of cantilever
Calculated Force Constant of cantilever
Calculated Resonance Frequency of cantilever

50 probes

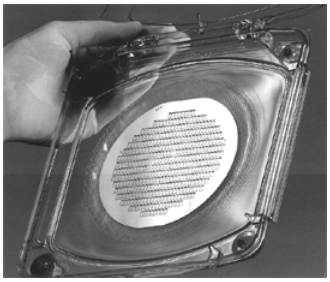
For easy handling our Silicon-SPM-Probes are shipped in a Gel-Pak® box (2” x 2”). These trays are specially designed for easy detaching of the probes.



Datasheet
Not available

Full wafer 4”

The wafer contains 380 up to 388 Probes, depending on the product. For further information take a look at the datasheet.
For easy handling our Wafer is shipped in a vacuum release Gel-Pak® box (with 4” diameter active surface). These trays are specially designed for easy detaching of the probes.



Datasheet of 32 Probes contains
Width of cantilever
Length of cantilever
Thickness of cantilever
Calculated Force Constant of cantilever
Calculated Resonance Frequency of cantilever

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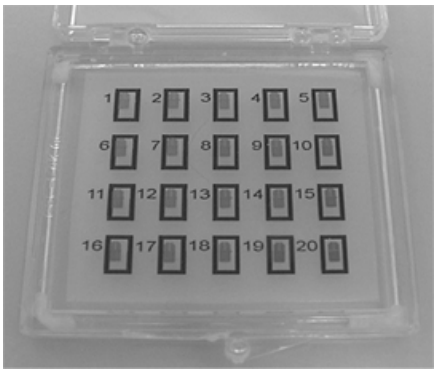
Handling Tips

For small packages



Our Probes are shipped in the specially designed Gel-Pak® carrier / shippers. The carrier is sealed with our NanoWorld *Authenticity Seal*. This seal will guarantee that the goods contained in the box have been quality controlled and packed by NanoWorld.

Before breaking the seal and opening the box ensure the following:

- Is the box sealed and is the seal intact?
- Please check the content for transportation damage! (e.g. loose probes)
- Please verify if the delivered probes are consistent with your order! The label at the backside of the box contains the information about the probes.

In case of any problems please contact your supplier immediately. *Please do not brake the seal if an exchange is necessary!*

Detaching the probes:
The carrier contains a soft elastomeric coating (gel) applied to a tray which is fixed in the hinged box. The probes are mounted on the gel side of the tray. They are held in place when they get in contact with the coated surface of the tray. The holding action depends on the surface contact with the backside of the probe holder. The better the contact the better the probe is held. The gel is not an adhesive. The top side of the probe together with cantilever and tip is left untouched.

1. Position the box in a way that you can see the probes (labeled side down).
2. Break the seal with a sharp object.
3. Press the lid upwards to open the box

Caution:
The tips are pointing upwards. Touching them with tweezers or fingers will destroy them.

4. To remove a probe, grab it at the holder with tapering tweezers.
5. Now you can carefully lift off the probe from the gel.

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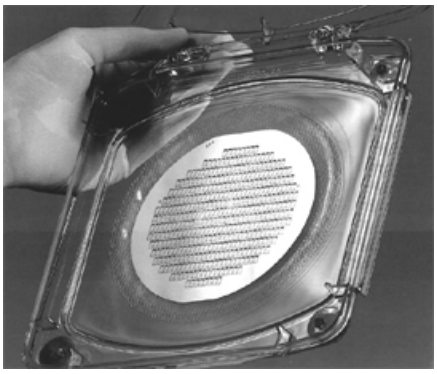
Handling Tips

For 4” wafers



The probe is identified by the label on the wafer box. Dopant and resistivity refer to the complete wafer i.e. tip, cantilever and holder. T, W and L represent thickness, width and length of the cantilever. Furthermore you can find the range for the Resonance Frequency and the Force Constant.

The wafers are shipped in a Gel-Pak® wafer box containing a special gel membrane which holds the wafer safely in place. The holding action depends on the contact between the smooth gel surface and the backside of the wafer.

Although the gel immobilizes the wafer the probe can easily be removed by applying vacuum at the end of the vacuum hose fixed to the back of the wafer box. Beneath the gel membrane a white fabric mesh is visible. Vacuum at the reverse side of the membrane draws the gel into the cavities of the mesh causing it to partially separate from the wafer and the probe. Thus the contact between the gel surface and the backside of the probe substrate is reduced allowing the probe to be readily removed by means of a vacuum pick-up tool or tapering tweezers.

The wafer comprises 388 probes. Each probe is surrounded by a silicon frame. The probe comprises the holder (for handling), the cantilever and the tip.

Caution:
The tips are pointing upwards. Touching them with tweezers or fingers will destroy them.

The holder is attached to the frame by means of 2 very thin (20-30 µm) silicon brackets. While applying vacuum to the end of the vacuum hose, gently press on the holder with the vacuum pick-up tool or tweezers to break the brackets. Now you can lift off the probe.

It is recommended to apply a negative pressure of approx. 100 millibar (=10 kPa) at the end of the vacuum hose fixed to the back of the wafer box!

If vacuum is not available you can carefully lift off the probe with tapering tweezers. Take care not to touch the cantilever or tip and not to puncture the gel with the tweezers.

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Type: Arrow™ NC

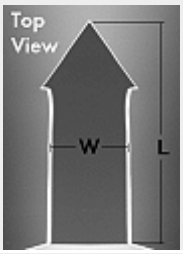
Non-Contact / TappingMode

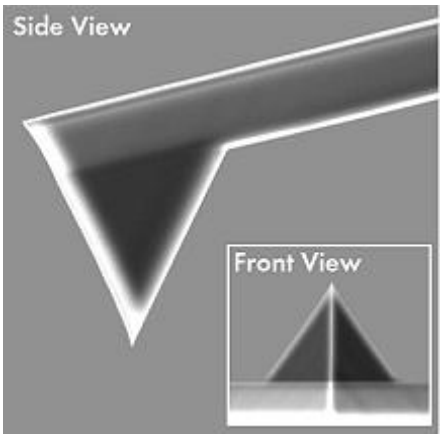
Optimized positioning through maximized tip visibility

NanoWorld Arrow™ NC probes are designed for Non-contact / TappingMode imaging. This probe type combines high operation stability with outstanding sensitivity and fast scanning ability. All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The probes feature a rectangular cantilever with a triangular free end and a tetrahedral tip with a height of 10 - 15 µm.

Additionally this probe offers a typical tip radius of curvature of less than 10 nm.

The unique Arrow™ shape with the tip position at the very end of the cantilever allows easy positioning of the tip on the area of interest.

Technical Data	Value	Range
Thickness	**4.6 µm**	4.1 - 5.1
Cantilever Geometry 	**W = 45 µm** **L = 160 µm**	40 - 50 155 - 165
Force Constant	**42 N/m**	27 - 80
Resonance Frequency	**285 kHz**	240 - 380



Order Code	Quantity	Data Sheet
Arrow NC-10	**10**	Nominal values
Arrow NC-20	**20**	Nominal values
Arrow NC-50	**50**	Nominal values
Arrow NC-W	**380**	Nominal values

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Type: Arrow™ NCR

Non-Contact / TappingMode - Reflex Coating

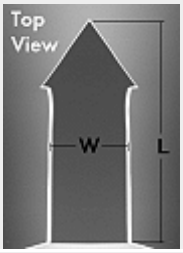
Optimized positioning through maximized tip visibility

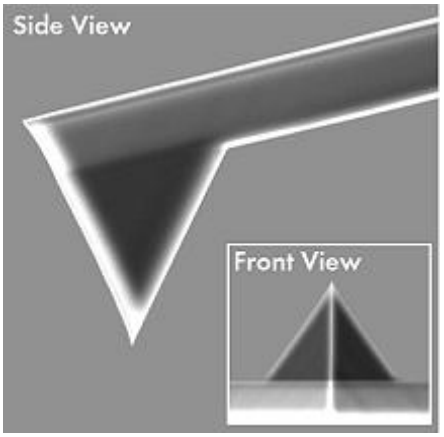
NanoWorld Arrow™ NC probes are designed for Non-contact / TappingMode imaging. This probe type combines high operation stability with outstanding sensitivity and fast scanning ability. All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The probes feature a rectangular cantilever with a triangular free end and a tetrahedral tip with a height of 10 - 15 µm.

Additionally this probe offers a typical tip radius of curvature of less than 10 nm.

The unique Arrow™ shape with the tip position at the very end of the cantilever allows easy positioning of the tip on the area of interest.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**4.6 µm**	4.1 - 5.1
Cantilever Geometry 	**W = 45 µm** **L = 160 µm**	40 - 50 155 - 165
Force Constant	**42 N/m**	27 - 80
Resonance Frequency	**285 kHz**	240 - 380



Order Code	Quantity	Data Sheet
Arrow NCR-10	**10**	Nominal values
Arrow NCR-20	**20**	Nominal values
Arrow NCR-50	**50**	Nominal values
Arrow NCR-W	**380**	Nominal values

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: Arrow™ NCPt

Non-Contact / TappingMode – PtIr5 Coating

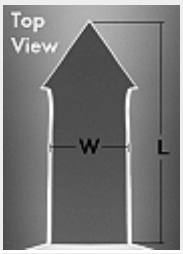
Optimized positioning through maximized tip visibility

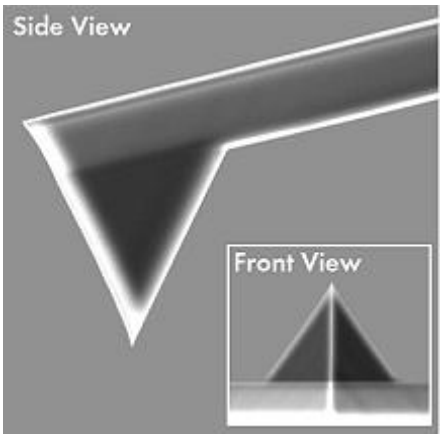
NanoWorld Arrow™ NCPt AFM probes are designed for non-contact or tapping mode imaging. This probe type combines high operation stability with outstanding sensitivity and fast scanning ability. All SPM probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The probes feature a rectangular cantilever with a triangular free end and a tetrahedral tip with a height of 10 - 15 µm.

Additionally this AFM tip offers a typical tip radius of curvature of less than 10 nm.

The unique Arrow™ shape with the tip position at the very end of the cantilever allows easy positioning of the tip on the area of interest.

The platinum iridium5 (PtIr5) coating on both sides of the probe allows electrical contacts between tip and sample (high conductivity) while enhancing the reflectivity of the cantilever. The typical tip radius of curvature is less than 25 nm.

Technical Data	Value	Range
Thickness	**4.6 µm**	4.1 - 5.1
Cantilever Geometry 	**W = 45 µm** **L = 160 µm**	40 - 50 155 - 165
Force Constant	**42 N/m**	27 - 80
Resonance Frequency	**285 kHz**	240 - 380



Order Code	Quantity	Data Sheet
Arrow NCPt-10	**10**	Nominal values
Arrow NCPt-20	**20**	Nominal values
Arrow NCPt-50	**50**	Nominal values
Arrow NCPt-W	**380**	Nominal values

PtIr5 Coating

PtIr5 Coating PtIr5 coating is an approximately 23 nm thick double layer of chromium and platinum iridium5 on both sides of the cantilever. The tip side coating enhances the conductivity of the tip and allows electrical contacts. The detector side coating enhances the reflectivity of the laser beam by a factor of 2 and prevents light from interfering within the cantilever. The coating process is optimised for stress compensation and wear resistance. The bending of the cantilever due to stress is less than 2°. Wear at the tip can occur if operating in contact-, friction- or force modulation mode.

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2002 Neuchâtel
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Type: Arrow™ UHF

Arrow™ – Ultra High Frequency – Reflex coating

Optimized positioning through maximized tip visibility

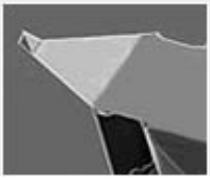
NanoWorld Arrow™ ultra high frequency AFM probes are capable of resonating with a very high frequency of up to 1.5 MHz. This probe type combines outstanding sensitivity with fast scanning ability. All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The probes feature a rectangular cantilever with a triangular free end and a tetrahedral tip with a height of 3 µm.

Additionally this AFM probe offers a typical tip radius of curvature of less than 10 nm.

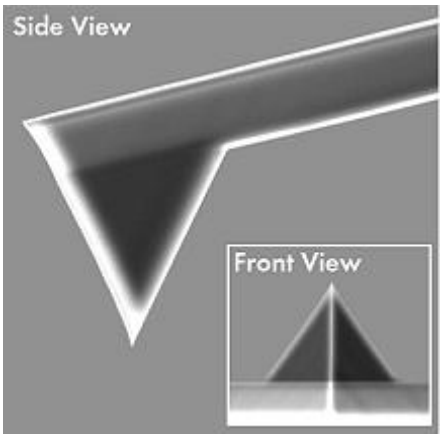
The unique Arrow™ shape with the tip position at the very end of the cantilever allows easy positioning of the tip on the area of interest.

If needed, specific cantilever thicknesses can be selected within very narrow tolerances for an additional selection fee.

The reflex coating on the detector side of the cantilever enhances the reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**1.0 µm**	0.6 – 1.0
Cantilever Geometry 	**W = 42 µm** **L = 35 µm**	- -
Force Constant	**42 N/m**	-
Resonance Frequency	**1.5 MHz**	07 – 1.5

Order Code	Quantity	Data Sheet
Arrow UHF-10	**10**	Nominal values
Arrow UHF-20	**20**	Nominal values



Reflex Coating

Reflex coating is an thin aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5.

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Type: NCH

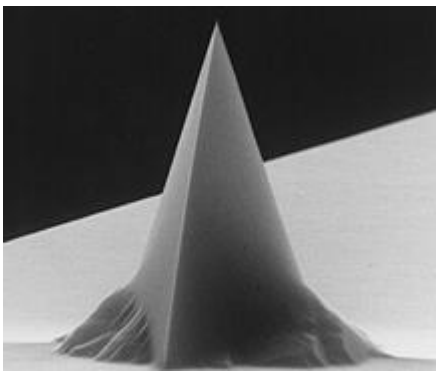
Non-Contact / TappingMode - High Resonance Frequency

The NanoWorld Pointprobe® NCH type is designed for Non-Contact / TappingMode imaging. This probe type combines high operation stability with outstanding sensitivity and fast scanning ability.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

Technical Data	Value	Range
Thickness	**4 µm**	3.5 - 4.5
Mean Width	**30 µm**	25 - 35
Length	**125 µm**	120 - 130
Force Constant	**42 N/m**	21 - 78
Resonance Frequency	**320 kHz**	250 - 390



Order Code	Quantity	Data Sheet
NCH-10	**10**	yes
NCH-20	**20**	yes
NCH-50	**50**	no
NCH-W	**380**	yes

For applications requiring lower Resonance Frequencies or a cantilever length exceeding 125 µm we recommend our Pointprobe® type NCL.

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Type: NCHR

Non-Contact / TappingMode - High Resonance Frequency - Reflex Coating

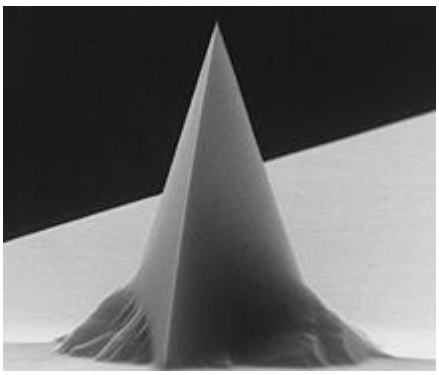
The NanoWorld Pointprobe® NCH type is designed for Non-Contact / TappingMode imaging. This type combines high operation stability with outstanding sensitivity and fast scanning ability.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**4 µm**	3.5 - 4.5
Mean Width	**30 µm**	25 - 35
Length	**125 µm**	120 - 130
Force Constant	**42 N/m**	21 - 78
Resonance Frequency	**320 kHz**	250 - 390



Order Code	Quantity	Data Sheet
NCHR-10	**10**	yes
NCHR-20	**20**	yes
NCHR-50	**50**	no
NCHR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

For applications requiring lower Resonance Frequencies or a cantilever length exceeding 125 µm we recommend our Pointprobe® type NCLR.

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Type: NCHPt

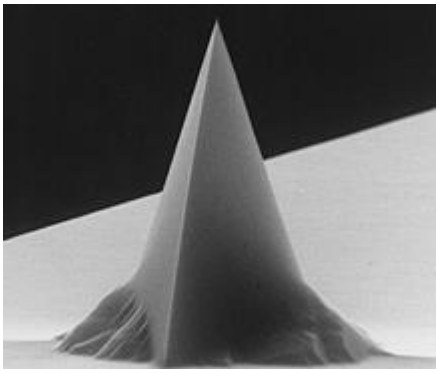
Non-Contact / TappingMode - High Resonance Frequency - PtIr5 Coating

The NanoWorld Pointprobe® NCH type is designed for Non-Contact / TappingMode imaging. This type combines high operation stability with outstanding sensitivity and fast scanning ability.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

The platinum iridium5 (PtIr5) coating on both sides of the probe allows electrical contacts between tip and sample (high conductivity) while enhancing the reflectivity of the cantilever. The typical tip radius of curvature is less than 25 nm.

Technical Data	Value	Range
Thickness	**4 µm**	3.5 - 4.5
Mean Width	**30 µm**	25 - 35
Length	**125 µm**	120 - 130
Force Constant	**42 N/m**	21 - 78
Resonance Frequency	**320 kHz**	250 - 390



Order Code	Quantity	Data Sheet
NCHPt-10	**10**	yes
NCHPt-20	**20**	yes
NCHPt-50	**50**	no
NCHPt-W	**380**	yes

PtIr5 Coating

PtIr5 coating is an approximately 23 nm thick double layer of chromium and platinum iridium5 on both sides of the cantilever. The tip side coating enhances the conductivity of the tip and allows electrical contacts. The detector side coating enhances the reflectivity of the laser beam by a factor of 2 and prevents light from interfering within the cantilever. The coating process is optimized for stress compensation and wear resistance. The bending of the cantilever due to stress is less than 2°. Wear at the tip can occur if operating in Contact Mode, Friction Mode or Force Modulation Mode.

For applications requiring lower Resonance Frequencies or a cantilever length exceeding 125 µm we recommend our Pointprobe® type NCLPt.

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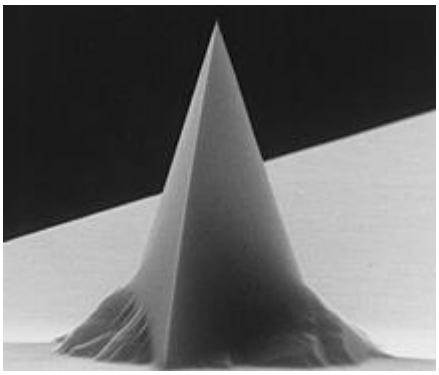
Type: NCST

Non-Contact / Soft Tapping Mode

NanoWorld Pointprobe® NCST AFM probes are designed for non-contact or soft tapping™ mode imaging. The combination of soft cantilever and fairly high resonance frequency enables stable and fast measurements with reduced tip-sample interaction. Thus, tip and sample wear could be significantly decreased.
All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this sensor offers typical tip radius of curvature of less than 8 nm.

Technical Data	Value	Range
Thickness	**2.8 µm**	2.3 - 3.3
Mean Width	**27 µm**	22- 32
Length	**150 µm**	145 - 155
Force Constant	**7.4 N/m**	3 - 16
Resonance Frequency	**160 kHz**	120 – 205



Order Code	Quantity	Data Sheet
NCST-10	**10**	yes
NCST-20	**20**	yes
NCST-50	**50**	no
NCST-W	**380**	yes

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Type: NCSTR

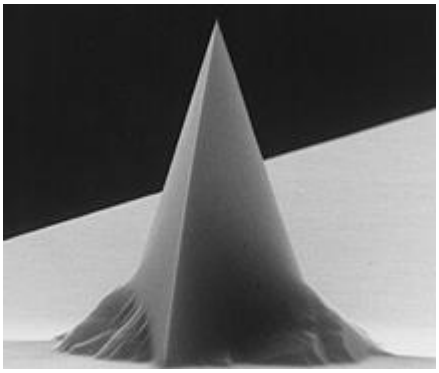
Non-Contact / Soft Tapping Mode – Reflex Coating

NanoWorld Pointprobe® NCSTR AFM probes are designed for non-contact or soft tapping mode imaging. The combination of soft cantilever and fairly high resonance frequency enables stable and fast measurements with reduced tip-sample interaction. Thus, tip and sample wear could be significantly decreased.
All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers a typical tip radius of curvature of less than 8 nm.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**2.8 µm**	2.3 - 3.3
Mean Width	**27 µm**	22- 32
Length	**150 µm**	145 - 155
Force Constant	**7.4 N/m**	3 - 16
Resonance Frequency	**160 kHz**	120 – 205



Order Code	Quantity	Data Sheet
NCSTR-10	**10**	yes
NCSTR-20	**20**	yes
NCSTR-50	**50**	no
NCSTR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever.

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Type: NCL

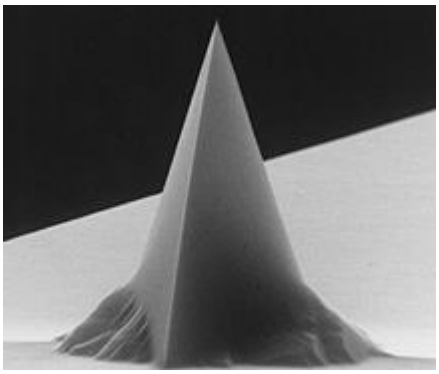
Non-Contact / TappingMode - Long Cantilever

The NanoWorld Pointprobe® NCL type is designed for Non-Contact / TappingMode imaging and offer an alternative to our high frequency Non-Contact type NCH. The NCL type is recommended if the feedback loop of the microscope does not accept high frequencies or if the detection system needs a minimum cantilever length (> 125 µm). This probe combines high operation stability with outstanding sensitivity. Compared to the high frequency Non-Contact type NCH the maximum scanning speed is slightly reduced.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

Technical Data	Value	Range
Thickness	**7 µm**	6.5 - 7.5
Mean Width	**38 µm**	33 - 43
Length	**225 µm**	220 - 230
Force Constant	**48 N/m**	31 - 71
Resonance Frequency	**190 kHz**	160 - 210



Order Code	Quantity	Data Sheet
NCL-10	**10**	yes
NCL-20	**20**	yes
NCL-50	**50**	no
NCL-W	**380**	yes

For applications allowing higher Resonance Frequencies or a shorter cantilever length we recommend our Pointprobe® type NCH.

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Type: NCLR

Non-Contact / TappingMode - Long Cantilever - Reflex Coating

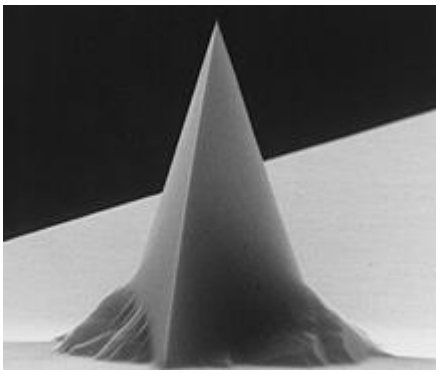
The NanoWorld Pointprobe® NCL type is designed for Non-Contact / TappingMode imaging and offer an alternative to our high frequency Non-Contact type NCH. The NCL type is recommended if the feedback loop of the microscope does not accept high frequencies or if the detection system needs a minimum cantilever length (> 125 µm). This probe combines high operation stability with outstanding sensitivity. Compared to the high frequency Non-Contact type NCH the maximum scanning speed is slightly reduced.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**7 µm**	6.5 - 7.5
Mean Width	**38 µm**	33 - 43
Length	**225 µm**	220 - 230
Force Constant	**48 N/m**	31 - 71
Resonance Frequency	**190 kHz**	160 - 210



Order Code	Quantity	Data Sheet
NCLR-10	**10**	yes
NCLR-20	**20**	yes
NCLR-50	**50**	no
NCLR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

For applications allowing higher Resonance Frequencies or a shorter cantilever length we recommend our Pointprobe® type NCHR.

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Type: NCLPt

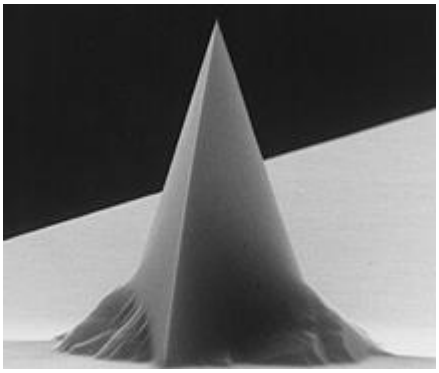
Non-Contact / TappingMode - Long Cantilever - PtIr5 Coating

The NanoWorld Pointprobe® NCL Probes are designed for Non-Contact / TappingMode imaging and offer an alternative to our high frequency Non-Contact type NCH. The NCL type is recommended if the feedback loop of the microscope does not accept high frequencies or if the detection system needs a minimum cantilever length (> 125 µm). This probe combines high operation stability with outstanding sensitivity. Compared to the high frequency Non-Contact type NCH the maximum scanning speed is slightly reduced.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

The platinum iridium5 (PtIr5) coating on both sides of the probe allows electrical contacts between tip and sample (high conductivity) while enhancing the reflectivity of the cantilever. The typical tip radius of curvature is less than 25 nm.

Technical Data	Value	Range
Thickness	**7 µm**	6.5 - 7.5
Mean Width	**38 µm**	33 - 43
Length	**225 µm**	220 - 230
Force Constant	**48 N/m**	31 - 71
Resonance Frequency	**190 kHz**	160 - 210



Order Code	Quantity	Data Sheet
NCLPt-10	**10**	yes
NCLPt-20	**20**	yes
NCLPt-50	**50**	no
NCLPt-W	**380**	yes

PtIr5 Coating

PtIr5 coating is an approximately 23 nm thick double layer of chromium and platinum iridium5 on both sides of the cantilever. The tip side coating enhances the conductivity of the tip and allows electrical contacts. The detector side coating enhances the reflectivity of the laser beam by a factor of 2 and prevents light from interfering within the cantilever. The coating process is optimized for stress compensation and wear resistance. The bending of the cantilever due to stress is less than 2°. Wear at the tip can occur if operating in Contact-, Friction- or Force Modulation Mode.

For applications allowing higher Resonance Frequencies or a shorter cantilever length we recommend our Pointprobe® type NCHPt.

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Type: SEIHR

SEIKO INSTRUMENTS Microscopes - Non-Contact Mode - High Force Constant - Reflex Coating

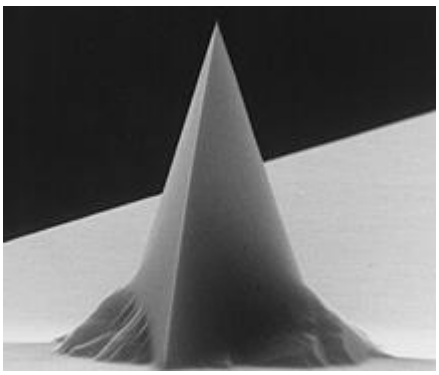
The NanoWorld Pointprobe® SEIHR type is designed for owners of a Seiko Instruments microscope using the Non-Contact Mode.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**5 µm**	4.5 - 5.5
Mean Width	**33 µm**	27.5 - 37.5
Length	**225 µm**	220 - 230
Force Constant	**15 N/m**	9 - 25
Resonance Frequency	**130 kHz**	110 - 150



Order Code	Quantity	Data Sheet
SEIHR-10	**10**	Yes
SEIHR-20	**20**	Yes
SEIHR-50	**50**	No
SEIHR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: SSS-NCH

SuperSharpSilicon™ - Non-Contact / TappingMode - High Resonance Frequency

The NanoWorld SuperSharpSilicon™ NCH type is designed for Non-Contact / TappingMode imaging. This type combines high operation stability with outstanding sensitivity and fast scanning ability.

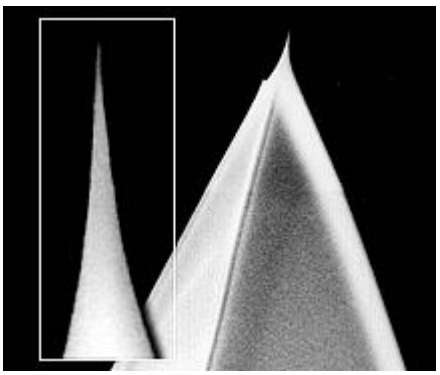
The SuperSharpSilicon™ type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

For enhanced resolution of nanostructures and microroughness we have developed an advanced tip manufacturing process leading to unrivalled sharpness of the SuperSharpSilicon™ Tip.

This type offers unique features:

- typical tip radius of curvature of 2 nm
- guaranteed tip radius of curvature 5 nm (yield >80%)
- half cone angle < 10° at the last 200 nm of the tip

Technical Data	Value	Range
Thickness	**4 µm**	3.5 - 4.5
Mean Width	**30 µm**	25 - 35
Length	**125 µm**	120 - 130
Force Constant	**42 N/m**	21 - 78
Resonance Frequency	**320 kHz**	250 - 390



Order Code	Quantity	Data Sheet
SSS-NCH-10	**10**	yes
SSS-NCH-20	**20**	yes
SSS-NCH-50	**50**	no
SSS-NCH-W	**380**	yes

For applications requiring lower Resonance Frequencies or a cantilever length exceeding 125 µm we recommend our SuperSharpSilicon™ type SSS-NCL.

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Type: SSS-NCL

SuperSharpSilicon™ - Non-Contact / TappingMode - Long Cantilever

NanoWorld SuperSharpSilicon™ NCL Probes are designed for Non-Contact / TappingMode imaging and offer an alternative to our high frequency Non-Contact type NCH. The NCL type is recommended if the feedback loop of the microscope does not accept high frequencies or if the detection system needs a minimum cantilever length (> 125 µm). This probe combines high operation stability with outstanding sensitivity. Compared to the high frequency Non-Contact type NCH the maximum scanning speed is slightly reduced.

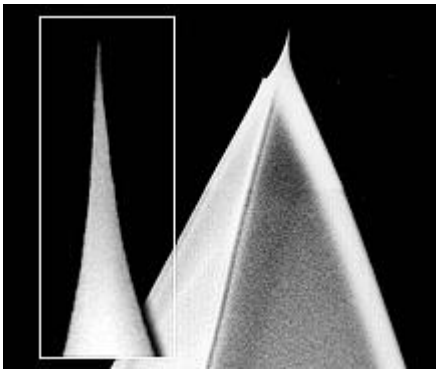
The SuperSharpSilicon™ type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

For enhanced resolution of nanostructures and microroughness we have developed an advanced tip manufacturing process leading to unrivalled sharpness of the SuperSharpSilicon™ Tip.

This type offers unique features:

- typical tip radius of curvature of 2 nm
- guaranteed tip radius of curvature 5 nm (yield >80%)
- half cone angle < 10° at the last 200 nm of the tip

Technical Data	Value	Range
Thickness	**7 µm**	6.5 - 7.5
Mean Width	**38 µm**	33 - 43
Length	**225 µm**	220 - 230
Force Constant	**48 N/m**	31 - 71
Resonance Frequency	**190 kHz**	160 - 210



Order Code	Quantity	Data Sheet
SSS-NCL-10	**10**	yes
SSS-NCL-20	**20**	yes
SSS-NCL-50	**50**	No
SSS-NCL-W	**380**	yes

For applications allowing higher resonance frequencies or a shorter cantilever length we recommend our SuperSharpSilicon™ type SSS-NCH.

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Type: SSS-SEIH

SuperSharpSilicon™ - SEIKO INSTRUMENTS Microscopes - Non-Contact Mode - High Force Constant

The NanoWorld SuperSharpSilicon SEIHR type is designed for owners of a Seiko Instruments microscope using the Non-Contact Mode.

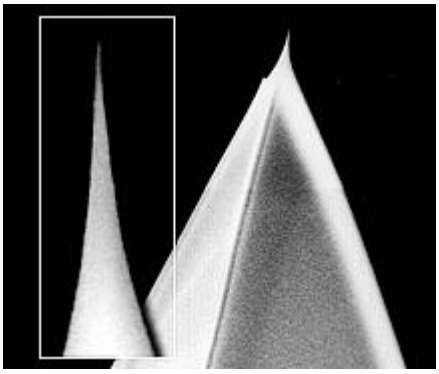
The SuperSharpSilicon™ type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

For enhanced resolution of nanostructures and microroughness we have developed an advanced tip manufacturing process leading to unrivalled sharpness of the SuperSharpSilicon™ Tip.

This probe offers unique features:

- typical tip radius of curvature of 2 nm
- guaranteed tip radius of curvature 5 nm (yield >80%)
- half cone angle < 10° at the last 200 nm of the tip

Technical Data	Value	Range
Thickness	**5 µm**	4.5 - 5.5
Mean Width	**33 µm**	27.5 - 37.5
Length	**225 µm**	220 - 230
Force Constant	**15 N/m**	9 - 25
Resonance Frequency	**130 kHz**	110 - 150



Order Code	Quantity	Data Sheet
SSS-SEIH-10	**10**	yes
SSS-SEIH-20	**20**	yes
SSS-SEIH-50	**50**	no
SSS-SEIH-W	**380**	yes

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Type: AR5-NCHR

High Aspect Ratio (> 5:1) - Non-Contact / TappingMode - High Resonance Frequency - Reflex Coating

The NanoWorld High Aspect Ratio NCH type is designed for Non-Contact / TappingMode imaging. This type combines high operation stability with outstanding sensitivity and fast scanning ability.

The High Aspect Ratio type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

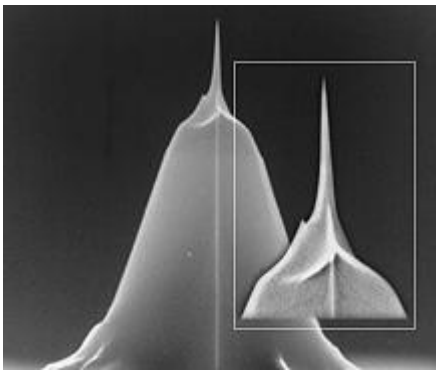
For measurements on samples with sidewall angles approaching 90° we offer specially tailored tips showing a high aspect ratio portion with near-vertical sidewalls.

This type offers unique features:

- length of the high aspect ratio portion of the tip > 2 µm
- typical aspect ratio of this portion in the order of **7:1** (guaranteed **5:1**)
  (when viewed from side as well as along cantilever axis!)
- half cone angle of the high aspect ratio portion typically < 5°
- typical tip radius of curvature < 10 nm

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**4 µm**	3.5 - 4.5
Mean Width	**30 µm**	25 - 35
Length	**125 µm**	120 - 130
Force Constant	**42 N/m**	21 - 78
Resonance Frequency	**320 kHz**	250 - 390



Order Code	Quantity	Data Sheet
AR5-NCHR-10	**10**	yes
AR5-NCHR-20	**20**	yes
AR5-NCHR-50	**50**	no
AR5-NCHR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

For applications requiring lower Resonance Frequencies or a cantilever length exceeding 125 µm we recommend our High Aspect Ratio type AR5-NCLR.

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Type: AR5T-NCHR

Tilted High Aspect Ratio (> 5:1) - Non-Contact / TappingMode - High Resonance Frequency - Reflex Coating

The NanoWorld High Aspect Ratio NCH type is designed for Non-Contact / TappingMode imaging. This type combines high operation stability with outstanding sensitivity and fast scanning ability.

The High Aspect Ratio type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

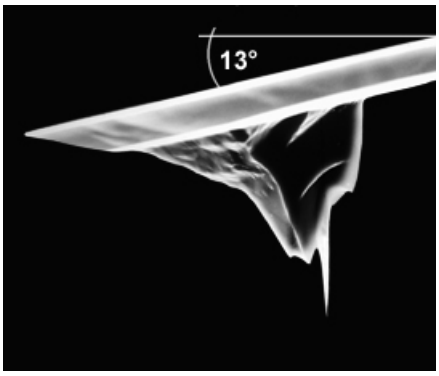
For measurements on samples with sidewall angles approaching 90° we offer a special version of our tailored tips. The last 2 µm of the tip are tilted 13° to the center axis of the tip.

This type offers unique features:

- tilted 13° to the center axis of the tip
- length of the high aspect ratio portion of the tip > 2 µm
- typical aspect ratio of this portion in the order of **7:1** (guaranteed **5:1**)
  (when viewed from side as well as along cantilever axis!)
- half cone angle of the high aspect ratio portion typically < 5°
- typical tip radius of curvature < 10 nm

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**4 µm**	3.5 - 4.5
Mean Width	**30 µm**	25 - 35
Length	**125 µm**	120 - 130
Force Constant	**42 N/m**	21 - 78
Resonance Frequency	**320 kHz**	250 - 390



Order Code	Quantity	Data Sheet
AR5T-NCHR-10	**10**	yes
AR5T-NCHR-20	**20**	yes
AR5T-NCHR-50	**50**	no
AR5T-NCHR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: AR10-NCHR

High Aspect Ratio (> 10:1) - Non-Contact / TappingMode - High Resonance Frequency - Reflex Coating

The NanoWorld High Aspect Ratio NCH type is designed for Non-Contact / TappingMode imaging. This type combines high operation stability with outstanding sensitivity and fast scanning ability.

The High Aspect Ratio type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

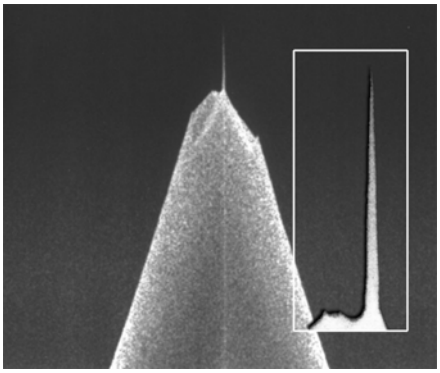
For measurements on samples with sidewall angles approaching 90° we offer specially tailored tips showing a high aspect ratio portion with near-vertical sidewalls.

This type offers unique features:

- length of the high aspect ratio portion of the tip > 1.5 µm
- typical aspect ratio of this portion in the order of **12:1** (guaranteed **10:1**)
  (when viewed from side as well as along cantilever axis!)
- half cone angle of the high aspect ratio portion typically < 2.8°
- typical tip radius of curvature < 10 nm

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**4 µm**	3.5 - 4.5
Mean Width	**30 µm**	25 - 35
Length	**125 µm**	120 - 130
Force Constant	**42 N/m**	21 - 78
Resonance Frequency	**320 kHz**	250 - 390



Order Code	Quantity	Data Sheet
AR10-NCHR-10	**10**	yes
AR10-NCHR-20	**20**	yes
AR10-NCHR-50	**50**	no
AR10-NCHR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: AR5-NCLR

High Aspect Ratio (> 5:1) - Non-Contact / TappingMode - Long Cantilever - Reflex Coating

The NanoWorld High Aspect Ratio NCL type is designed for Non-Contact / TappingMode imaging and offer an alternative to our high frequency Non-Contact type NCH. The NCL type is recommended if the feedback loop of the microscope does not accept high frequencies or if the detection system needs a minimum cantilever length (> 125 µm). This type combines high operation stability with outstanding sensitivity and fast scanning ability. Compared to the high frequency Non-Contact type NCH the maximum scanning speed is slightly reduced.

The High Aspect Ratio type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

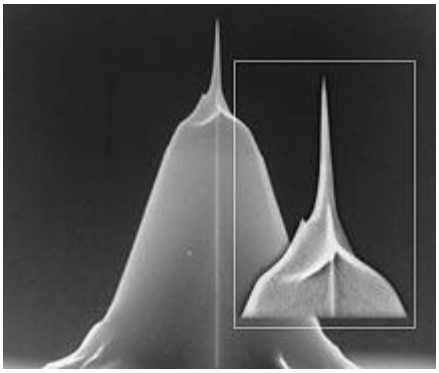
For measurements on samples with sidewall angles approaching 90° we offer specially tailored tips showing a high aspect ratio portion with near-vertical sidewalls.

These probes offer unique features:

- length of the high aspect ratio portion of the tip > 2 µm
- typical aspect ratio of this portion in the order of **7:1** (guaranteed **5:1**)
  (when viewed from side as well as along cantilever axis !)
- half cone angle of the high aspect ratio portion typically < 5°
- typical tip radius of curvature < 10 nm

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**7 µm**	6.5 - 7.5
Mean Width	**38 µm**	33 - 43
Length	**225 µm**	220 - 230
Force Constant	**48 N/m**	31 - 71
Resonance Frequency	**190 kHz**	160 - 210



Order Code	Quantity	Data Sheet
AR5-NCLR-10	**10**	Yes
AR5-NCLR-20	**20**	Yes
AR5-NCLR-50	**50**	No
AR5-NCLR-W	**380**	Yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

For applications allowing higher Resonance Frequencies or a shorter cantilever length we recommend our High Aspect Ratio type AR5-NCHR.

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Type: DT-NCHR

Diamond Coated Tip - Non-Contact / TappingMode - High Resonance Frequency - Reflex Coating

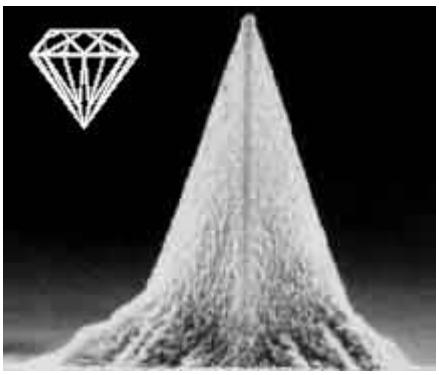
The NanoWorld Diamond Coated NCH type is designed for Non-Contact / TappingMode imaging. This type combines high operation stability with outstanding sensitivity and fast scanning ability.

The Diamond Coated type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

For applications that require hard contact between tip and sample this probe offers a real diamond tip side coating. This coating features extremely high wear resistance due to the unsurpassed hardness of diamond.
The typical macroscopic tip radius of curvature is in the range between 100 and 200 nm. Nanoroughnesses in the 10 nm regime improve the resolution on flat surfaces.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**4 µm**	3.5 - 4.5
Mean Width	**30 µm**	25 - 35
Length	**125 µm**	120 - 130
Force Constant	**42 N/m**	21 - 78
Resonance Frequency	**320 kHz**	250 - 390



Order Code	Quantity	Data Sheet
DT-NCHR-10	**10**	yes
DT-NCHR-20	**20**	yes
DT-NCHR-50	**50**	no
DT-NCHR-W	**380**	yes

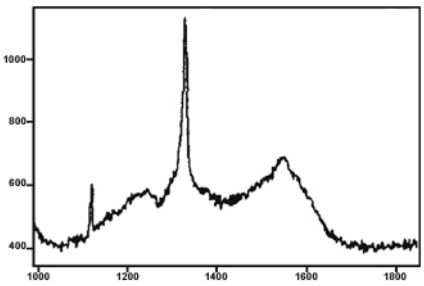


Fig.: Raman spectrum of the diamond coating

Diamond Coating

Diamond coating is an approximately 100 nm thick coating of polycrystalline diamond on the tip side of the cantilever leading to an unsurpassed hardness of the tip. The figure shows the Raman spectrum of the coating verifying true diamond.

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminum coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

For applications requiring lower Resonance Frequencies or a cantilever length exceeding 125 µm we recommend our Diamond Coated type DT-NCLR.

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Type: CDT-NCHR

Conductive Diamond Coated Tip - Non-Contact / TappingMode - High Resonance Frequency - Reflex Coating

The NanoWorld Conductive Diamond Coated NCH type is designed for Non-Contact / TappingMode imaging. This type combines high operation stability with outstanding sensitivity and fast scanning ability.

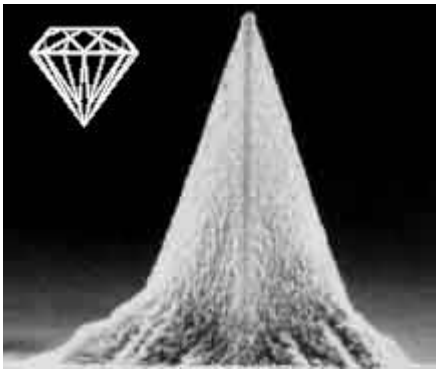
The Diamond Coated type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

For applications that require hard contact between tip and sample this type offers a real diamond tip side coating. This coating features extremely high wear resistance due to the unsurpassed hardness of diamond. The typical macroscopic tip radius of curvature is in the range between 100 and 200 nm. Nanoroughnesses in the 10 nm regime improve the resolution on flat surfaces.

The CDT features a conductive diamond coating. Some typical applications for these tips are Scanning Spreading Resistance Microscopy (SSRM), Tunneling AFM (Conducting AFM) and Scanning Capacitance Microscopy (SCM).

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**4 µm**	3.5 - 4.5
Mean Width	**30 µm**	25 - 35
Length	**125 µm**	120 - 130
Force Constant	**42 N/m**	21 - 78
Resonance Frequency	**320 kHz**	250 - 390



Order Code	Quantity	Data Sheet
CDT-NCHR-10	**10**	yes
CDT-NCHR-20	**20**	yes
CDT-NCHR-50	**50**	no
CDT-NCHR-W	**380**	yes

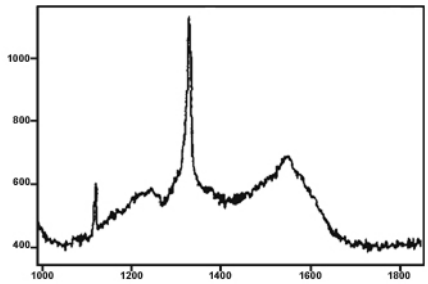


Fig.: Raman spectrum of the diamond coating

Conductive Diamond Coating

Diamond coating is an approximately 100 nm thick coating of polycrystalline diamond on the tip side of the cantilever leading to an unsurpassed hardness of the tip. The figure shows the Raman spectrum of the coating verifying true diamond.
The coating is highly doped with boron. This leads to a macroscopic resistivity of 0.003 – 0.005 Ohm*cm.

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminum coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

For applications requiring lower Resonance Frequencies or a cantilever length exceeding 125 µm we recommend our Conductive Diamond Coated type CDT-NCLR.

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Type: DT-NCLR

Diamond Coated Tip - Non-Contact / TappingMode - Long Cantilever - Reflex Coating

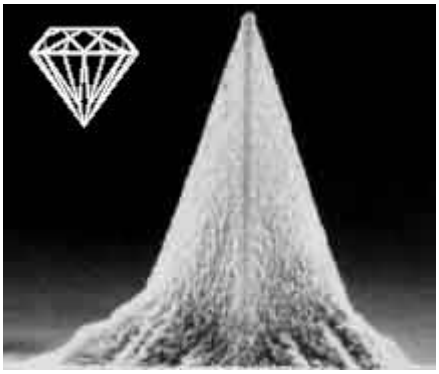
The NanoWorld Diamond Coated NCL type is designed for Non-Contact / TappingMode imaging and offer an alternative to our high frequency Non-Contact type NCH. The NCL type is recommended if the feedback loop of the microscope does not accept high frequencies or if the detection system needs a minimum cantilever length (> 125 µm). This type combines high operation stability with outstanding sensitivity and fast scanning ability. Compared to the high frequency Non-Contact type NCH the maximum scanning speed is slightly reduced.

The Diamond Coated type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.
For applications that require hard contact between tip and sample this probe offers a real diamond tip side coating. This coating features extremely high wear resistance due to the unsurpassed hardness of diamond.

The typical macroscopic tip radius of curvature is in the range between 100 and 200 nm. Nanoroughnesses in the 10 nm regime improve the resolution on flat surfaces.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**7 µm**	6.5 - 7.5
Mean Width	**38 µm**	33 - 43
Length	**225 µm**	220 - 230
Force Constant	**48 N/m**	31 - 71
Resonance Frequency	**190 kHz**	160 - 210



Order Code	Quantity	Data Sheet
DT-NCLR-10	**10**	Yes
DT-NCLR-20	**20**	Yes
DT-NCLR-50	**50**	No
DT-NCLR-W	**380**	Yes

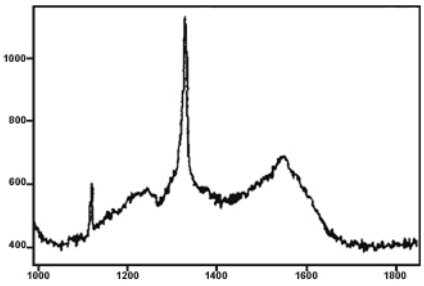


Fig.: Raman spectrum of the diamond coating

Diamond Coating

Diamond coating is an approximately 100 nm thick coating of polycrystalline diamond on the tip side of the cantilever leading to an unsurpassed hardness of the tip. The figure shows the Raman spectrum of the coating verifying true diamond.

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminum coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

For applications allowing higher Resonance Frequencies or a shorter cantilever length we recommend our Diamond Coated type DT-NCHR.

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Type: CDT-NCLR

Conductive Diamond Coated Tip - Non-Contact / TappingMode- Long Cantilever - Reflex Coating

The NanoWorld Diamond Coated NCL type is designed for Non-Contact / TappingMode imaging and offer an alternative to our high frequency Non-Contact type NCH. The NCL type is recommended if the feedback loop of the microscope does not accept high frequencies or if the detection system needs a minimum cantilever length (> 125 µm). This type combines high operation stability with outstanding sensitivity and fast scanning ability.

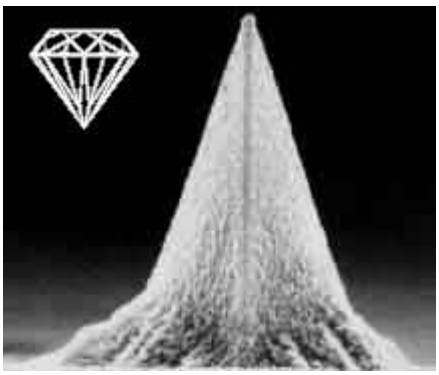
The Diamond Coated type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

For applications that require hard contact between tip and sample this probe offers a real diamond tip side coating. This coating features extremely high wear resistance due to the unsurpassed hardness of diamond. The typical macroscopic tip radius of curvature is in the range between 100 and 200 nm. Nanoroughnesses in the 10 nm regime improve the resolution on flat surfaces.

The CDT features a conductive diamond coating. Some typical applications for this tip are Scanning Spreading Resistance Microscopy (SSRM), Tunneling AFM (Conducting AFM) and Scanning Capacitance Microscopy (SCM).

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**7 µm**	6.5 - 7.5
Mean Width	**38 µm**	33 - 43
Length	**225 µm**	220 - 230
Force Constant	**48 N/m**	31 - 71
Resonance Frequency	**190 kHz**	160 - 210



Order Code	Quantity	Data Sheet
CDT-NCLR-10	**10**	yes
CDT-NCLR-20	**20**	yes
CDT-NCLR-50	**50**	no
CDT-NCLR-W	**380**	yes

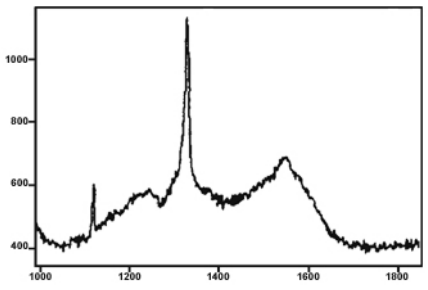


Fig.: Raman spectrum of the diamond coating

Conductive Diamond Coating

Diamond coating is an approximately 100 nm thick coating of polycrystalline diamond on the tip side of the cantilever leading to an unsurpassed hardness of the tip. The figure shows the Raman spectrum of the coating verifying true diamond.
The coating is highly doped with boron. This leads to a macroscopic resistivity of 0.003 – 0.005 Ohm*cm.

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminum coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

For applications allowing higher resonance frequencies or a shorter cantilever length we recommend our Conductive Diamond Coated type CDT-NCHR.

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Type: Arrow™ FM

Force Modulation Mode

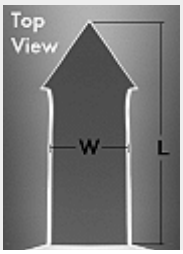
Optimized positioning through maximized tip visibility

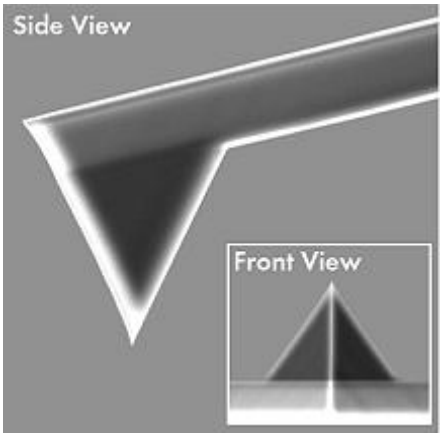
NanoWorld Arrow™ FM probes are designed for Force Modulation Mode imaging. The Force Constant of the FM type fills the gap between Contact and Non-Contact probes. Furthermore Non-Contact / TappingMode imaging is possible with this probe (reduced operation stability).

All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The probes feature a rectangular cantilever with a triangular free end and a tetrahedral tip with a height of
10 - 15 µm.

Additionally this probe offers a typical tip radius of curvature of less than 10 nm.

The unique Arrow™ shape with the tip position at the very end of the cantilever allows easy positioning of the tip on the area of interest.

Technical Data	Value	Range
Thickness	**3.0µm**	2.5 - 3.5
Cantilever Geometry 	**W = 35 µm** **L = 240 µm**	30 - 40 235 - 245
Force Constant	**2.8 N/m**	1.4 - 5.8
Resonance Frequency	**75 kHz**	58 - 97



Order Code	Quantity	Data Sheet
Arrow FM-10	**10**	Nominal values
Arrow FM-20	**20**	Nominal values
Arrow FM-50	**50**	Nominal values
Arrow FM-W	**380**	Nominal values

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Type: Arrow™ FMR

Force Modulation Mode - Reflex Coating

Optimized positioning through maximized tip visibility

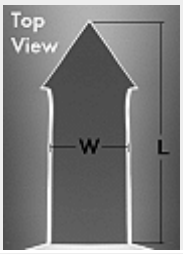
NanoWorld Arrow™ FM probes are designed for Force Modulation Mode imaging. The Force Constant of the FM type fills the gap between Contact and Non-Contact probes. Furthermore Non-Contact / TappingMode imaging is possible with this probe (reduced operation stability).

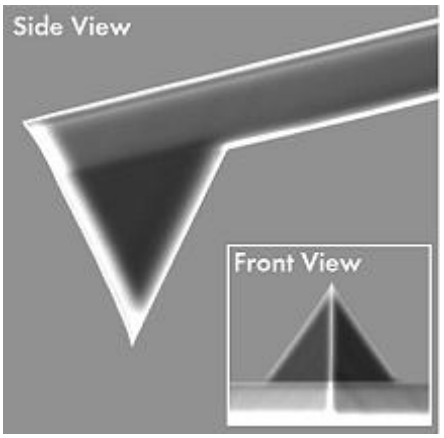
All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The probes feature a rectangular cantilever with a triangular free end and a tetrahedral tip with a height of
10 - 15 µm.

Additionally this probe offers a typical tip radius of curvature of less than 10 nm.

The unique Arrow™ shape with the tip position at the very end of the cantilever allows easy positioning of the tip on the area of interest.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**3.0µm**	2.5 - 3.5
Cantilever Geometry 	**W = 35 µm** **L = 240 µm**	30 - 40 235 - 245
Force Constant	**2.8 N/m**	1.4 - 5.8
Resonance Frequency	**75 kHz**	58 - 97



Order Code	Quantity	Data Sheet
Arrow FMR-10	**10**	Nominal values
Arrow FMR-20	**20**	Nominal values
Arrow FMR-50	**50**	Nominal values
Arrow FMR-W	**380**	Nominal values

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: Arrow™ EFM

Electrostatic Force Microscopy – PtIr5 coating

Optimized positioning through maximized tip visibility

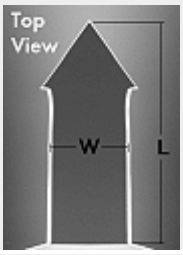
NanoWorld Arrow™ EFM probes are designed for electrostatic force microscopy. The force constant and the special coating of the EFM type are optimised for this type of application. This type of probe yields very high force sensitivity, while simultaneously enabling tapping and lift mode operation.

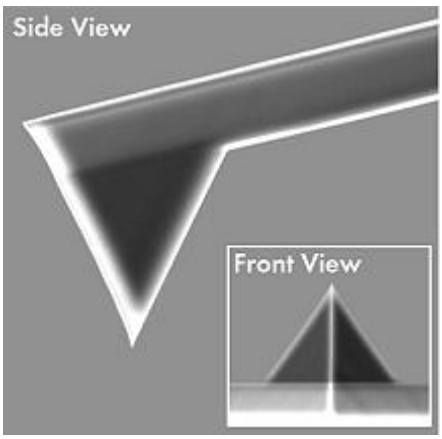
All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The probes feature a rectangular cantilever with a triangular free end and a tetrahedral tip with a height of 10 - 15 µm.

Additionally this probe offers a typical tip radius of curvature of less than 10 nm.

The unique Arrow™ shape with the tip position at the very end of the cantilever allows easy positioning of the tip on the area of interest.

The platinum iridium5 (PtIr5) coating on both sides of the probe allows electrical contacts between tip and sample (high conductivity) while enhancing the reflectivity of the cantilever. The typical tip radius of curvature is less than 25 nm.

Technical Data	Value	Range
Thickness	**3.0µm**	2.5 - 3.5
Cantilever Geometry 	**W = 35 µm** **L = 240 µm**	30 - 40 235 - 245
Force Constant	**2.8 N/m**	1.4 - 5.8
Resonance Frequency	**75 kHz**	58 - 97



Order Code	Quantity	Data Sheet
Arrow EFM-10	**10**	Nominal values
Arrow EFM-20	**20**	Nominal values
Arrow EFM-50	**50**	Nominal values
Arrow EFM-W	**380**	Nominal values

PtIr5 Coating

PtIr5 coating is an approximately 23 nm thick double layer of chromium and platinum iridium5 on both sides of the cantilever. The tip side coating enhances the conductivity of the tip and allows electrical contacts. The detector side coating enhances the reflectivity of the laser beam by a factor of 2 and prevents light from interfering within the cantilever. The coating process is optimised for stress compensation and wear resistance. The bending of the cantilever due to stress is less than 2°. Wear at the tip can occur if operating in contact-, friction- or force modulation mode.

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Type: FM

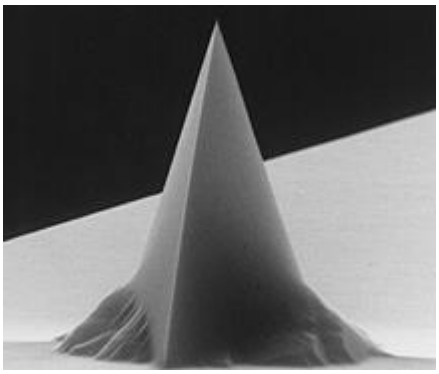
Force Modulation Mode

The NanoWorld Pointprobe® FM type is designed for Force Modulation Mode imaging. The Force Constant of the FM type fills the gap between Contact and Non-Contact probes. Furthermore Non-Contact / TappingMode imaging is possible with this probe (reduced operation stability).

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

Technical Data	Value	Range
Thickness	**3 µm**	2.5 - 3.5
Mean Width	**28 µm**	22.5 - 32.5
Length	**225 µm**	220 - 230
Force Constant	**2.8 N/m**	1.2 - 5.5
Resonance Frequency	**75 kHz**	60 - 90



Order Code	Quantity	Data Sheet
FM-10	**10**	yes
FM-20	**20**	yes
FM-50	**50**	no
FM-W	**380**	yes

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Type: FMR

Force Modulation Mode - Reflex Coating

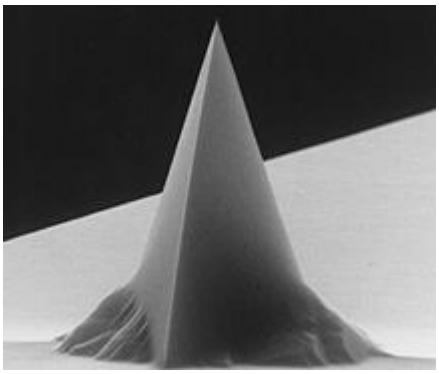
The NanoWorld Pointprobe® FM Probes are designed for Force Modulation Mode imaging. The Force Constant of the FM type fills the gap between Contact and Non-Contact probes. Furthermore Non-Contact / TappingMode imaging is possible with this probe (reduced operation stability).

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**3 µm**	2.5 - 3.5
Mean Width	**28 µm**	22.5 - 32.5
Length	**225 µm**	220 - 230
Force Constant	**2.8 N/m**	1.2 - 5.5
Resonance Frequency	**75 kHz**	60 - 90



Order Code	Quantity	Data Sheet
FMR-10	**10**	yes
FMR-20	**20**	yes
FMR-50	**50**	no
FMR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: EFM

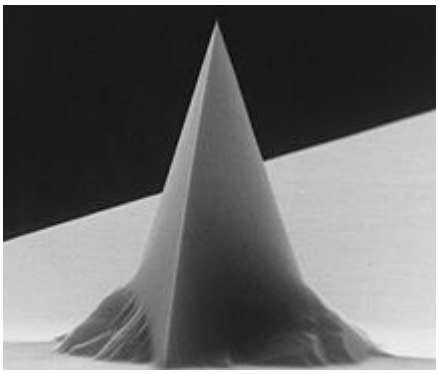
Electrostatic Force Microscopy - PtIr5 Coating

The NanoWorld Pointprobe® EFM type is designed for Electrostatic Force Microscopy. The Force Constant and the special coating of the EFM type are optimized for this type of application. This type of probe yields a very high force sensitivity, while simultaneously enabling TappingMode and Lift Mode operation.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

The platinum iridium5 (PtIr5) coating on both sides of the probe allows electrical contacts between tip and sample (high conductivity) while enhancing the reflectivity of the cantilever. The typical tip radius of curvature is less than 25 nm.

Technical Data	Value	Range
Thickness	**3 µm**	2.5 - 3.5
Mean Width	**28 µm**	22.5 - 32.5
Length	**225 µm**	220 - 230
Force Constant	**2.8 N/m**	1.2 - 5.5
Resonance Frequency	**75 kHz**	60 - 90



Order Code	Quantity	Data Sheet
EFM-10	**10**	yes
EFM-20	**20**	yes
EFM-50	**50**	no
EFM-W	**380**	yes

PtIr5 Coating

PtIr5 coating is an approximately 23 nm thick double layer of chromium and platinum iridium5 on both sides of the cantilever. The tip side coating enhances the conductivity of the tip and allows electrical contacts. The detector side coating enhances the reflectivity of the laser beam by a factor of 2 and prevents light from interfering within the cantilever. The coating process is optimized for stress compensation and wear resistance. The bending of the cantilever due to stress is less than 2°. Wear at the tip can occur if operating in Contact Mode, Friction Mode or Force Modulation Mode.

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Type: MFMR

Magnetic Force Microscopy - Reflex Coating

The NanoWorld Pointprobe® MFM type is designed for Magnetic Force Microscopy. The Force Constant and the special hard Magnetic tip side coating of the MFM type are optimized for this type of application. This type of probe yields very high force sensitivity, while simultaneously enabling TappingMode and Lift Mode operation.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

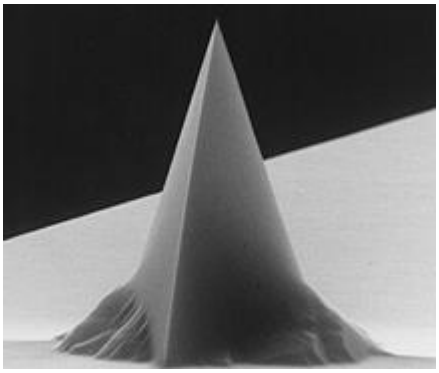
Additionally this probe offers unique features:

- typical tip radius of curvature < 50 nm
- high magnetic contrast and lateral resolution < 100 nm
- electrically conductive coating

Soft magnetic samples may be influenced by the tip magnetization!

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**3 µm**	2.5 - 3.5
Mean Width	**28 µm**	22.5 - 32.5
Length	**225 µm**	220 - 230
Force Constant	**2.8 N/m**	1.2 - 5.5
Resonance Frequency	**75 kHz**	60 - 90



Order Code	Quantity	Data Sheet
MFMR-10	**10**	yes
MFMR-20	**20**	yes
MFMR-50	**50**	no
MFMR-W	**380**	yes

Hard Magnetic Coating

Hard Magnetic coating is cobalt alloy coating on the tip side of the cantilever leading to a permanent magnetization of the tip with the direction usually along the tip axis. We recommend to magnetize the tip by means of a strong magnet (e.g. a NdFeB magnet, a few millimeters in size). As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminum coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress-free the bending of the cantilever due to stress is less than 2°.

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Type: S-MFMR

Soft Magnetic Coating - Magnetic Force Microscopy - Reflex Coating

NanoWorld Pointprobe® S-MFMR AFM probes are designed for the measurement of magnetic domains in soft magnetic samples. Due to the low coercivity of the soft magnetic tip coating the magnetisation of the tip will easily get reoriented by hard magnetic samples.

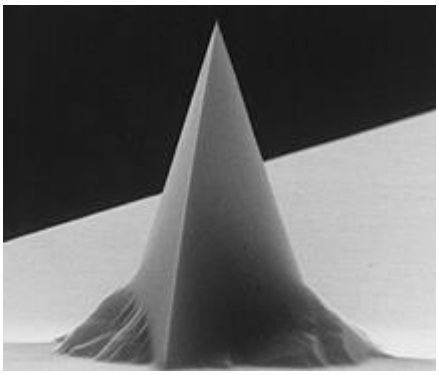
All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this sensor offers unique features:

- soft magnetic coating on the tip side (coercivity of app. 0.75 Oe, remanence magnetization of app. 225 emu/cm^3)
- effective magnetic moment 0.75x of standard probes
- tip radius of curvature of the coated tip < 30 nm
- magnetic resolution better than 35 nm

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**3 µm**	2.5 - 3.5
Mean Width	**28 µm**	22.5 - 32.5
Length	**225 µm**	220 - 230
Force Constant	**2.8 N/m**	1.2 - 5.5
Resonance Frequency	**75 kHz**	60 - 90



Order Code	Quantity	Data Sheet
S-MFMR-10	**10**	yes
S-MFMR-20	**20**	yes
S-MFMR-50	**50**	no

Soft Magnetic Coating

The S-MFMR is coated with a soft magnetic thin film. This soft magnetic coating on the tip has a coercivity of app. 0.75 Oe and a remanence magnetization of app. 225 emu/cm^3 (these values were determined on a flat surface). For enhanced signal strength the magnetization of the tip by means of a strong permanent magnet prior to the measurement is recommended.

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: DT-FMR

Diamond Coated Tip - Force Modulation Mode - Reflex Coating

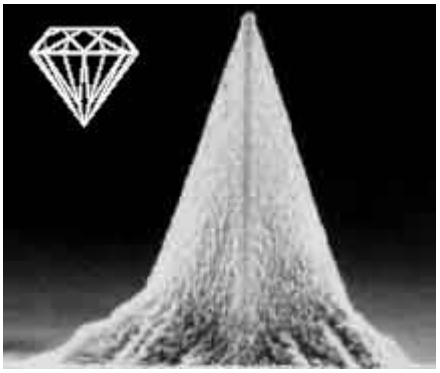
The NanoWorld Diamond Coated FM Probes are designed for Force Modulation Mode imaging. The Force Constant of the FM type fills the gap between Contact and Non-Contact probes. Furthermore Non-Contact / TappingMode imaging is possible with this probe (reduced operation stability).

The Diamond Coated type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

For applications that require hard contact between tip and sample this probe offers a real diamond tip side coating. This coating features extremely high wear resistance due to the unsurpassed hardness of diamond.
The typical macroscopic tip radius of curvature is in the range between 100 and 200 nm. Nanoroughnesses in the 10 nm regime improve the resolution on flat surfaces.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**3 µm**	2.5 - 3.5
Mean Width	**28 µm**	22.5 - 32.5
Length	**225 µm**	220 - 230
Force Constant	**2.8 N/m**	1.2 - 5.5
Resonance Frequency	**75 kHz**	60 - 90



Order Code	Quantity	Data Sheet
DT-FMR-10	**10**	yes
DT-FMR-20	**20**	yes
DT-FMR-50	**50**	no
DT-FMR-W	**380**	yes

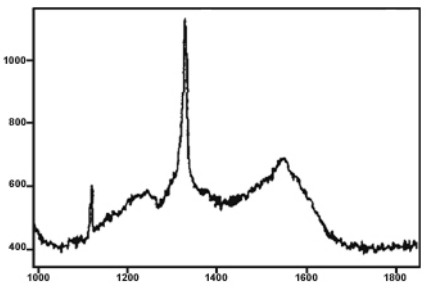


Fig.: Raman spectrum of the diamond coating

Diamond Coating

Diamond coating is an approximately 100 nm thick coating of polycrystalline diamond on the tip side of the cantilever leading to an unsurpassed hardness of the tip. The figure shows the Raman spectrum of the coating verifying true diamond.

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminum coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: CDT- FMR

Conductive Diamond Coated Tip - Force Modulation Mode – Reflex Coating

The NanoWorld Conductive Diamond Coated FM type is designed for Force Modulation Mode imaging. The Force Constant of the FM type fills the gap between Contact and Non-Contact probes. Furthermore Non-Contact / TappingMode imaging is possible with this probe (reduced operation stability).

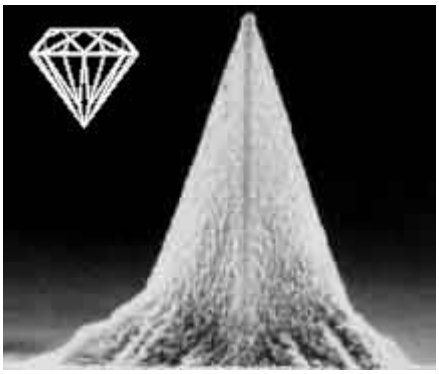
The Conductive Diamond Coated type is based on the Pointprobe® series. All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

For applications that require hard contact between tip and sample this probe offers a real diamond tip side coating. This coating features extremely high wear resistance due to the unsurpassed hardness of diamond. The typical macroscopic tip radius of curvature is in the range between 100 and 200 nm. Nanoroughnesses in the 10 nm regime improve the resolution on flat surfaces.

The CDT features a conductive diamond coating. Some typical applications for this tip are Scanning Spreading Resistance Microscopy (SSRM), Tunneling AFM (Conducting AFM) and Scanning Capacitance Microscopy (SCM).

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**3 µm**	2.5 - 3.5
Mean Width	**28 µm**	22.5 - 32.5
Length	**225 µm**	220 - 230
Force Constant	**2.8 N/m**	1.2 - 5.5
Resonance Frequency	**75 kHz**	60 - 90



Order Code	Quantity	Data Sheet
CDT-FMR-10	**10**	yes
CDT-FMR-20	**20**	yes
CDT-FMR-50	**50**	no
CDT-FMR-W	**380**	yes

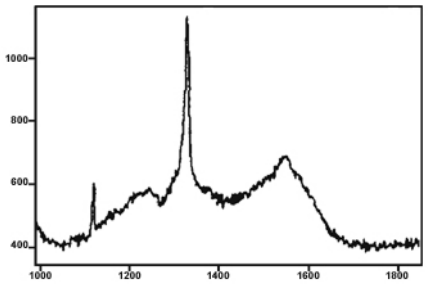


Fig.: Raman spectrum of the diamond coating

Conductive Diamond Coating

Diamond coating is an approximately 100 nm thick coating of polycrystalline diamond on the tip side of the cantilever leading to an unsurpassed hardness of the tip. The figure shows the Raman spectrum of the coating verifying true diamond.
The coating is highly doped with boron. This leads to a macroscopic resistivity of 0.003 – 0.005 Ohm*cm.

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminum coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: PNP-DB

Pyrex-Nitride Probe – Diving Board Cantilevers
Contact Mode

Leading edge in sharpness and durability

NanoWorld Pyrex-Nitride probes are designed for biological imaging in contact or dynamic mode.

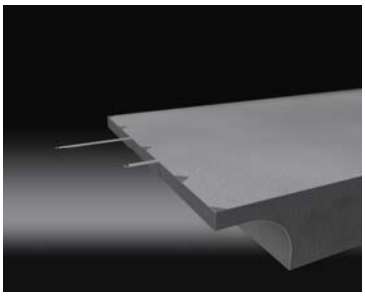
The Pyrex-Nitride probes have silicon nitride cantilevers with very low force constants and integrated oxide sharpened, pyramidal tips with a height of 3.5 µm. The tip is located 4 µm behind the free end of the cantilever. This probe series features a support chip that is made of Pyrex. Two chip versions are available: The DB series with rectangular / diving board cantilevers and the TR series having triangular cantilevers. Both sides of the chip have identical cantilevers. All cantilevers are stress compensated and have a 65 nm chromium / gold backside coating for high laser reflectivity.

All chips are pre-separated prior to shipment and come in Gel-Pak containers.

The typical tip radius of curvature of is below 10 nm. The cantilever bending is below 2°.

Pyrex-Nitride™ oxide sharpened,pyramidal tip

DB Series		
Cantilever#	**1**	**2**
Shape	Diving Board	
Overall Thickness	600 nm	600 nm
Length	100 µm	200 µm
Width (single beam)	40 µm	40 µm
Force Constant	0.48 N/m	0.06 N/m
Resonance Frequency	67 kHz	17 kHz



Please note: The above given mechanical properties are typical values.

Order Code	Quantity	Data Sheet
PNP-DB-20	**20**	**Nominal values**
PNP-DB-50	**50**	**Nominal values**

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Type: PNP-TR

Pyrex-Nitride Probe – TRiangular Cantilevers

Leading edge in sharpness and durability

NanoWorld Pyrex-Nitride probes are designed for various imaging applications in contact or dynamic mode.

The Pyrex-Nitride probes have silicon nitride cantilevers with very low force constants and integrated oxide sharpened, pyramidal tips with a height of 3.5 µm. The tip is located 4 µm behind the free end of the cantilever. The probe series features a support chip that is made of Pyrex. The TR series features two different triangular cantilevers. Both sides of the chip have identical cantilevers. All cantilevers are stress compensated and have a 65 nm chromium / gold backside coating for high laser reflectivity.

All chips are pre-separated prior to shipment and come in Gel-Pak containers.

The typical tip radius of curvature is below 10 nm. The cantilever bending is below 2°.

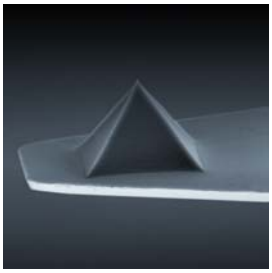


Fig. 1: Pyrex-Nitride oxide sharpened, pyramidal tip

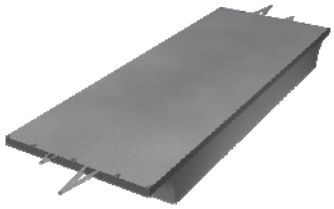
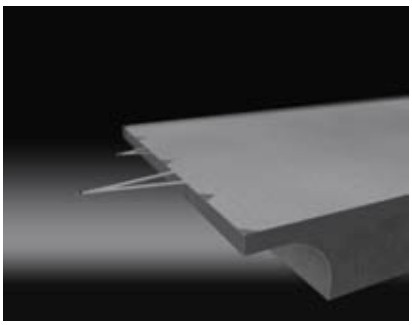


Fig. 2: Pyrex-Nitride Probe - Diving Board Cantilevers

TR Series		
Cantilever #	**1**	**2**
Shape	Triangular	
Overall Thickness	600 nm	600 nm
Length	100 µm	200 µm
Width (single beam)	2 x 13.5 µm	2 x 28 µm
Force Constant	0.32 N/m	0.08 N/m
Resonance Frequency	67 kHz	17 kHz



Please note: The above given mechanical properties are typical values.

Order Code	Quantity	Data Sheet
PNP-TR-20	**20**	**Nominal values**
PNP-TR-50	**50**	**Nominal values**

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Type: Arrow™ CONT

Contact Mode

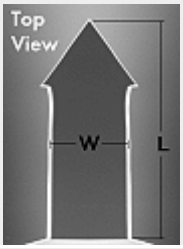
Optimized positioning through maximized tip visibility

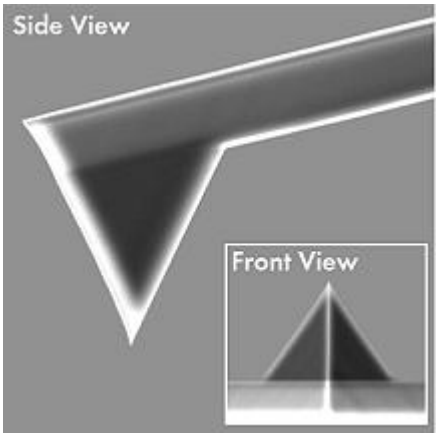
NanoWorld Arrow™ CONT probes are designed for Contact Mode imaging. Furthermore this type can be used for Force Distance Spectroscopy Mode or Pulsed Force Mode (PFM). The CONT type is optimized for high sensitivity due to a low Force Constant.

All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The probes feature a rectangular cantilever with a triangular free end and a tetrahedral tip with a height of
10 - 15 µm.

Additionally this probe offers a typical tip radius of curvature of less than 10 nm.

The unique Arrow™ shape with the tip position at the very end of the cantilever allows easy positioning of the tip on the area of interest.

Technical Data	Value	Range
Thickness	**2.0µm**	1.5 - 2.5
Cantilever Geometry 	**W = 45 µm** **L = 450 µm**	40 - 50 445 - 455
Force Constant	**0.2 N/m**	0.06 - 0.38
Resonance Frequency	**14 kHz**	10 - 19



Order Code	Quantity	Data Sheet
Arrow CONT-10	**10**	Nominal values
Arrow CONT-20	**20**	Nominal values
Arrow CONT-50	**50**	Nominal values
Arrow CONT-W	**380**	Nominal values

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Type: Arrow™ CONTR

Contact Mode - Reflex Coating

Optimized positioning through maximized tip visibility

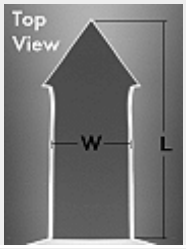
NanoWorld Arrow™ CONT probes are designed for Contact Mode imaging. Furthermore this type can be used for Force Distance Spectroscopy Mode or Pulsed Force Mode (PFM). The CONT type is optimized for high sensitivity due to a low Force Constant.

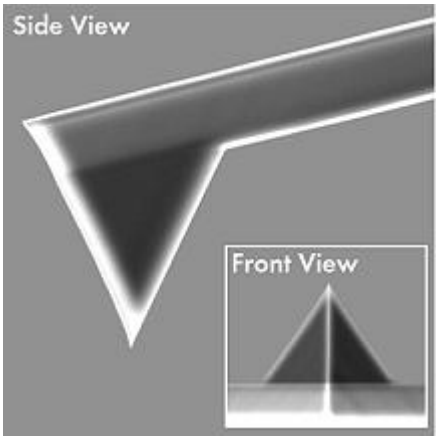
All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The probes feature a rectangular cantilever with a triangular free end and a tetrahedral tip with a height of
10 - 15 µm.

Additionally this probe offers a typical tip radius of curvature of less than 10 nm.

The unique Arrow™ shape with the tip position at the very end of the cantilever allows easy positioning of the tip on the area of interest.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**2.0µm**	1.5 - 2.5
Cantilever Geometry 	**W = 45 µm** **L = 450 µm**	40 - 50 445 - 455
Force Constant	**0.2 N/m**	0.06 - 0.38
Resonance Frequency	**14 kHz**	10 - 19



Order Code	Quantity	Data Sheet
Arrow CONTR-10	**10**	Nominal values
Arrow CONTR-20	**20**	Nominal values
Arrow CONTR-50	**50**	Nominal values
Arrow CONTR-W	**380**	Nominal values

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminum coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: Arrow™ CONTPt

Contact Mode – PtIr5 Coating

Optimized positioning through maximized tip visibility

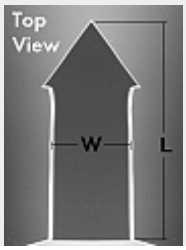
NanoWorld Arrow™ CONTPt AFM probes are designed for Contact Mode imaging. Furthermore this type can be used for Force Distance Spectroscopy Mode or Pulsed Force Mode (PFM). The CONT type is optimized for high sensitivity due to a low Force Constant.

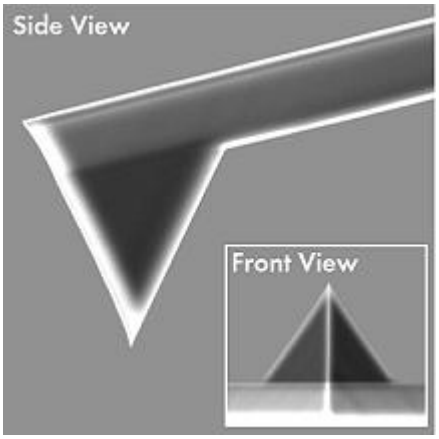
All AFM probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The SPM probes feature a rectangular cantilever with a triangular free end and a tetrahedral tip with a height of 10 - 15 µm.

Additionally this probe offers a typical tip radius of curvature of less than 10 nm.

The unique Arrow™ shape with the tip position at the very end of the cantilever allows easy positioning of the tip on the area of interest.

The platinum iridium5 (PtIr5) coating on both sides of the probe allows electrical contacts between tip and sample (high conductivity) while enhancing the reflectivity of the cantilever. The typical tip radius of curvature is less than 25 nm.

Technical Data	Value	Range
Thickness	**2.0µm**	1.5 - 2.5
Cantilever Geometry		
	**W = 45 µm** **L = 450 µm**	40 - 50 445 - 455
Force Constant	**0.2 N/m**	0.06 - 0.38
Resonance Frequency	**14 kHz**	10 - 19



Order Code	Quantity	Data Sheet
Arrow CONTPt-10	**10**	Nominal values
Arrow CONTPt-20	**20**	Nominal values
Arrow CONTPt-50	**50**	Nominal values
Arrow CONTPt-W	**380**	Nominal values

PtIr5 Coating

PtIr5 Coating PtIr5 coating is an approximately 23 nm thick double layer of chromium and platinum iridium5 on both sides of the cantilever. The tip side coating enhances the conductivity of the tip and allows electrical contacts. The detector side coating enhances the reflectivity of the laser beam by a factor of 2 and prevents light from interfering within the cantilever. The coating process is optimised for stress compensation and wear resistance. The bending of the cantilever due to stress is less than 2°. Wear at the tip can occur if operating in contact-, friction- or force modulation mode.

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Type: CONT

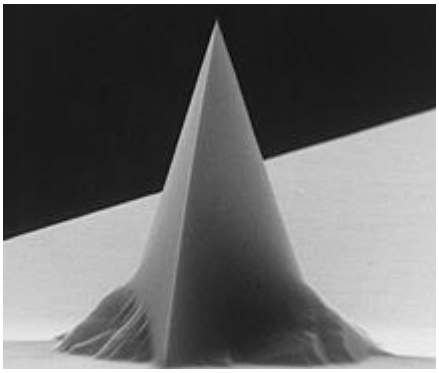
Contact Mode

The NanoWorld Pointprobe® CONT type is designed for Contact Mode imaging. Furthermore this type can be used for Force Distance Spectroscopy Mode or Pulsed Force Mode (PFM). The CONT type is optimized for high sensitivity due to a low Force Constant.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

Cantilever Data	Value	Range
Thickness	**2 µm**	1.5 - 2.5
Mean Width	**50 µm**	45 - 55
Length	**450 µm**	445 - 455
Force Constant	**0.2 N/m**	0.07 - 0.4
Resonance Frequency	**13 kHz**	9 - 17



Order Code	Quantity	Data Sheet
CONT-10	**10**	yes
CONT-20	**20**	yes
CONT-50	**50**	no
CONT-W	**385**	yes

For Lateral Force Microscopy (LFM) we recommend our specially tailored LFM type.

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Type: CONTR

Contact Mode - Reflex Coating

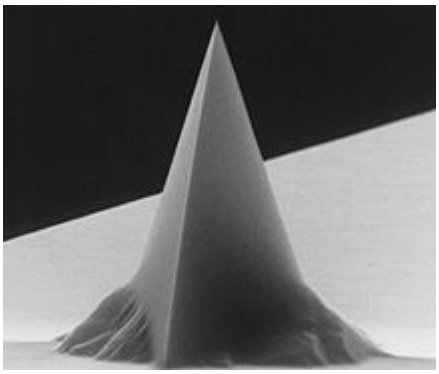
The NanoWorld Pointprobe® CONT type is designed for Contact Mode imaging. Furthermore this probe can be used for Force Distance Spectroscopy Mode or Pulsed Force Mode (PFM). The CONT type is optimized for high sensitivity due to a low Force Constant.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**2 µm**	1.5 - 2.5
Mean Width	**50 µm**	45 - 55
Length	**450 µm**	445 - 455
Force Constant	**0.2 N/m**	0.07 - 0.4
Resonance Frequency	**13 kHz**	9 - 17



Order Code	Quantity	Data Sheet
CONTR-10	**10**	yes
CONTR-20	**20**	yes
CONTR-50	**50**	no
CONTR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

For Lateral Force Microscopy (LFM) we recommend our specially tailored LFMR type with reflex coating.

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Type: CONTPt

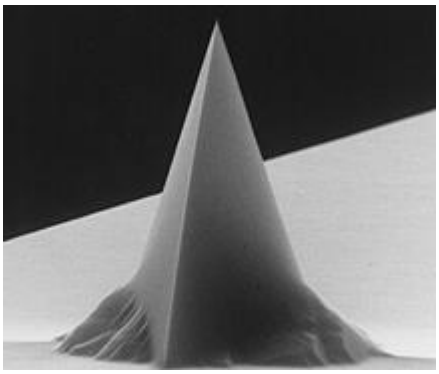
Contact Mode - PtIr5 Coating

The NanoWorld Pointprobe® CONT type is designed for Contact Mode imaging. Furthermore this type can be used for Force Distance Spectroscopy Mode or Pulsed Force Mode (PFM). The CONT type is optimized for high sensitivity due to a low Force Constant.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10 -15 µm.

The platinum iridium5 (PtIr5) coating on both sides of the probe allows electrical contacts between tip and sample (high conductivity) while enhancing the reflectivity of the cantilever. The typical tip radius of curvature is less than 25 nm.

Technical Data	Value	Range
Thickness	**2 µm**	1.5 - 2.5
Mean Width	**50 µm**	45 - 55
Length	**450 µm**	445 - 455
Force Constant	**0.2 N/m**	0.07 - 0.4
Resonance Frequency	**13 kHz**	9 - 17



Order Code	Quantity	Data Sheet
CONTPt-10	**10**	yes
CONTPt-20	**20**	yes
CONTPt-50	**50**	no
CONTPt-W	**380**	yes

PtIr5 Coating

PtIr5 coating is an approximately 23 nm thick double layer of chromium and platinum iridium5 on both sides of the cantilever. The tip side coating enhances the conductivity of the tip and allows electrical contacts. The detector side coating enhances the reflectivity of the laser beam by a factor of 2 and prevents light from interfering within the cantilever. The coating process is optimized for stress compensation and wear resistance. The bending of the cantilever due to stress is less than 2°. Wear at the tip can occur if operating in Contact Mode, Friction Mode or Force Modulation Mode.

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Type: CONTSC

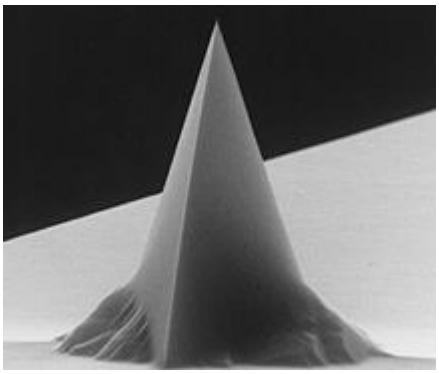
Contact Mode – Short Cantilever

NanoWorld Pointprobe® CONTSC AFM probe is an alternative cantilever type for contact mode applications. The length of cantilever is reduced with respect to the preferred contact mode type enabling easier exchange with non-contact mode probes for some AFM instruments. Additionally, this probe type allows the application for lateral or friction force mode.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10 -15 µm.

Additionally this probes offers typical tip radius of curvature of less than 8 nm.

Technical Data	Value	Range
Thickness	**1 µm**	0.5 - 1.5
Mean Width	**48 µm**	42.5 – 52.5
Length	**225 µm**	220 - 230
Force Constant	**0.2 N/m**	0.02 - 0.7
Resonance Frequency	**23 kHz**	10 - 39



Order Code	Quantity	Data Sheet
CONTSC-10	**10**	yes
CONTSC-20	**20**	yes
CONTSC-50	**50**	no
CONTSC-W	**380**	yes

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Type: CONTSCR

Contact Mode – Short Cantilever – Reflex Coating

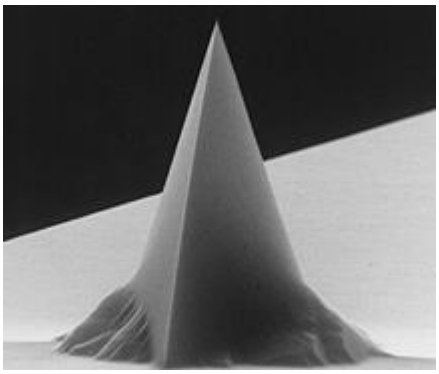
NanoWorld Pointprobe® CONTSCR AFM probe is an alternative cantilever type for contact mode applications. The length of cantilever is reduced with respect to the preferred contact mode type enabling easier exchange with non-contact mode probes for some AFM instruments. Additionally, this probe type allows the application for lateral or friction force mode.

All SPM probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10 -15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

The reflex coating on the detector side of the cantilever enhances its reflectivity and prevents light from interfering within the cantilever.

Technical Data	Value	Range
Thickness	**1 µm**	0.5 - 1.5
Mean Width	**48 µm**	42.5 – 52.5
Length	**225 µm**	220 - 230
Force Constant	**0.2 N/m**	0.02 - 0.7
Resonance Frequency	**23 kHz**	10 - 39



Order Code	Quantity	Data Sheet
CONTSCR-10	**10**	yes
CONTSCR-20	**20**	yes
CONTSCR-50	**50**	no
CONTSCR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: ZEILR

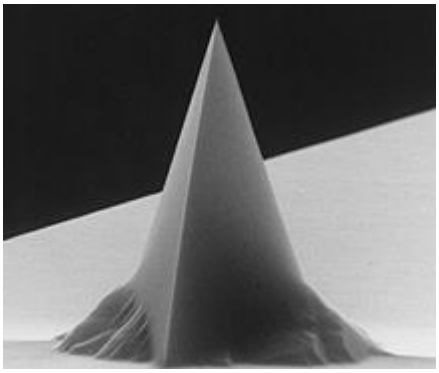
ZEISS Veritekt microscopes - Contact Mode
Low Force Constant - Reflex Coating

The NanoWorld Pointprobe® ZEILR type is designed for owners of the Zeiss Veritekt or a Seiko Instruments microscope using the Contact Mode. Compared to the Pointprobe® Contact Mode type the Force Constant is slightly increased.

All probes of the Pointprobe® series are made from monolithic silicon which is highly doped to dissipate static charge. They are chemically inert and offer a high mechanical Q-factor for high sensitivity. The tip is shaped like a polygon based pyramid with a height of 10-15 µm.

Additionally this probe offers typical tip radius of curvature of less than 8 nm.

Technical Data	Value	Range
Thickness	**4 µm**	3.5 - 4.5
Mean Width	**55 µm**	50 - 60
Length	**450 µm**	445 - 455
Force Constant	**1.6 N/m**	1.0 - 2.6
Resonance Frequency	**27 kHz**	23 - 31



Order Code	Quantity	Data Sheet
ZEILR-10	**10**	yes
ZEILR-20	**20**	yes
ZEILR-50	**50**	no
ZEILR-W	**380**	yes

Reflex Coating

Reflex coating is an approximately 30 nm thick aluminium coating on the detector side of the cantilever which enhances the reflectivity of the laser beam by a factor of 2.5. Furthermore it prevents light from interfering within the cantilever. As the coating is almost stress free the bending of the cantilever due to stress is less than 2°.

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Type: Arrow™ TL1

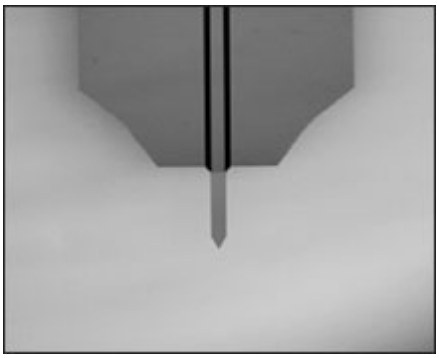
Tipless Cantilevers

NanoWorld Arrow™ TL1 probes are tipless cantilevers for special applications. They can for example be used for attaching spheres and other objects to the free end of the cantilever, or for functionalizing and sensing applications.

All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge and are chemically inert. The TL1 probes feature one rectangular cantilever with a triangular free end.

The Arrow™ TL1 probes are optionally available with a top side coating of 5 nm titanium / 30 nm gold.

Cantilever Data	Value	Range
Thickness	**1.0 µm**	0.5 - 2.5
Width (rectangular part)	**100 µm**	95 - 105
Length	**500 µm**	495 - 505
Force Constant	**0.03 N/m**	0.004 - 0.54
Resonance Frequency	**6 kHz**	3 - 14



Order Code without coating	Quantity	Data Sheet
Arrow TL1-50	**50**	Nominal values
Order Code with Ti/Au coating	**Quantity**	**Data Sheet**
Arrow TL1Au-50	**50**	Nominal values

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Type: Arrow™ TL2

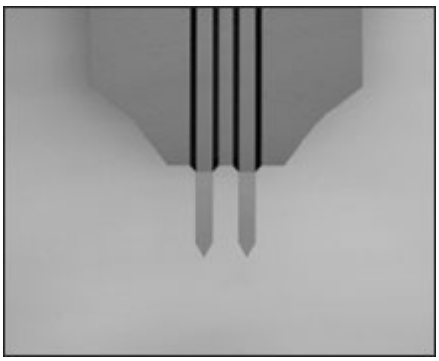
Tipless Cantilevers

NanoWorld Arrow™ TL2 probes are tipless cantilevers for special applications. They can for example be used for attaching spheres and other objects to the free end of the cantilever, or for functionalizing and sensing applications.

All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge and are chemically inert. The TL2 probes feature two rectangular cantilevers having a triangular free end.
The cantilevers have a pitch of 250 µm.

The Arrow™ TL2 probes are optionally available with a top side coating of 5 nm titanium / 30 nm gold.

Cantilever Data	Value	Range
Thickness	**1.0 µm**	0.5 - 2.5
Width (rectangular part)	**100 µm**	95 - 105
Length	**500 µm**	495 - 505
Force Constant	**0.03 N/m**	0.004 - 0.54
Pitch	**250 µm**	n.a.
Resonance Frequency	**6 kHz**	3 - 14



Order Code without coating	Quantity	Data Sheet
Arrow TL2-50	**50**	Nominal values
Order Code with Ti/Au coating	**Quantity**	**Data Sheet**
Arrow TL2Au-50	**50**	Nominal values

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Type: Arrow™ TL8

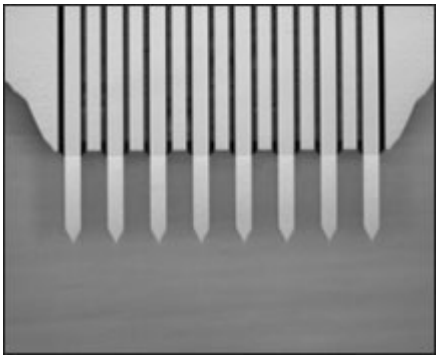
Tipless Cantilevers

NanoWorld Arrow™ TL8 probes are tipless cantilevers for special applications. They can for example be used for attaching spheres and other objects to the free end of the cantilever, or for functionalizing and sensing applications.

All probes of the Arrow™ series are made from monolithic silicon which is highly doped to dissipate static charge and are chemically inert. The TL8 probes feature eight rectangular cantilevers having a triangular free end.
The cantilevers have a pitch of 250 µm.

The Arrow™ TL8 probes are optionally available with a top side coating of 5nm titanium / 30nm gold.

Cantilever Data	Value	Range
Thickness	**1.0 µm**	0.5 - 2.5
Width (rectangular part)	**100 µm**	95 - 105
Length	**500 µm**	495 - 505
Force Constant	**0.03 N/m**	0.004 - 0.54
Pitch	**250 µm**	n.a.
Resonance Frequency	**6 kHz**	3 - 14



Order Code without coating	Quantity	Data Sheet
Arrow TL8-50	**50**	Nominal values
Order Code with Ti/Au coating	**Quantity**	**Data Sheet**
Arrow TL8Au-50	**50**	Nominal values

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Type: PNP-TR-TL

Pyrex-Nitride Probe – TRiangular Cantilevers - TipLess

Leading edge in sharpness and durability

NanoWorld Pyrex-Nitride™ probes are designed for various imaging applications in contact or dynamic mode. Tipless cantilevers are often used for applications that require functionalization of the cantilever surface or attaching objects (like spheres or particles) to the end of the cantilever. These and various other applications are especially interesting for the fields of life science and biology.

The Pyrex-Nitride™ probes have silicon nitride cantilevers with very low force constants. The probe series features a support chip that is made of Pyrex. The TR series features two different triangular cantilevers. Both sides of the chip have identical cantilevers. All cantilevers are stress compensated and have a 65 nm chromium / gold backside coating for high laser reflectivity.

All chips are pre-separated prior to shipment and come in Gel-Pak containers.

The cantilever bending is below 2°.

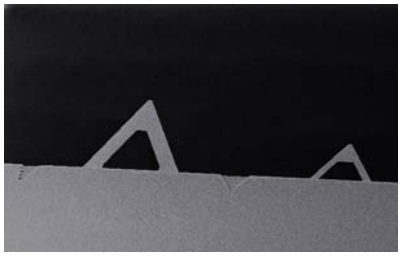


Fig. 1: Pyrex-Nitride oxide sharpened, pyramidal tip

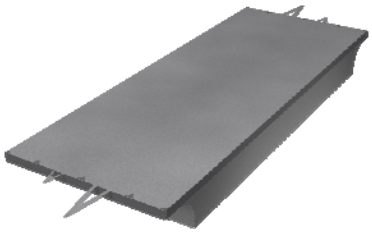
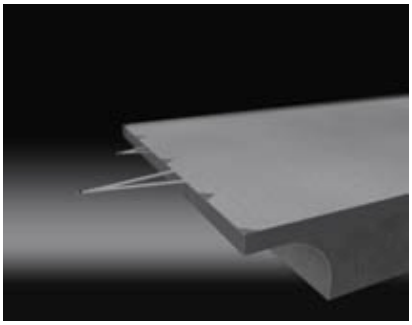


Fig. 2: Pyrex-Nitride Probe - Diving Board Cantilevers

TR Series		
Cantilever#	**1**	**2**
Shape	Triangular	
Overall Thickness	600 nm	600 nm
Length	100 µm	200 µm
Width (single beam)	2 x 13.5 µm	2 x 28 µm
Force Constant	0.32 N/m	0.08 N/m
Resonance Frequency	67 kHz	17 kHz



Please note: The above given mechanical properties are typical values.

Order Code	Quantity	Data Sheet
PNP-TR-TL-20	**20**	**Nominal values**
PNP-TR-TL-50	**50**	**Nominal values**

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Type: PNP-TR-TL-Au

Pyrex-Nitride Probe – TRiangular Cantilevers – TipLess – Coating (Au)

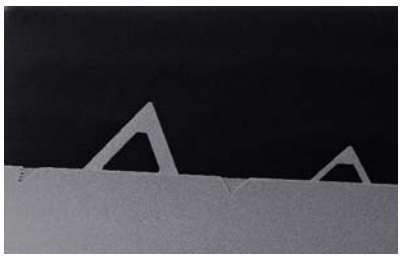
Leading edge in sharpness and durability

NanoWorld Pyrex-Nitride™ probes are designed for various imaging applications in contact or dynamic mode. Tipless cantilevers are often used for applications that require functionalization of the cantilever surface or attaching objects (like spheres or particles) to the end of the cantilever. These and various other applications are especially interesting for the fields of life science and biology.

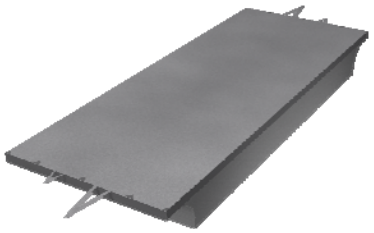
The Pyrex-Nitride™ probes have silicon nitride cantilevers with very low force constants. The probe series features a support chip that is made of Pyrex. The TR series features two different triangular cantilevers. Both sides of the chip have identical cantilevers. All cantilevers are stress compensated and have a 35 nm chromium / gold coating on both sides.

All chips are pre-separated prior to shipment and come in Gel-Pak containers.

The cantilever bending is below 2°.

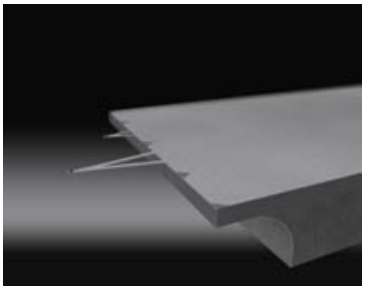


Pyrex-Nitride™ Triangular Tipless Cantilever



Pyrex-Nitride™ Probe – Triangular Tipless Cantilevers

TR Series		
Cantilever#	**1**	**2**
Shape	Triangular	
Overall Thickness	600 nm	600 nm
Length	100 µm	200 µm
Width (single beam)	2 x 13.5 µm	2 x 28 µm
Force Constant	0.32 N/m	0.08 N/m
Resonance Frequency	67 kHz	17 kHz



Please note: The above given mechanical properties are typical values.

Order Code	Quantity	Data Sheet
PNP-TR-TL-Au-20	**20**	**Nominal values**
PNP-TR-TL-Au-50	**50**	**Nominal values**

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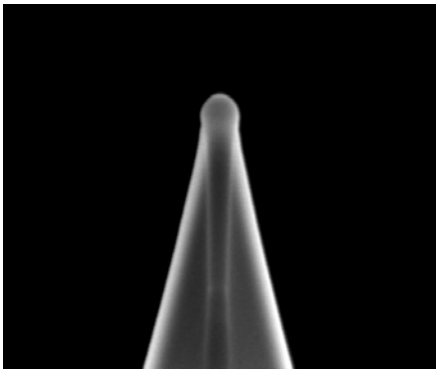
Special Developments

Sphere Tips

Spherical Tip with silicon oxide coating and a tip radius in the range of 2 µm

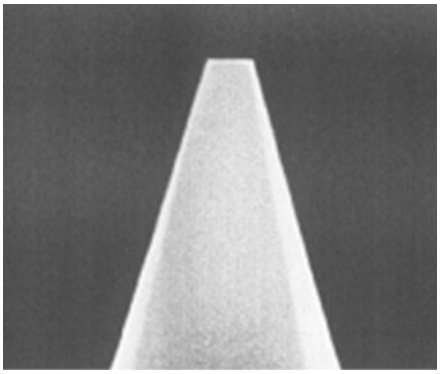
For further information please contact developers@nanoworld.com



Plateau Tip

We are also offering tips with a defined plateau between 1 µm and 8 µm. The picture shows a plateau with a side length of about 1 µm.

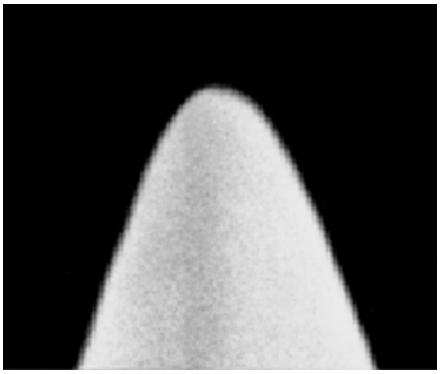
For further information please contact developers@nanoworld.com



Rounded Tip

The rounding is possible with all types of our Pointprobe® products. The tip radius of curvature can be chosen between 50 nm and 500 nm. The picture shows a tip with a radius of 200 nm.

For further information please contact developers@nanoworld.com



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Type: ALIGN

Alignment Chip

The alignment chip (ALIGN) is used for a reproducible alignment of the Pointprobe® probes to the detection system. The chip has three ridges that fit exactly into corresponding grooves at the backside of every Pointprobe®, SuperSharpSilicon™ (SSS) and High Aspect Ratio Probe. Due to this alignment mechanism the SPM-Probe can be changed with precise repositioning of the tip within ±2 µm.

Technical Data	Value	Range
Width	**2900 µm**	±50 µm
Length	**3400 µm**	±50 µm
Thickness	**525 µm**	±25 µm

Order Code	Quantity	Coating
ALIGN – 10	**10**	Chromium

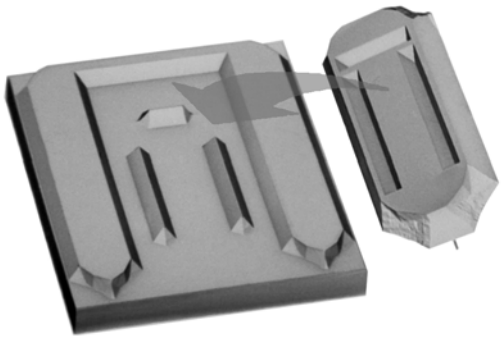

Fig.: Picture of alignment chip and backside of Pointprobe® Probe

Technical features

- reproducible positioning
- fits on all Pointprobe®, SuperSharpSilicon™ (SSS) and High Aspect Ratio Probes
- chromium coating

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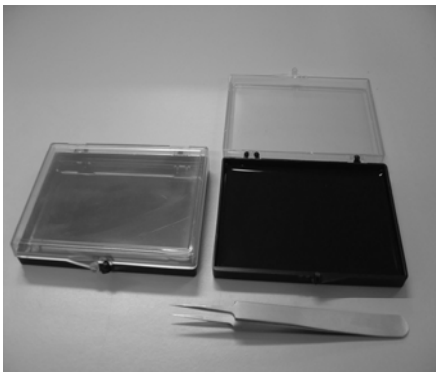
Type: TS-KIT

Tip storage Kit

The Tip Storage Kit (TS-KIT) consists of 10 NanoWorld antistatic standard GelPak® boxes with picking tweezers.



Type: ESD-KIT

ESD Safe Handling Kit

Dissipative anti-static rubber mat, grounding wire 3 m in length and wristband to ensure ESD-safe handling of our AFM probes.

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Terms and conditions

Selection

Subject to availability sets of 10 probes or sets of 20 probes can be selected according to customer requirements (e.g. with narrow tolerances). The additional selection fee is 66.00 US$ per set.

Guarantees

YIELD: We guarantee more than 90% good probes (exception: For SuperSharpSilicon™ cantilever tips, Diamond Coated tips and Conductive Diamond Coated tips we guarantee more than 80% good probes). Every good probe meets the respective specifications.

TIP RADIUS: For good probes we guarantee a tip radius of smaller than 12 nm (uncoated probes only). The typical tip radius is better than 8 nm. For SuperSharpSilicon™ cantilever probes we guarantee a tip radius of smaller than 5 nm, the typical tip radius is in the order of 2 nm. Coated tips have a typical radius in the order of the layer thickness.

ASPECT RATIO: For the High Aspect Ratio tips AR5 and the Tilt Compensated High Aspect Ratio tips AR5T we guarantee an aspect ratio of **5:1** for the last 2 µm of the tip. The typical aspect ratio is in the order of **7:1**.
For the High Aspect Ratio tips AR10 we guarantee an aspect ratio of **10:1** for the last 1.5 µm of the tip. The typical aspect ratio is in the order of **12:1**.

COATINGS: Although the coatings are almost free of stress it cannot be avoided completely. The bending of the cantilever due to stress is less than 2°.

Terms

TERMS: Prices are FCA Neuchâtel including packing & insurance, but exclusive of any tax and custom duties. For international transports a flat rate of 80.00 US$ is added to the invoice. Shipment is via Federal Express. Other carriers are subject to an additional handling charge (minimum 100.00 US$ for international shipments).

DELIVERY: Delivery period is 1 week if in stock, otherwise up to 4 months depending on status of processing.

Contact

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