AppNano

SPM PROBES AND ACCESSORIES

2017

General Info

VertiSense Thermal Imaging

Silicon Probes

Tip View Silicon Probes

Coated Probes

Silicon Nitride Probes

Special / Custom Probes

Membranes/ Standards

STM Probes

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AppNano develops, manufactures, and supplies various nanostructures including both conventional and specialized SPM probes for most applications. We leverage our extensive experience in nanofabrication technology and research in AFM probes to supply the highest quality probes utilizing the latest technology in the market. Our in-house clean room facility combined with our state-of-the-art characterization tools enables rapid prototyping, adaptability, and versatility in designing and developing new products for our customers. Major research programs are continuously underway both in-house and with external collaborators to develop high performance probes for advanced applications.

We are the only AFM probe manufacturer who makes the most varieties of application enabling probes in the world. Our company continues to innovate new nanoscale imaging applications through probes .

We guarantee our probes to be compatible with all commercially available AFMs including those manufactured by the following manufacturers :

AIST-NT / Horiba	Molecular Vista
Anasys Instruments	Nanosurf
Alfantac	Nano pacific
ATC	Nanonics
Bruker Veeco , DI)	Oxford (Asylum Research)
CSI	Park System
DME / Semilab	RHK Technology
Hitachi (Seiko)	Shimadzu
JPK Instrument	WiTek
Keysight (Molecular Imaging, PNI)	Jeol
NT-MDT	AFM Workshop

Featured products

VertiSense SThM Module

- **Patented probe design**
- Excellent **spatial thermal resolution: up to 20 nm**
- Very high **Thermal sensitivity: <0.01 °C**
- Wide range of temperature measurements: **20 °C - 700 °C**
- Both **thermal conductivity mapping** and **temperature mapping**

See page# 10-14 for details

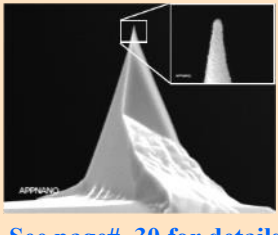
SThM Probe Calibration Unit

- **Precise Temperature Control**
- Calibration up to 300 **°C**
- Ceramic embedded micro-heater and thermocouple assembly.
- Local Sample Heating

See page# 14 for details

Titanium Nitride (TiN) Coated Probes

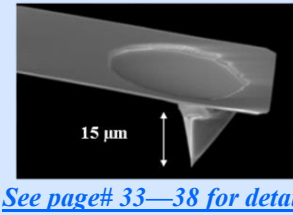
- **Excellent Conductivity & Voltage stability (up to 6V)**
- **Very good wear resistance**
- **Sharp tip for high resolution imaging**



See page# 30 for details

Nitra Tall Probes

- **Extra tip height-** ***Reduced artifacts when imaging tall features***
- **Integrated laser reflecting pad-** ***for optional gold coating***
- **Reduced thermal drift-** ***when used with no gold coating***



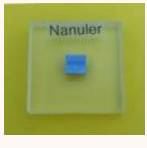
See page# 33—38 for details

Featured products

STM Tip Etcher

- Precise control of electro-chemical etching parameters
- Reproducible tip ROC and aspect ratio
- User controlled etch parameters for custom tip shapes
- Optional Add-on for
  (i) Electroplating and
  (ii) Pt tip Etching

See page 49 for details



Step Height Standards

- For **AFMs and Profilers**
- Range **0.1 µm to 50 µm**
- **+ve and –ve Step Heights**
- **Metal** coated option
- **Quartz and Metal Disk** mount option

Details Page # 51

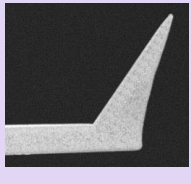
EFM Standards

- **SiO2 - Metal lines**
- **Bonded/ Wired on Chip**

Details Page # 53

OMNI™ TERS Probes

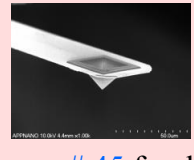
- Enables all modes of TERS
- Protected Raman active Ag layer



See page 44 for details

SNOM Aperture Probes

- Cantilever based aperture probes
- Customized aperture size

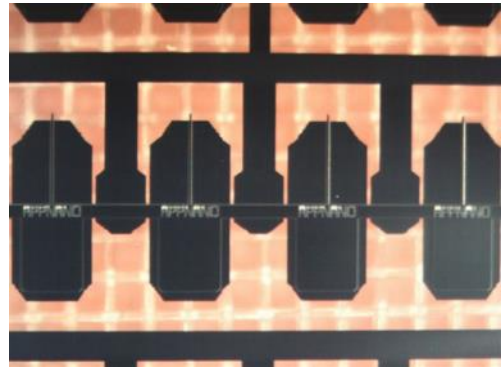


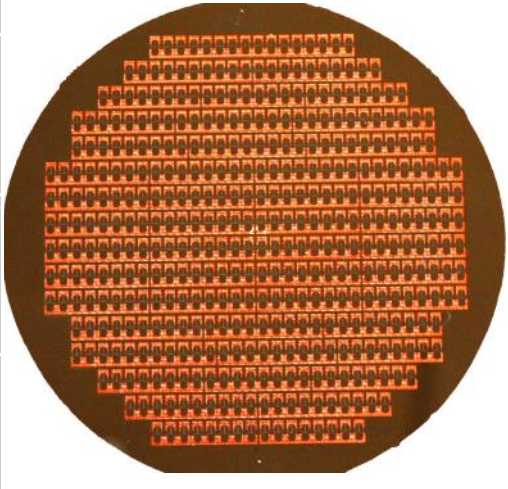
See page # 45 for details

AppNano Patented Wafer Form

The "old-style" wafer form, offered by most manufacturers, makes the removal of chips difficult and tedious. The use of tweezers is impaired by thick beams leaving little area for tweezers. Additionally, horizontal beams tend to be nearly 250 µm thick. Removal of tips requires more force which often causes beams to shatter. The resulting fragments are a serious problem as they can destroy the tip apex of other probes on the wafer. The traditional wafer form has often been a problem and reduces the benefits of bulk purchasing.

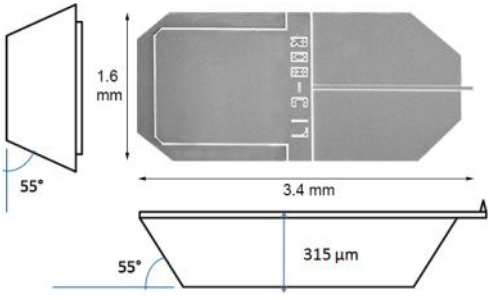
AppNano developed a patented wafer form with major improvements. This new form allows for open tweezers access to the bottom half of the AFM probe chip. Open access makes removal easy without damaging the cantilever or tip. Thin 50 µm horizontal silicon beams hold the chip in place while remaining easy to break when force is applied for removal.





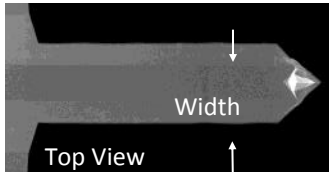
The chip holding beams are strategically positioned. They allow for maximum access to the probes while utilizing tweezers. The beam placement also maintains a sturdy holding structure for the probes.

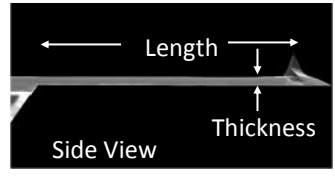
Probe Chip & Wafer Specifications



Probe Chip Dimensions - The dimensions of the probe chip are 3400 x 1600 x 315 µm (Length x Width x Thickness).

Chip Backside: All probes have Grooves on the backside for alignment chips.



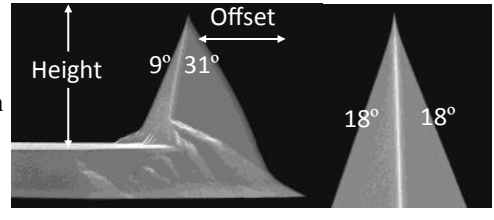


Cantilever– The length of the cantilever is measured from the chip body to

Tip- AppNano silicon probe tips are available in tetrahedral and triangular

Tetrahedral Tips:

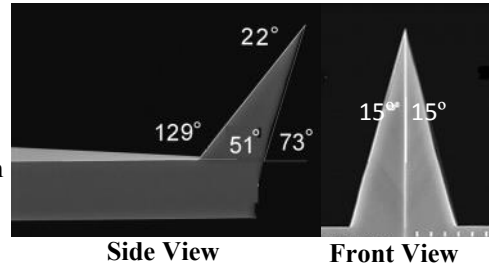
- Tip height range: 14 to 16 µm
- Tip offset range: 15 to 25 µm



Side View **Front View**

Triangular Tips:
ACCESS Probe series has triangular tips: These tips are at the extreme end of the cantilever.

- Tip height range: 14 to 16 µm
- Apex half cone angle is 11°



Side View **Front View**

Material - AppNano silicon probes are manufactured out of prime grade, low resistivity (0.010 to 0.025 Ω-cm), n-type Antimony doped, single crystal silicon. Well-established silicon technology combined with novel micro-fabrication processes are the key ingredients for achieving consistent high

Terms & Conditions, Packaging

Terms & Conditions

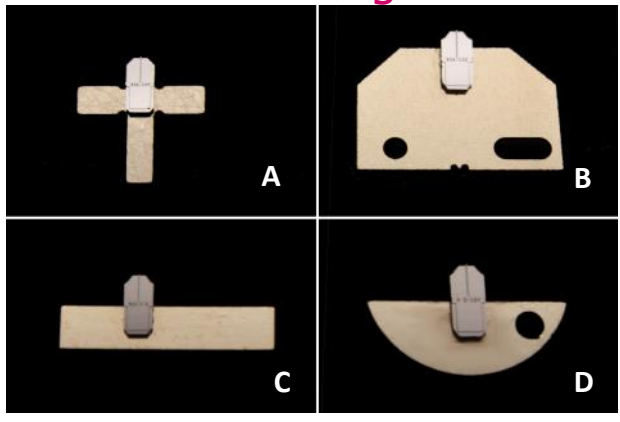
- **FCA:** Origin
- **Payment:** Prepaid or Net 30 days upon approved credit.
- **Freight Charges:** All freight charges are to be paid by the buyer.
- **Warranty:** Six months after shipping subject to standard storage and handling conditions. Contact AppNano customer support for details.
- **Delivery:** All products are shipped on a best effort basis depending upon availability.
- **Acceptance:** Acceptance of these products is assumed if AppNano has not been contacted about the AFM Probes within 30 days of receipt of goods. All prices and specifications are subject to change. Specifications listed are the nominal specifications for each product. Visit our website for specification ranges. If certain specifications are critical to your application, please contact our technical staff to verify specifications prior to purchase. For a complete copy of our Terms & Conditions, contact info@appnano.com.

Probe Packaging: AppNano Probes are carefully packed and shipped in conducting and ESD safe boxes. Our standard package sizes are 5**,** 10, 20, 50, 200 and full wafer (410+) probes.

AppNano ESD safe 50 Probe box.

AppNano ESD safe wafer box.

Custom Probe Mounting



Some AFM systems require AFM probes that have been pre-mounted on special probe holders. AppNano supplies pre-mounted probes for most major AFM systems for a small fee. The type of system must be specified at the time of ordering. AppNano has the technology and fixtures to correctly mount any of our AFM probes for systems manufactured by :
A: Ambios Technology, Quesant
B: Park Systems
C: Pacific Nanotechnology (PNI), NanoInk
D: Selected models from Bruker (Including TopoMetrix, PSIA and TM Microscope)

If you have a different brand of AFM than listed above, contact us for information on probe mounting.

Characterization and Metrology

In addition to probe production, AppNano offers a variety of imaging characterization services using the state-of-the-art equipment in our facility. Possible sample types for this process include polymers, metallurgical samples, electronic materials, ceramics, and particles and contaminants on various surfaces.

Available services:

- Atomic Force Microscopy (AFM)
- Field Emission Scanning Electron Microscopy (FE-SEM)
- Focused Ion Beam (FIB)
- Thin film deposition up to 6” substrate

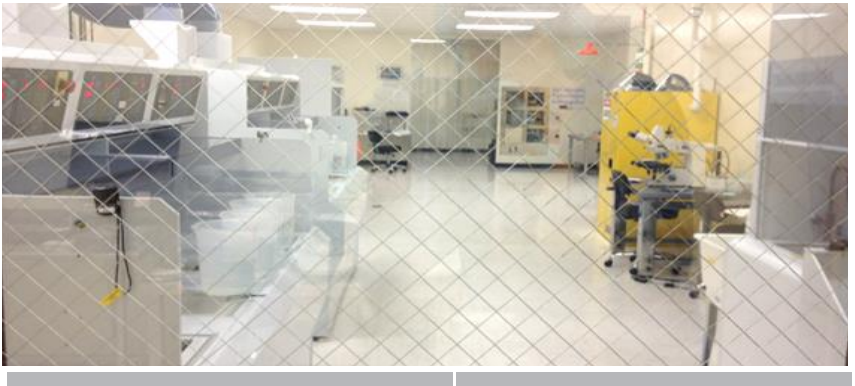
Contact: info@appnano.com for more information.

Custom MEMS & Nanofabrication

In addition to providing you with our standard catalog of products, Applied NanoStructures enjoys working with customers to develop new probes and devices for advanced applications. Our experienced Research and Development team takes pride in using our knowledge of silicon nanofabrication

Advanced Manufacturing Clean Room Facility

- Wet Chemical Processing
- Diffusion / Oxidation Processing
- Metallization (Al, Cr, Ti, Au, Ni, Ag, PtIr, etc.)
- Focused Ion Beam (FIB)
- Dry Etching Processing
- Physical Vapor Deposition
- Photolithography
- Optical and Electrical Characterization
- Scanning Probe and Scanning Electron Microscopy (FESEM) Imaging



R&D, Manufacturing & QA	OEM / Custom Nanofabrication
Suited for rapid prototyping as well as batch processing	Nano Thermal Analysis Probes
	Piezoresistive Cantilevers
Complete facility to develop, manufacture, qualify and test MEMS devices	Flat Tip Probes
	MOSFET Cantilevers
Continual upgrades to the facility with new equipment	Tall Tip Probes
	Custom MEMS devices

Please contact us at info@appnano.com if you would like to discuss the creation of a custom product.

VertiSense™ SThM Module

R&D 100 2014 Winner

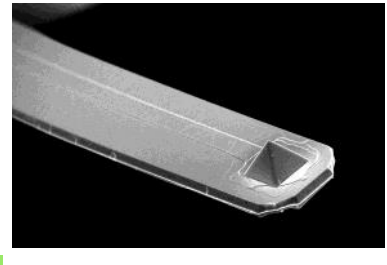
Microscopy TODAY 2014 Innovation Award

Scanning Thermal Microscopy Module and Probes

- **Accurate nanoscale temperature** measurement
- Ultra **high thermal spatial resolution** (up to 20 nm)
- **High local temperatures** (up to 700° C) with minimal bending of cantilever
- **Excellent thermal sensitivity** (0.01° C)
- Thermal **conductivity contrast and temperature contrast** mapping modes
- Supports **Contact, Tapping,** and newer advanced **"mixed-mode"** scanning modes

INTERFACE

- Plug and Play module
- Compatible with most AFMs
- Real-time temperature display
- Ultra low noise, high speed amplifier
- Wireless Bluetooth controller to control the amplifier



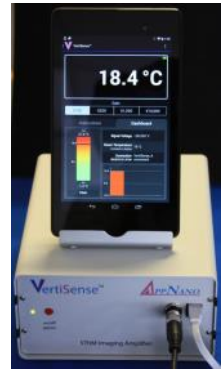
INNOVATION

The patented innovative design of the **thermal probe** has the following features to provide unprecedented ultra-high resolution temperature and conductivity mapping of samples at the nanoscale:

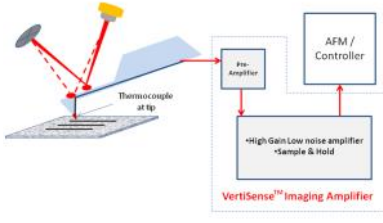
- The nanoscale **thermocouple sensor** is located at the apex of the tip.
- Embedded thermocouple enables **longer probe lifetime** without altering thermal sensitivity or calibration.
- Material surrounding the tip sensor is **thermally insulated** to prevent heat loss from the tip to the cantilever and substrate.
- **Embedded metal contacts** minimize heat losses from the sample to the thermal probe.
- Remotely located **cold junction** allows for true temperature measurement.

VertiSense™ Imaging Amplifier

VertiSense™ Thermal Imaging Amplifier is an innovative ultra low noise amplifier used with AppNano VertiSense™ thermal probes to image thermal properties of a sample in either Temperature Mapping Mode (TMM) or Thermal Conductivity Mapping Modes (CMM).



The linear characteristics of the thermocouple sensor and amplifier allow a direct temperature display during thermal imaging. The amplifier is controlled by a wireless Bluetooth technology through an Android App.

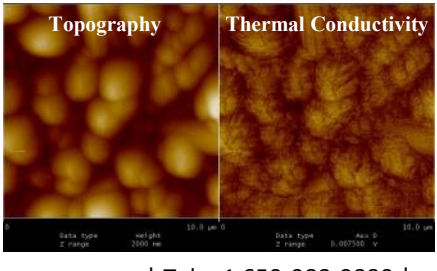


An easy positioning of the laser deflection spot on the cantilever enables Temperature Mapping Mode (TMM) or Conductivity Mapping Mode (CMM).

VertiSense™ Thermal Imaging Amplifier

Parameter	Value
Input	± 10.0 mV
Output Range	± 10 V
Signal Gain	100, 200, 1000 and 10,000
Noise	<1 nV @ 1 kHz
CM Rejection	High (> 115 dB)
Temperature Display	Real Time Tip Temperature
T/C Calibration	Adjustable

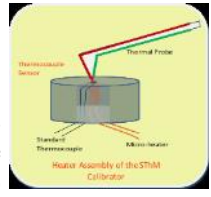
VertiSense™ SThM Images

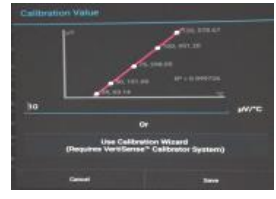


Scan of a 10 x 10 µm sample of Bi_2Te_3 : carbon nanocrystalline films prepared by co-sputtering showing, left, topography and, right, thermal conductivity. A secondary phase along the Bi_2Te_3 crystallite boundaries changes the thermal conductivity of the composite while maintaining the electrical conductivity. Sample and Image Analysis Curtsey Ms. Khushboo Agarwal and Prof. B.R. Mehta, Thin Film Lab, IIT Delhi, India.

VertiSense™ Thermal Calibration Module

VertiSense™ thermal calibrator is designed to calibrate VertiSense™ thermal probes for accurate measurement of sample temperatures. The module consists of a microheater integrated with k-type thermocouple and a PID controller. The controller is programmed to maintain the heater at specific temperatures with the feedback from the thermocouple. The probe is calibrated across a temperature range (25° to 200° C) to determine its thermal sensitivity (µV/° C) for accurate measurement of temperatures.

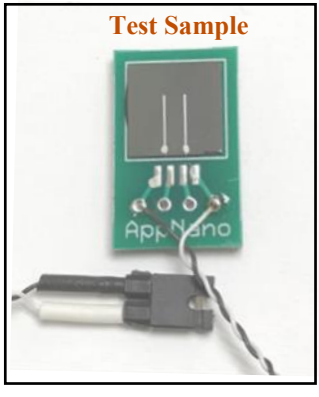


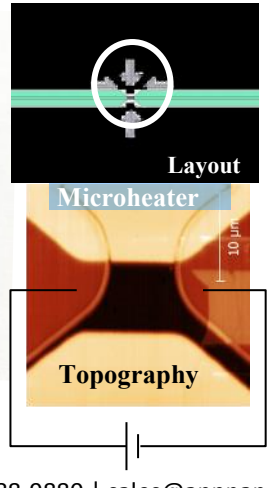


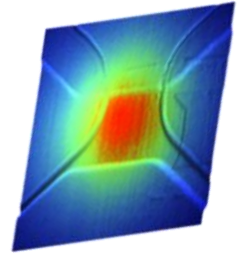
For customers who need to calibrate VertiSense™ probes to a higher temperature please contact AppNano.

VertiSense™ Thermal Test Sample

The VertiSense™ thermal test sample consists of a silicon chip that has a micro fabricated heater to qualify the VertiSense™ thermal module functionality. It comes with a battery pack to supply power to the heater. The microheater size is about 5 µm x 10 µm . The hot spot of the microheater is capable of reaching up to 80° C.



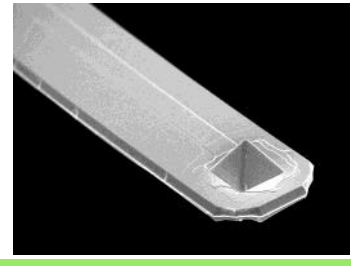




3D Topography of the microheater with temperature overlaid as color

VertiSense™ Thermal Probes

VertiSense™ Thermal Probes are used for Scanning Thermal Microscopy. These innovative thermal probes can be used to image thermal properties of a sample in either Temperature Mapping or Thermal Conductivity Mapping Modes. The thermocouple sensor is located at the apex of the tip to allow true temperature measurement with ultra high lateral thermal resolution.



Probe Model: VTP-200

Parameter	Value		
	Nominal	Minimum	Maximum
Spring Constant (N/m)	9.9	3.0	24.9
Frequency (kHz)	107	67	153
Length (µm)	200	190	210
Width (µm)	50	45	55
Thickness (µm)	3.5	2.5	4.5

Probe Model: VTP-500

Parameter	Value		
	Nominal	Minimum	Maximum
Spring Constant (N/m)	0.63	0.21	1.45
Frequency (kHz)	17	11	23
Length (µm)	500	490	510
Width (µm)	50	45	55
Thickness (µm)	3.5	2.5	4.5

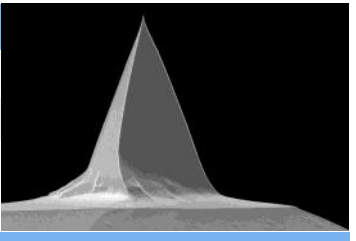
Ordering Information

There are 5 probes in each box. The probes are mounted for specific AFM models. Brand name and model of AFM is required at the time of ordering.
- VertiSense™ Thermal Probes work only with the AppNano Thermal Imaging Amplifier.
- Probe temperature calibration services are available at an additional cost.

Probe Model: ACT Probe Series

ACT Series Probes are designed for non-contact, tapping, and close contact mode applications in air and fluid. ACT probes have a high frequency that allows faster scanning.

Tip Specifications	
Material	Si
Shape	Pyramidal
Height (µm)	14-16



Cantilever Specifications

	Spring Constant (N/m)	Frequency (kHZ)	Length (µm)	Width (µm)	Thickness (µm)
Nominal	**34**	**300**	**125**	**30**	**4.0**
Min	15	210	115	25	3.5
Max	73	400	135	35	4.5

Probe Type	Reflex Side Coating / Thickness	Description	Tip ROC
ACT	None		6 nm (Guaranteed <10 nm)
ACTA	Al / 50 nm		
ACTG	Ti/Au : 10 nm / 50 nm		
ACTGG	Ti/Au : 10 nm / 50 nm	Tip side coated	30 nm
ACT-SS	None	Super Sharp	1 - 2 nm
ACTA-SS	Al / 50 nm		
ACT-TL	None	Tipless Probe	No Tip
ACTA-TL	Al / 50 nm		

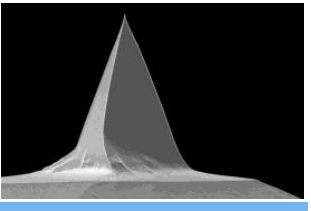
Ordering Information

Standard Package	10, 20, 50, 200, wafer (410+)
How to Order	(Probe type)-(Package size)
Example	To order 50 ACT probes with reflex and tip side gold coating: **ACTGG-50**

Probe Model: ACL Probe Series

ACL Series Probes are designed for non-contact, tapping mode, intermittent contact, and/or close contact applications. The long ACL cantilever allows larger laser clearance. These probes are available with and without Al coating on the reflex side.

Tip Specifications	
Material	Si
Shape	Pyramidal
Height (µm)	14-16



Cantilever Specifications

	Spring Constant (N/m)	Frequency (kHZ)	Length (µm)	Width (µm)	Thickness (µm)
Nominal	**58**	**190**	**225**	**40**	**7.8**
Min	36	160	215	35	7.3
Max	90	225	235	45	8.3

Probe Type	Reflex Side Coating / Thickness	Description	Tip ROC
ACL	None		6 nm (Guaranteed <10 nm)
ACLA	Al / 50 nm		
ACLG	Ti/Au : 10 nm / 50 nm		
ACLGG	Ti/Au : 10 nm / 50 nm	Tip side coated	30 nm
ACL-SS	None	Super Sharp	1 - 2 nm
ACLA-SS	Al / 50 nm		
ACL-TL	None	Tipless Probe	No Tip
ACLA-TL	Al / 50 nm		

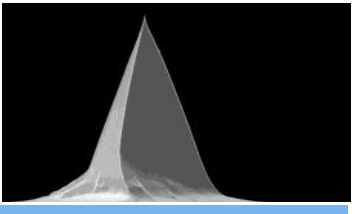
Ordering Information

Standard Package	10, 20, 50, 200, wafer (410+)
How to Order	(Probe type)-(Package size)
Example	To order 50 ACL probes with reflex and tip side gold coating: **ACLGG-50**

Probe Model: ACST Probe Series

ACST Series Probes are designed for soft tapping or non-contact mode applications. ACST probes are moderately soft with a mid-range resonance frequency.

Tip Specifications	
Material	Si
Shape	Pyramidal
Height (µm)	14-16



Cantilever Specifications

	Spring Constant (N/m)	Frequency (kHZ)	Length (µm)	Width (µm)	Thickness (µm)
Nominal	**7.8**	**150**	**150**	**28**	**3**
Min	3.0	100	140	23	2.5
Max	17.9	208	160	33	3.5

Probe Type	Reflex Side Coating / Thickness	Description	Tip ROC
ACST	None		6 nm (Guarantee d <10 nm)
ACSTA	Al / 50 nm		
ACSTG	Ti/Au : 10 nm / 50 nm		
ACSTGG	Ti/Au : 10 nm / 50 nm	Tip side coated	30 nm
ACST-SS	None	Super Sharp	1 - 2 nm
ACSTA-SS	Al / 50 nm		
ACST-TL	None	Tipless Probe	No Tip
ACSTA-TL	Al / 50 nm		

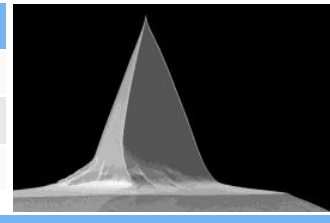
Ordering Information

Standard Package	10, 20, 50, 200, wafer (410+)
How to Order	(Probe type)-(Package size)
Example	To order 50 ACST probes with reflex and tip side gold coating: **ACSTGG-50**

Probe Model: FORT Probe Series

FORT Series Probes are designed for force modulation applications. FORT probe's medium frequency and spring constant makes them ideal for Force Modulation Mode.

Tip Specifications	
Material	Si
Shape	Pyramidal
Height (µm)	14-16



Cantilever Specifications

	Spring Constant (N/m)	Frequency (kHZ)	Length (µm)	Width (µm)	Thickness (µm)
Nominal	**1.6**	**61**	**225**	**27**	**2.7**
Min	0.6	43	215	22	2.2
Max	3.7	82	235	32	3.2

Probe Type	Reflex Side Coating / Thickness	Description	Tip ROC
FORT	None		6 nm (Guaranteed <10 nm)
FORTA	Al / 50 nm		
FORTG	Ti/Au : 10 nm / 50 nm		
FORTGG	Ti/Au : 10 nm / 50 nm	Tip side coated	30 nm
FORT-SS	None	Super Sharp	1 - 2 nm
FORTA-SS	Al / 50 nm		
FORT-TL	None	Tipless Probe	No Tip
FORTA-TL	Al / 50 nm		

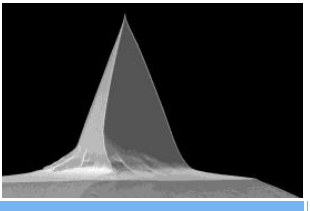
Ordering Information

Standard Package	10, 20, 50, 200, wafer (410+)
How to Order	(Probe type)-(Package size)
Example	To order 50 FORT probes with reflex and tip side gold coating: **FORTGG-50**

Probe Model: SHOCON Probe Series

SHOCON Series Probes are designed for contact mode applications with a shorter length, providing better sensitivity without compromising on spring constant requirements.

Tip Specifications	
Material	Si
Shape	Pyramidal
Height (µm)	14-16



Cantilever Specifications

	Spring Constant (N/m)	Frequency (kHZ)	Length (µm)	Width (µm)	Thickness (µm)
Nominal	**0.14**	**21**	**225**	**46**	**1.0**
Min	0.01	8	215	41	0.5
Max	0.60	38	235	51	1.5

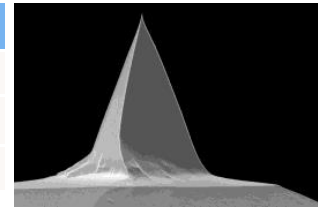
Probe Type	Reflex Side Coating / Thickness	Description	Tip ROC
SHOCON	None		6 nm (Guaranteed <10 nm)
SHOCONA	Al / 50 nm		
SHOCONG	Ti/Au : 10 nm / 50 nm		
SHOCONGG	Ti/Au : 10 nm / 50 nm	Tip side coated	30 nm
SHOCON-SS	None	Super Sharp	1 - 2 nm
SHOCONA-SS	Al / 50 nm		
SHOCON-TL	None	Tipless Probe	No Tip
SHOCONA-TL	Al / 50 nm		

Ordering Information	
Standard Package	10, 20, 50, 200, wafer (410+)
How to Order	(Probe type)-(Package size)
Example	To order 50 SHOCON probes with reflex and tip side gold coating: **SHOCONGG-50**

Probe Model: SICON Probe Series

SICON Series Probes are for contact mode applications. These probes have a long, thin cantilever allowing for a low spring constant and improved laser clearance.

Tip Specifications	
Material	Si
Shape	Pyramidal
Height (µm)	14-16



Cantilever Specifications

	Spring Constant (N/m)	Frequency (kHZ)	Length (µm)	Width (µm)	Thickness (µm)
Nominal	**0.29**	**15**	**450**	**49**	**2.5**
Min	0.13	11	440	44	2.0
Max	0.6	19	460	54	3.0

Probe Type	Reflex Side Coating / Thickness	Description	Tip ROC
SICON	None		6 nm (Guaranteed <10 nm)
SICONA	Al / 50 nm		
SICONG	Ti/Au : 10 nm / 50 nm		
SICONGG	Ti/Au : 10 nm / 50 nm	Tip side coated	30 nm
SICON-SS	None	Super Sharp	1 - 2 nm
SICONA-SS	Al / 50 nm		
SICON-TL	None	Tipless Probe	No Tip
SICONA-TL	Al / 50 nm		

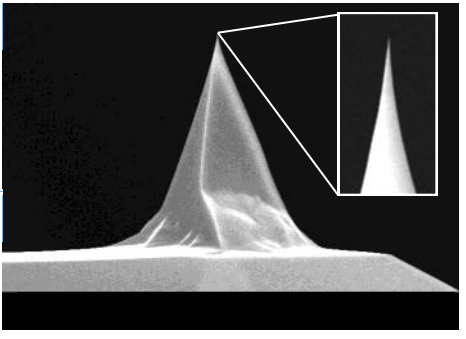
Ordering Information

Standard Package	10, 20, 50, 200, wafer (410+)
How to Order	(Probe type)-(Package size)
Example	To order 50 SICON probes with reflex and tip side gold coating: **SICONGG-50**

Probe Option: Super Sharp (SS) Probes

AppNano produces **Super Sharp (SS) Probes** with a proprietary process; the resulting tips achieve an ultra-small curvature radius (1-2nm). AppNano Super Sharp Probes yield enhanced resolution images.

Tip Specifications	
Shape	Pyramidal
Height (µm)	14-16
ROC (nm)	1-2
Cantilever Specifications	
Material	Si
Shape	Rectangular
Reflex Coating	None, Al, G



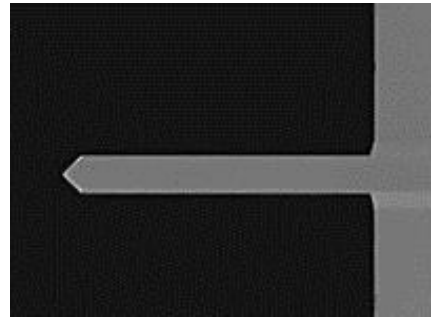
Probe Type	Description	Page
ACT-SS	Super Sharp ACT Probe	15
ACTA-SS	Al coated (Reflex side), ACT-SS Probe	15
ACL-SS	Super Sharp ACL Probe	16
ACLA-SS	Al coated (Reflex side), ACL-SS Probe	16
ACST-SS	Super Sharp ACST Probe	17
ACSTA-SS	Al coated (Reflex side), ACST-SS Probe	17
FORT-SS	Super Sharp FORT Probe	18
FORTA-SS	Al coated (Reflex side), FORT-SS Probe	18
SHOCON-SS	Super Sharp SCHOCON Probe	19
SHOCONA-SS	Al coated (Reflex side), SHOCON-SS Probe	19
SICON-SS	Super Sharp SICON Probe	20
SICONA-SS	Al coated (Reflex side), SICON-SS Probe	20

Custom Options Available— Custom gold and platinum coatings available upon request. For details, contact by phone or email.

Probe Option: Tipless (TL) Probes

AppNano probes are also available in a configuration where there is no tip on the cantilever. These probes are used for custom applications.

Cantilever Specifications	
Material	Si
Shape	Rectangular
Reflex Coating	None, Al, G 35 nm ±5



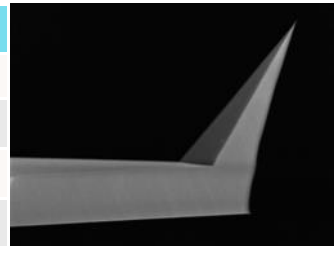
Probe Type	Description	Page
ACT-TL	Tipless ACT Probe	15
ACTA-TL	Al coated (Reflex side), ACT-TL Probe	15
ACL-TL	Tipless ACL Probe	16
ACLA-TL	Al coated (Reflex side), ACL-TL Probe	16
ACST-TL	Tipless ACST Probe	17
ACSTA-TL	Al coated (Reflex side), ACST-TL Probe	17
FORT-TL	Tipless FORT Probe	18
FORTA-TL	Al coated (Reflex side), FORT-TL Probe	18
SHOCON-TL	Tipless SCHOCON Probe	19
SHOCONA-TL	Al coated (Reflex side), SHOCON-TL Probe	19
SICON-TL	Tipless SICON Probe	20
SICONA-TL	Al coated (Reflex side), SICON-TL Probe	20
HYDRA-TL	See HYDRA Probes for options	32-36

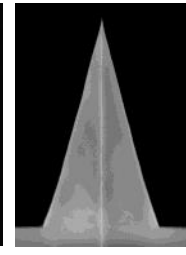
Custom Options Available— Custom gold and platinum coatings available upon request. For details, contact by phone or email.

Probe Model: ACCESS-NC

ACCESS-NC Probes are sharp silicon probes designed to allow a direct optical view of the AFM tip when imaging. ACCESS-NC is intended for use in tapping/non-contact mode.

Tip Specifications	
Material	Si
Height (µm)	14-16
Coating	**None**
ROC (nm)	<10





Cantilever Parameter	Nominal	Minimum	Maximum
Spring Constant (N/m)	**93**	34	243
Frequency (kHz)	**320**	201	508
Length (µm)	**150**	130	170
Width (µm)	**54**	52	56
Thickness (µm)	**5.5**	4.5	6.5
Reflex Side Coating	None, Al, G		

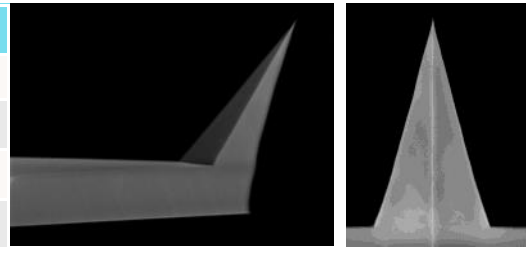
The part number for Al coating on the reflex side is **ACCESS-NC-A**.
The part number for Gold coating on the reflex and tip side is **ACCES-NC-GG** (ROC =30 nm)

Ordering Information		
ACCESS-NC (no coating)	**ACCESS-NC-A (reflex side Al coated)**	**Probes**
ACCESS-NC-10	ACCESS-NC-A-10	10
ACCESS-NC-20	ACCESS-NC-A-20	20
ACCESS-NC-50	ACCESS-NC-A-50	50
ACCESS-NC-200	ACCESS-NC-A-200	200
ACCESS-NC-W	ACCESS-NC-A-W	410+

Probe Model: ACCESS-FM

ACCESS-FM Probes are sharp silicon probes designed to allow a direct optical view of the AFM tip when imaging. ACCESS-FM are ideal for Force Modulation Mode.

Tip Specifications	
Material	Si
Height (µm)	14-16
Coating	**None**
ROC (nm)	<10



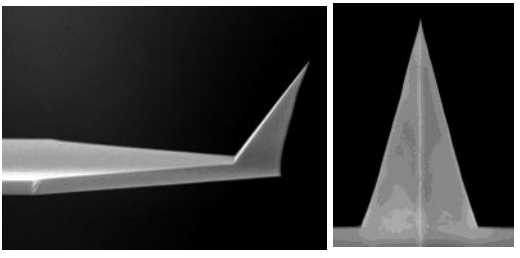
Cantilever Parameter	Nominal	Minimum	Maximum
Spring Constant (N/m)	**2.7**	0.6	8.9
Frequency (kHz)	**60**	32	99
Length (µm)	**245**	225	265
Width (µm)	**52**	51	53
Thickness (µm)	**2.8**	1.8	3.8
Reflex Side Coating	None, Al, G		

Ordering Information		
ACCESS-FM (no coating)	**ACCESS-FM-A (reflex side Al coated)**	**Probes**
ACCESS-FM-10	ACCESS-FM-A-10	10
ACCESS-FM-20	ACCESS-FM-A-20	20
ACCESS-FM-50	ACCESS-FM-A-50	50
ACCESS-FM-200	ACCESS-FM-A-200	200
ACCESS-FM-W	ACCESS-FM-A-W	410+

Probe Model: ACCESS-C

ACCESS-C Probes are sharp silicon probes designed to allow a direct optical view of the AFM tip when imaging. ACCESS-C is intended for use in contact mode.

Tip Specifications	
Material	Si
Height (µm)	14-16
Coating	**None**
ROC (nm)	<10



Cantilever Parameter	Nominal	Minimum	Maximum
Spring Constant (N/m)	**0.29**	0.05	0.94
Frequency (kHz)	**16**	9	25
Length (µm)	**450**	430	470
Width (µm)	**49**	48.0	50.0
Thickness (µm)	**2.5**	1.5	3.5
Reflex Side Coating	None, Al, G		

The part number for aluminum coating is **ACCESS-C-A**

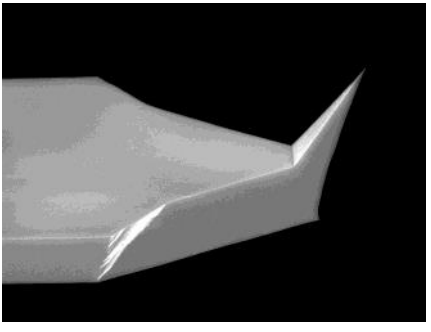
Ordering Information		
ACCESS-C (no coating)	**ACCESS-C-A** (reflex side Al coated)	**Probes**
ACCESS-C-10	ACCESS-C-A-10	10
ACCESS-C-20	ACCESS-C-A-20	20
ACCESS-C-50	ACCESS-C-A-50	50
ACCESS-C-200	ACCESS-C-A-200	200
ACCESS-C-W	ACCESS-C-W	410+

Probe Model: ACCESS-UHF Fast Scanning Probes Series

ACCESS-UHF Fast Scanning (UHF) Series Probes are designed for fast and high resolution imaging. The reflex side can optionally be coated with aluminum.

Tip Specifications	
Shape	Pyramidal
Height (µm)	8-12
ROC(nm)	6

Cantilever Specifications	
Material	Si
Shape	Rectangular
Coating	None or Al



Parameter	Nominal	Minimum	Maximum
Spring Constant (N/m)	**115**	19	565
Frequency (kHz)	**1100**	450	2400
Length (µm)	**55**	45	65
Width (µm)	**26**	25	27
Thickness (µm)	**2.8**	1.8	3.8
Tip ROC (nm)	<10		

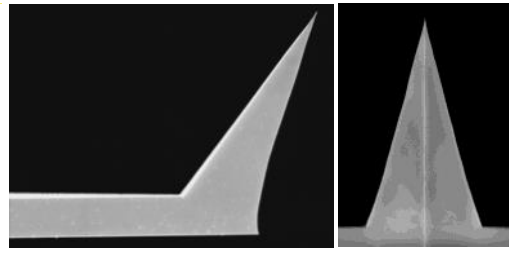
Ordering Information

ACCESS-UHF (no coating)	ACCESS-UHF-A (reflex side Al coated)	Tips
ACCESS-UHF-10	ACCESS-UHF-A-10	10
ACCESS-UHF-20	ACCESS-UHF-A-20	20
ACCESS-UHF-50	ACCESS-UHF-A-50	50
ACCESS-UHF-200	ACCESS-UHF-A-200	200
ACCESS-UHF-W	ACCESS-UHF-A-W	410+

Conductive ACCESS Probes

Conductive ACCESS Probes are silicon probes with conductive coatings (Ptlr or Gold) designed to allow a direct optical view of AFM tip when imaging. **ACCESS-EFM** is coated with Ptlr, **ACCESS-FM-GG** is coated with gold on both sides. Both probes are ideal for Electrical Force Microscopy.

Tip Specifications	
Material	Si
Height (µm)	14-16
Coating	**None**
ROC (nm)	<30



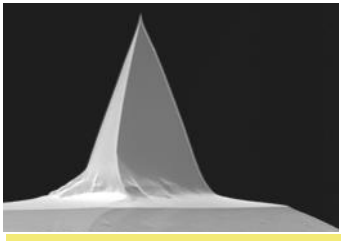
Cantilever Parameter	Nominal	Minimum	Maximum
Spring Constant (N/m)	**2.7**	0.6	8.9
Frequency (kHz)	**60**	32	99
Length (µm)	**245**	225	265
Width (µm)	**52**	51	53
Thickness (µm)	**2.8**	1.8	3.8
Reflex Side Coating	None, Al, G		

* Both reflex and tip side must be coated with same material

Ordering Information		
Pt-Ir Coated	**Gold Coated**	**Probes**
ACCESS-EFM-10	ACCESS-FM-GG-10	10
ACCESS-EFM-20	ACCESS-FM-GG-20	20
ACCESS-EFM-50	ACCESS-FM-GG-50	50
ACCESS-EFM-200	ACCESS-FM-GG-200	200
ACCESS-EFM-W	ACCESS-FM-GG-W	410+

Probe Model: EFM Probe Series

ANSCM Series Probes are coated with Ptlr on both sides for EFM applications. **ANSCM-PT** probes are for force modulation, **ANSCM-PC** probes are for contact mode applications, and **ANSCM-PA** probes are for tapping mode. **ANSCM-PA5** probes are designed for CAFM applications and have a thicker



Tip Specifications	
Shape	Pyramidal
Height (µm)	14-16
Coating	Ptlr

Applications
Electrical Force Microscopy Conducting Atomic Force Microscopy Kelvin Probe Force Microscopy Piezoresponse Force Scanning Capacitance Microscopy TUNA (Tunneling AFM)

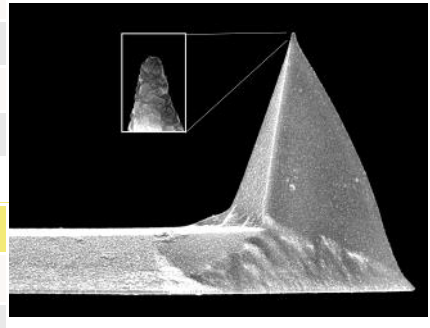
Parameter	Probe Type			
	ANSCM-PA5	ANSCM-PA	ANSCM-PT	ANSCM-PC
Spring Constant (N/m)	34	34	1.6	0.3
Frequency (kHz)	290	290	61	15
Length (µm)	125	125	225	450
Width (µm)	30	30	27	49
Thickness (µm)	4.0	4.0	2.7	2.5
Tip ROC (nm)	55	30	30	30
Pt/Ir Thickness (nm)	50 ± 5	25 ± 5	25 ± 5	25 ± 5

Ordering Information	
Standard Package	10, 20, 50, 200, wafer (410+)
How to Order	(Probe type)-(Package size)
Example	Part number to order 10 Force Modulation EFM probes : **ANSCM-PT-10**

Probe Model: Doped Diamond Probe Series

Doped Diamond (DD) Probes offers a unique combination of hardness and conducting tip. The tip side of these probes is coated with polycrystalline diamond. The diamond film is doped with boron to make it highly conducting.

Tip Specifications	
Height (µm)	14-16
Aspect Ratio	1.5-3.0
ROC* (nm)	100-300
Coating	100nm Doped Diamond



*Normal specification

Cantilever Specifications	
Material	Si
Shape	Rectangular
Reflex Coating	Al / 50 nm

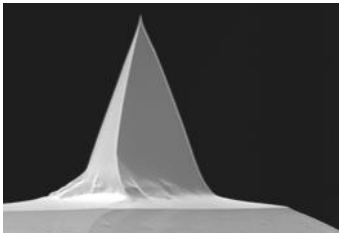
Parameter	Probe Type			
	DD-ACTA	DD-FORTA	DD-SICONA	DD-ACCESS -NC-A
Spring Constant (N/m)	34	1.6	0.3	93
Frequency (kHz)	290	61	15	320
Length (µm)	125	225	450	150
Width (µm)	30	27	49	54
Thickness (µm)	4.0	2.7	2.5	5.5

Ordering Information

Non-contact	Force Modulation	contact	ACCESS	Probes
DD-ACTA-10	DD-FORTA-10	DD-SICONA-10	DD-ACCESS-NC-A-10	10
DD-ACTA-20	DD-FORTA-20	DD-SICONA-20	DD-ACCESS-NC-A-20	20
DD-ACTA-50	DD-FORTA-50	DD-SICONA-50	DD-ACCESS-NC-A-50	50
DD-ACTA-200	DD-FORTA-200	DD-SICONA-200	DD-ACCESS-NC-A-200	200
DD-ACTA-W	DD-FORTA-W	DD-SICONA-W	DD-ACCESS-NC-A-W	410+

Probe Model: Titanium Nitride (TiN) Probe Series

TiN Series Probes are coated with conductive titanium nitride on both sides for EFM applications. TiN coating offers excellent conductivity and voltage stability (up to 6V) with very good wear resistance.



Tip Specifications	
Shape	Pyramidal
Height (µm)	14-16
Coating	TiN

Applications
Electricfield Force Microscopy Kelvin Probe Force Microscopy Piezoresponse Force Conducting Atomic Force Microscopy Scanning Capacitance Microscopy TUNA (Tunneling AFM) Scanning Spreading Resistance Microscopy

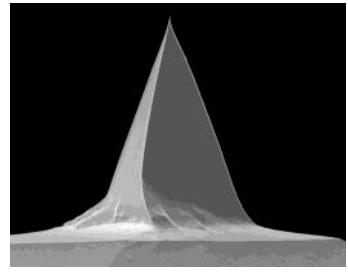
Parameter	Probe Type	
	TiN-ACT	**TiN-FORT**
Spring Constant (N/m)	34	1.6
Frequency (kHz)	290	61
Length (µm)	125	225
Width (µm)	30	27
Thickness (µm)	4.0	2.7
Tip ROC (nm)	35	35
TiN Thickness (nm)	50 ± 5	50 ± 5
Al coating (Reflex side, nm)	50	50

Ordering Information	
Standard Package	10, 20, 50, 200, wafer (410+)
How to Order	(Probe type)-(Package size)
Example	Part number to order 10 Force Modulation EFM probes : **TiN-ACT-10**

Probe Model: MAGT Probe Series

MAGT Series Probes are for MFM applications. **MAGT** probes have a medium coercivity and medium moment, **MAGT-LM** probes have low moment and **MAGT-HM** probes have high moment magnetic material coatings.

Tip Specifications	
Shape	Pyramidal
Height (µm)	14-16
ROC*	See below
Coating	See below ± 5 nm



* nominal specification

Cantilever Specifications	
Material	Si
Shape	Rectangular
Reflex Coating	Cr-Co
Tip Coating	Cr-Co

Parameter	Value
Spring Constant (N/m)	1.6
Frequency (kHz)	61
Length (µm)	225
Width (µm)	27
Thickness (µm)	2.7

Type	Tip ROC	Cr-Co Coating Thickness
MAGT	40 nm	50 nm
MAGT-LM	25 nm	15 nm
MAGT-HM	75 nm	150 nm

Ordering Information			
Medium Moment	**Low Moment**	**High Moment**	**Probes**
MAGT-10	MAGT-LM-10	MAGT-HM-10	10
MAGT-20	MAGT-LM-20	MAGT-HM-20	20
MAGT-50	MAGT-LM-50	MAGT-HM-50	50
MAGT-200	MAGT-LM-200	MAGT-HM-200	200
MAGT-W	MAGT-LM-W	MAGT-HM-W	410+

HYDRA Probe Series

The **HYDRA** Series is a unique series of silicon nitride probes, with a proprietary design by AppNano. The probe consists of a silicon chip, silicon nitride cantilever, and a silicon tetrahedral tip.

Ordering Information

Example Part Number: **HYDRA6V-100N-10**

HYDRA 6 V - 100 N-10

Thickness:
2 for 200nm
4 for 400nm
6 for 600nm

Shape:
V - for V-shape
R - for Rectangular

Length:
50 for 50 µm
100 for 100 µm
200 for 200 µm

Width:
N for Narrow
W for Wide

Amount:
10 for 10 probes
20 for 20 probes
50 for 50 probes

Additional Options

HYDRA 6 V - 100 N G-10

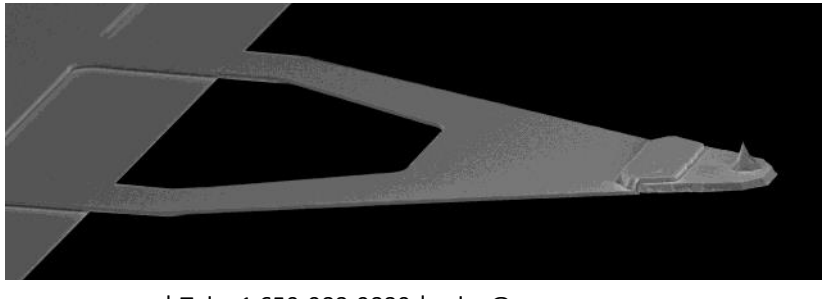
HYDRA 6 V - 100 N GG-10

HYDRA 6 V - 100 N TL-10

Reflex Coating:
G for Gold

Tip & Reflex Coating:
GG for Gold-Gold

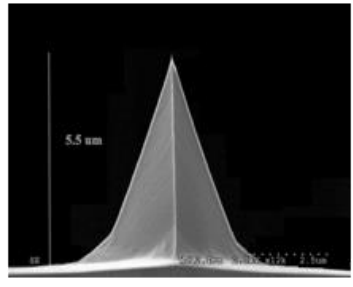
Tipless Option:
TL for Tip-Less



Probe Model: HYDRA Rectangular (R) Probe Series

The **HYDRA R-Series Probes** are rectangular nitride cantilevers with a sharp silicon tip designed for force-distance applications. These probes can also be used for tapping mode and contact mode in an air or fluid medium.

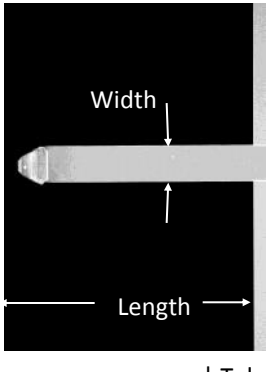
Tip Specifications	
Material	Si
Shape	Tetrahedral
Height (µm)	4-6
ROC(nm)	<10*
Coating	Ti/Au: 8 nm/ 35 nm *



* Probes with larger tip radius and with out coating are available upon request.

Cantilever Specifications		
Material	**Shape**	**Options**
Low Stress Silicon Nitride	Rectangular	No Coating, G, GG, TL

Parameter	Value			
	2R-50N	**2R-100N**	**6R-100N**	**6R-200N**
Spring Constant (N/m)	0.084	0.011	0.284	0.035
Frequency (kHz)	77	21	66	17
Length (µm)	50	100	100	200
Width (µm)	35	35	35	35
Thickness (µm)	0.2	0.2	0.6	0.6



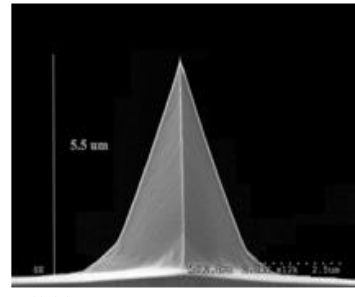
Ordering Information	
Example Part Number	**No. of Probes**
HYDRA2R-50NG-10	10
HYDRA2R-50NG-20	20
HYDRA2R-50NG-50	50

For inquiries regarding larger quantities, please contact our sales group.

Probe Model: HYDRA V-Shaped Probe Series

The **HYDRA V-Series Probes** are V-Shaped nitride cantilevers with a sharp silicon tip for imaging soft samples. These probes can be used for force-distance mode, tapping mode, or contact mode in air or liquid medium.

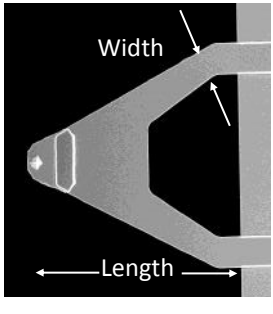
Tip Specifications	
Material	Si
Shape	Tetrahedral
Height (µm)	4-6
ROC(nm)	<10*
Coating	Ti/Au: 8 nm/ 35 nm *



* Probes with larger tip radius and with out coating are available upon request.

Cantilever Specifications		
Material	**Shape**	**Options**
Low Stress Silicon Nitride	V-Shape	No Coating, G, GG, TL

Parameter	Value				
	4V-100N	**6V-100N**	**6V-100W**	**6V-200N**	**6V-200W**
Spring Constant (N/m)	0.088	0.292	0.405	0.045	0.081
Frequency (kHz)	42	66	67	17	17
Length (µm)	100	100	100	200	200
Width (µm)	18	18	25	22	40
Thickness (µm)	0.4	0.6	0.6	0.6	0.6

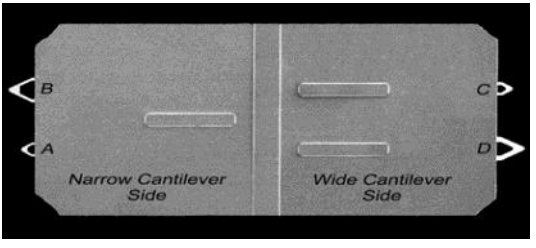


Ordering Information	
Example Part Number	**No. of Probes**
HYDRA6V-100NG-10	10
HYDRA6V-100NG-20	20
HYDRA6V-100NG-50	50

Probe Model: HYDRA-ALL Probe Series

The **HYDRA-ALL Probe** is a 4-in-1 probe chip with four cantilevers of varying spring constants and lengths. The probe is designed to work with soft materials in a variety of applications.

Tip Specifications	
Material	Si
Shape	Tetrahedral
Height (µm)	4-6
ROC(nm)	<10*
Coating	None, G



* Probes with larger tip radius are available upon request

Parameter	4 Cantilevers on 1 Chip			
	Lever A: 6V-100N	**Lever B: 6V-200N**	**Lever C: 6V-100W**	**Lever D: 6V-200W**
Spring Constant (N/m)	0.292	0.045	0.405	0.081
Frequency (kHz)	66	17	67	17
Length (µm)	100	200	100	200
Width (µm)	18	22	25	40
Thickness (µm)	0.6	0.6	0.6	0.6

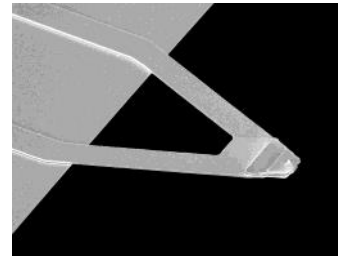
Ordering Information		
Hydra-All (no coating)	**Hydra-All-G** (reflex side Ti/Au coated)	**Tips**
Hydra-All-10	Hydra-All-G-10	10
Hydra-All-20	Hydra-All-G-20	20
Hydra-All-50	Hydra-All-G-50	50

Probe Model: VScan -Air Probe

The **VScan Series Probes** are V-shaped nitride cantilevers with a sharp silicon tip designed for SCAN-ASYST* Mode. These probes can also be used for tapping mode and contact mode in air or fluid mediums.

** SCAN-ASYST is a registered trademark of Bruker Nano, Inc.*

Tip Specifications	
Material	Si
Shape	Tetrahedral
Height (µm)	4-6
ROC (nm)	<10*
Coating	None



* Probes with larger tip radius are available upon request

Parameter	Nominal	Minimum	Maximum
Spring Constant (N/m)	**0.292**	0.133	0.621
Frequency (kHz)	**66**	49	90
Length (µm)	**100**	90	110
Width (µm)	**18**	15	21
Thickness (µm)	**0.60**	0.54	0.66
Material	Silicon Nitride		
Shape	Triangular		
Options	Al, 35 nm		

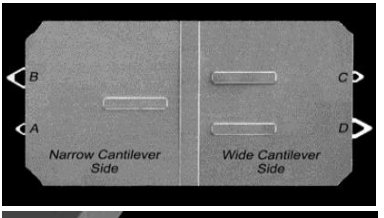
Ordering Information	
VScan-Air	**Tips**
VSCAN-AIR-10	10
VSCAN-AIR-20	20
VSCAN-AIR-50	50
For inquiries regarding larger quantities, please contact our sales group.	

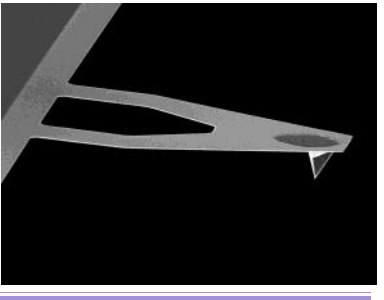
Probe Model: Nitra-Tall-V Probes

The Nitra-Tall-V probes are designed to image tall biological features. The tip and cantilever both are made of silicon nitride material. The tip is integrated on a silicon pad for increased laser reflectance signal without any additional metal coating. Tall tip minimizes tip-sidewall artifacts when imaging tall features.

Tip Specifications	
Material	Silicon Nitride
Shape	Tetrahedral
Height (µm)	15 (14-16)
ROC (nm)	>30
Tip Side Coating	None, Ti/Au

Cantilever Specifications	
Material	Silicon Nitride
Shape	Rectangular
Coating	None, Ti/Au





Parameter	Value			
	Lever A	Lever B	Lever C	Lever D
	Nominal	Nominal	Nominal	Nominal
Spring Constant (N/m)	0.162	0.029	0.237	0.058
Frequency (kHz)	37	12	41	13
Length (µm)	105	205	105	205
Width (µm)	15	20	22	40
Thickness (µm)	0.55	0.55	0.55	0.55

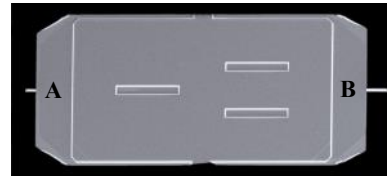
Ordering Information	
Part Number	Probes
NITRA-TALL-V - 10	10
NITRA-TALL-V- 20	20
NITRA-TALL-V– 50	50

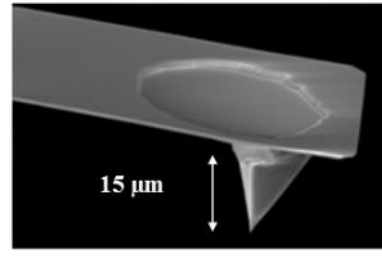
Probe Model: Nitra-Tall-R Probes

The Nitra-Tall-R probes are designed to image tall biological features. The tip and cantilever both are made of silicon nitride material. The tip is integrated on a silicon pad for increased laser reflectance signal without any additional metal coating. Tall tip minimizes tip-sidewall artifacts when imaging tall features.

Tip Specifications	
Material	Silicon Nitride
Shape	Tetrahedral
Height (µm)	15 (14-16)
ROC (nm)	>30
Tip Side Coating	None, Ti/Au

Cantilever Specifications	
Material	Silicon Nitride
Shape	Rectangular
Coating	None, Ti/Au





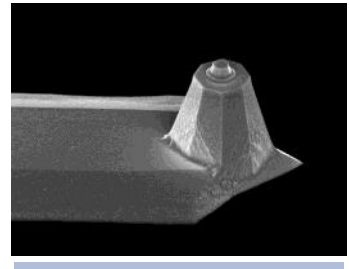
Parameter	Value					
	Lever A			Lever B		
	Nominal	Min	Max	Nominal	Min	Max
Spring Constant (N/m)	0.1	0.06	0.164	0.018	0.012	0.027
Frequency (kHz)	26	21	34	10	8	11
Length (µm)	130	120	140	230	220	240
Width (µm)	35	30	40	35	30	40
Thickness (µm)	0.55	0.50	0.60	0.55	0.50	0.60

Ordering Information	
Part Number	Probes
NITRA-TALL-R - 10	10
NITRA-TALL-R- 20	20
NITRA-TALL-R– 50	50

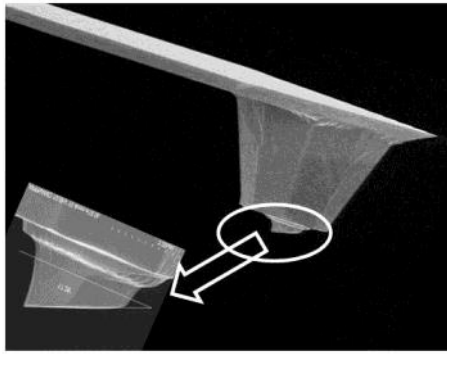
Probe Model: Plateau (PTU) Probe Series

Plateau (PTU) Series Probes are produced with a flat top and a conical tip, providing a well defined contact area. The Plateau series is available with optional tilt compensation.

Cantilever	Description
ACT	79 N/m, 300 kHz, Uncoated
ACTA	79 N/m, 300 kHz, Al reflex
FORT	3.4 N/m, 60 kHz, Uncoated
FORTA	3.4 N/m, 60 kHz, Al reflex
SICON	0.31 N/m, 13 kHz, Uncoated
SICONA	0.31 N/m, 13 kHz, Al reflex



Tip Specifications	
Material	Si
Shape	Plateau
Radius (µm)	1.8
Height (µm)	16-20
Front Plane	2º
Back Plane	9º



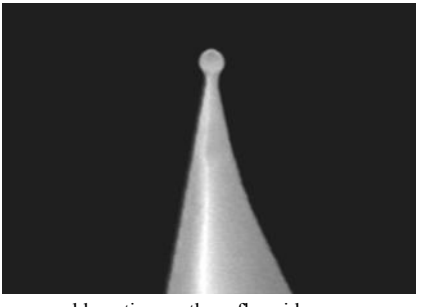
A tilt-compensated PTU probe. Contact sales@appnano.com for more information and pricing.

Ordering Information						
ACT-PTU	ACTA-PTU	FORT-PTU	FORTA-PTU	SICON-PTU	SICONA-PTU	Tips
ACT-PTU-10	ACTA-PTU-10	FORT-PTU-10	FORTA-PTU-10	SICON-PTU-10	SICONA-PTU-10	10
ACT-PTU-20	ACTA-PTU-20	FORT-PTU-20	FORTA-PTU-20	SICON-PTU-20	SICONA-PTU-20	20
ACT-PTU-50	ACTA-PTU-50	FORT-PTU-50	FORTA-PTU-50	SICON-PTU-50	SICONA-PTU-50	50

Probe Model: Ball Probes

Ball Probes are designed for applications that require hard contact with the sample. The tip apex is created using Electron Beam Deposited high density carbon. It is hemispherical in shape and has an extremely smooth surface.

Tip Specifications	
Material	Si/High Density Carbon
Shape	Ball
Height (µm)	14-16



Ball probes can be ordered with optional aluminum or gold coating on the reflex side.

Ball Type	Ball Diameter
-B20	10-30 nm
-B35	25-45 nm
-B50	40-60 nm
-B100	90-110 nm
-B150	135-165 nm

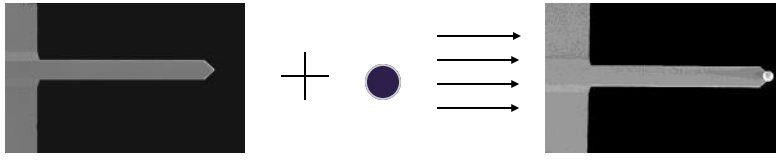
Ordering Information

Cantilever Model	Probe Type				
	-B20	**-B35**	**-B50**	**-B100**	**-B150**
FORT (1.6 N/m, 60 kHz)	FORT-B20	FORT-B35	FORT-B50	FORT-B100	FORT-B150
ACT (37 N/m, 300 kHz)	ACT-B20	ACT-B35	ACT-B50	ACT-B100	ACT-B150
SICON (0.29 N/m, 15 kHz)	SICON-B20	SICON-B35	SICON-B50	SICON-B100	SICON-B150

FORTA, ACTA, and SICONA also available

Probe Model: COLLOIDAL Probes

Atomic Force Microscopy using colloidal probes requires a tip of known shape, in these cases, a spherical, colloidal particle to be mounted cleanly on a consistently reproducible cantilever. These probes are known as "Colloidal Probes" and are used to study interactions between two surfaces and to quantify the interactive properties.



Manufacturing:

At AppNano we attach the spheres to the tipless cantilever using high precision 6 axis micro-manipulators with 1,000x optics.

Ordering Options

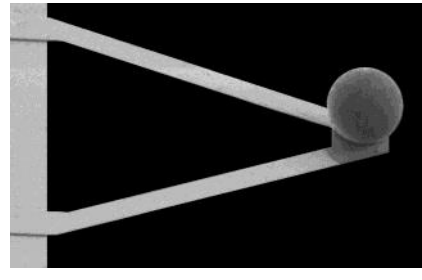
Tipless Cantilever Types

ACL-TL, ACT-TL, ACST-TL, FORT-TL, HYDRA-TL, SHOCON-TL, SICON-TL

Colloidal Particle Options

Type: BSG, SiO, PS

Diameter: A - 5 µm to 9 µm
B - 10 µm to 14 µm
C - 15 µm to 19 µm
D - 20 µm or more



Coating Options

Reflex Side: A (Al), G (Au)

How to Order

Type Cantilever-Type Colloidal Particle-Size-Coating-Quantity*

Example: The part # for 5 of the 12 µm diameter glass sphere colloidal probes with gold coating on both sides is -

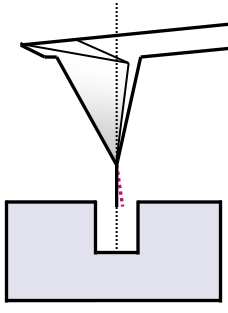
SICON-TL-BSG-B-GG-5*

* Minimum order is 5 probes per box of each type ordered

High Aspect Ratio Probes

AppNano manufactures probes with various spike lengths and widths for measuring trenches and deep features. SPM/AFM instrument manufacturers use different probe chip mounting angles. AppNano provides options to meet all commercial AFM systems. Additionally, we can fabricate HART probes to meet custom dimensions.

Tilt Compensation



Spike Tilt: HART probe spikes are offered with three tilt variations (0°, 3°, 12°). By offsetting the AFM system's natural mounting tilt, the spike is arranged perpendicular to the surface.

Ordering Information (Standard)

Example Part Number: **HART3-2-5**

HART3 - 2 - 5

Tilt Compensation:
0 for 0° Tilt
3 for 3° Tilt
12 for 12° Tilt

Spike Length:
Length 1 µm
Length 2 µm
Length 4 µm
Length 6 µm

Quantity:
5 Probe Box*
50 Probe Box*
**Standard box sizes*

Ordering Information (with Reflex Coating)

Example Part Number: **HARTA3-2-**

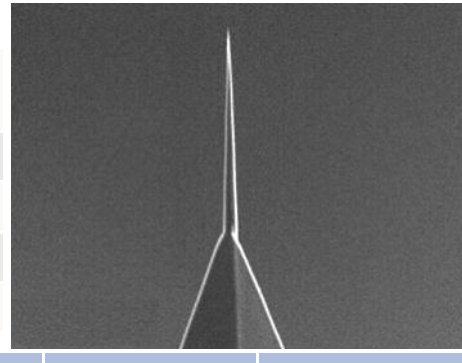
HARTA3 - 2 - 5

Al Reflex Side

Probe Model: HART Probe Series

HART Series Probes are designed for imaging of features up to 6 µm deep. The spike can be tilt-compensated to enter the trench vertically by specifying a spike angle of 0, 3, or 12° depending on the AFM system being used.

Spike Properties
Heavily Doped(0.01—0.025 Ω-cm) Single Crystal Si
Focused Ion Beam Milled
Tip ROC: <30nm
Height (µm): 14-16
Aspect Ratio: 5-10



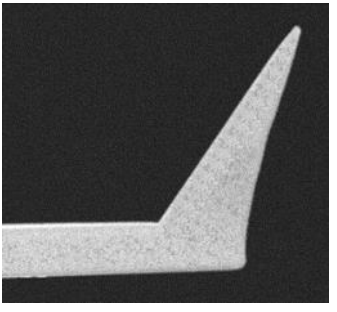
Probe Type	Tilt Compensation	Spike Length (µm)	Reflex Coating
HART0	0° (No Tilt)	1,2	None
HARTA0	0° (No Tilt)	1,2	Al (50nm)
HART3	3°	1,2	None
HARTA3	3°	1,2	Al (50nm)
HART12	12°	2,4,6	None
HARTA12	12°	2,4,6	Al (50nm)

Cantilever Parameter	Nominal	Min	Max	Spike Specifications	
				Length (µm)	Width (nm)
Spring Constant (N/m)	**40**	25	75		
Frequency (kHz)	**300**	200	400	1	100
Length (µm)	**125**	115	135	2	100
Width (µm)	**35**	30	40	4	200
Thickness (µm)	**4.5**	4.0	5.0	6	400

Probe Model: Omni™ TERS probes

Omni™ TERS probes enable all modes of TERS (transmission, reflection and collection). Raman active Ag layer along with protective layers are innovatively packaged to enhance shelf life. Tip is optimally designed to minimize the interference from underlying Si .

Tip Specifications	
Material	Si
Shape	Triangular
Height (µm)	12



Cantilever Specifications

Parameter	Probe Model	
	Omni ™ TERS –NC	Omni ™ TERS –FM
Spring constant (N/m)	93	2.7
Resonance frequency (kHz)	320	60
Length (µm)	150	245
Width (µm)	54	52
Thickness (µm)	5.2	2.2

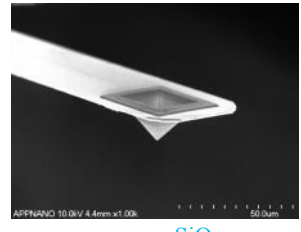
Ordering Information

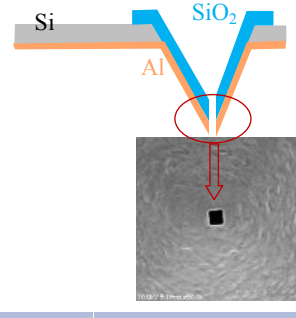
Omni ™ TERS Probes are currently available exclusively through HORIBA Scientific channels

Probe Model: SNOM

Cantilever aperture SNOM probes are best suited for high efficiency SNOM imaging and simultaneous topography without damaging the sample or tip. Aperture is precisely controlled by Focused Ion Beam (FIB) milling with in +/- 10nm.

Tip specifications	
Shape	Hollow Pyramid
Material	SiO_2
Opening angle	70°
Coating	Al, 100 nm
Aperture	Customized, Min. 50 nm





Cantilever specifications	
Shape	Rectangular
Material	Si
Reflex Coating	None

Parameter	SNOM-C	SNOM-NC
Spring constant (N/m)	1	16
Resonance frequency (kHz)	21	130
Length (µm)	500	200
Width (µm)	55	55
Thickness (µm)	4	4

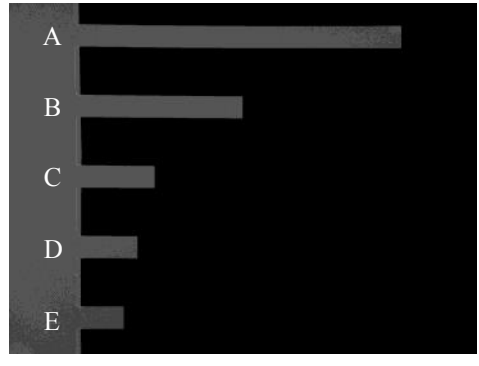
Ordering Information *		
No. of Probes	SNOM - C	SNOM – NC
5	SNOM - C –5	SNOM – NC—10
10	SNOM - C– 10	SNOM – NC—10

* Customer requires to specify minimum and maximum size of the aperture when ordering the probes.

Probe Model: FCL Probe Series

FCL Probe is a tipless force calibration probes. Each chip includes five tipless cantilevers which are designed for the spring constant calibration of SPM probes. The reflex side can optionally be coated with aluminum.

Tip Specifications	
Material	Si
Shape	Rectangular
Thickness (µm)	2.0
Width (µm)	32
Reflex Coating	None or Al
Handle Chip Specifications	
Length (mm)	3.4
Width (mm)	1.6
Thickness (µm)	300



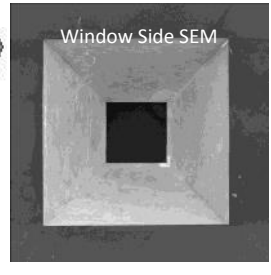
Number Cantilevers per probe: 5

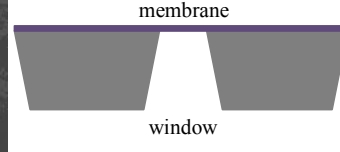
Cantilever	Frequency (kHz)	Spring Constant (N/m)	Length (µm)
A	**14**	**0.12**	**442**
B	**60**	**0.98**	**218**
C	**300**	**12**	**96**
D	**550**	**30**	**71**
E	**1000**	**77**	**50**

Ordering Information		
FCL (no Coating)	FCLA (reflex side Al Coated)	Probes
FCL-5	FCLA-5	5
FCL-10	FCLA-10	10

Membrane Model: SIWD, NIWD, OXWD

Applied NanoStructures' **SIWD Membrane** is made with silicon, **NIWD Membrane** is made with low stress silicon nitride, **OXWD Membrane** is made with silicon oxide which can be coated with various materials according to customer request. Additionally, the size of the chip and window as well as thickness of the membrane can be varied to fit different applications.





Cross-sectional view

Parameters for Chip	Value for Chip		
	Nominal	Minimum	Maximum
Thickness (µm)	300	290	310
Width & Length (µm)	6000 x 6000	5950 x 5950	6050 x 6050
Coatings	Various Coatings Available		

Parameters for Window	Membrane Size			
	SIWD	SIWDS	NIWD, OXWD	NIWDS, OXWDS
Thickness (µm)	0.5	0.5	0.2	0.2
Membrane Size (µm)	200 x 200	20 x 20	200 x 200	20 x 20
Window Size (µm)	600 x 600	450 x 450	600 x 600	450 x 450

Ordering Information	
Example Part Number	# of Chips
SIWD-5 / SIWDS-5	5
SIWD-20 / SIWDS-20	20
SIWD-100 / SIWDS-100	100

Membrane Model: PORE

AppNano **PORE** products are designed for various biological applications. Our nanopores are micro fabricated using single crystal Silicon (SIWD), Silicon Nitride (NIWD), or Silicon Oxide (OXWD) membranes. Nanopores can be ordered with a single pore, or in a 2x2 or 5x5 array.

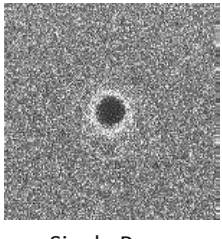
PORE-SI-01-020

Membrane Material	
Silicon	SI
Silicon Nitride	NI
Silicon Oxide	OX

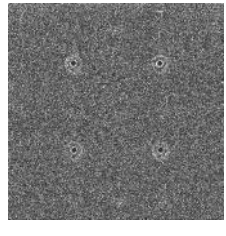
Nanopore Diameter	
20nm	020
100nm	100
200nm	200

Arrangement of Pores	
Single Pore	01
2x2 Array	22
5x5 Array	55

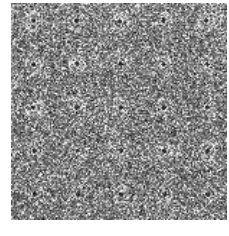
Specify regular (WD) or small (WDS) window size when ordering.



Single Pore



2x2 Array

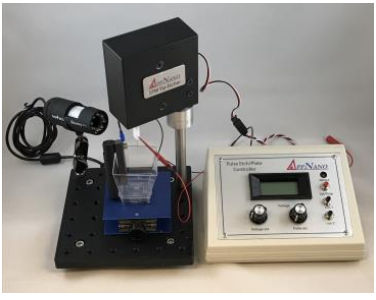


5x5 Array

For specifications on thickness, membrane size, window size, chip thickness, chip width, and chip length, please see website.

Ordering Information	
Example Part Number	**# of Chips**
PORE-SI-01-020	2
PORE-SI-01-100	5
PORE-SI-01-200	5

STM Tip Etcher / Electroplating Station



APPNANO STM Tip Etcher / Electroplating station is a compact production tool that allows in-house manufacturing of sharp tungsten tips for R&D, Laboratory Experiments and Industrial applications. It has two modes of operating :

(i) W Etch (for **Tungsten Tip Etch**)
(ii) Plate (for **Electroplating**).

The **W Etch** feature allows an automatic tip etch stop, an automatic dip and retract, and a live tip etch view. The machine uses pulse etching technology for highly controlled and reproducible tip radius of curvature and aspect ratio. The pulse width is adjustable for creating custom tip shapes.

The **Plate** feature allows electroplating of various metal in manual mode. It is capable of electroplating wide range of thicknesses from nanometer to micrometers for metals contacts, blanket plating to create conducting surface or coat metals to protect against corrosion on small samples .

Technical Specifications - W Etch

* Etch type: DC PWM
* Selectable etch Voltage: 1.5V to 12V
* Current max: 1A
* Optical view: ~200X digital microscope (requires computer)
* Tip Surface detect: Automatic
* Tip etch control: Linear Servo 15 mm travel, 0.02 mm step resolution
* Tip taper distance: 1 mm (can be specified shorter or longer).
* Run 1 : High current fast etch with user adjustable pulse duration
* Run 2 : Low current slow etch with user etch stop detection

Technical Specifications - Plate

* Electroplate Voltage : DC 1.5 V to 12 V
* Maximum Current : 1A
* Sample Size : Small

Option : Pt Etch Module

For more information, contact sales@appnano.com.

Etched Tungsten Probes for STM

Probe Model: STM-W

AppNano etched STM probes are made from 99.95% tungsten wire (0.25 mm in diameter). The probes are produced by computer controlled electrochemical etching and result in probes with a tip radius of less than 20 nm.

Ordering Information	
Part Number	**# of Tips**
STM-W-5	5

Cut Platinum Probes for STM

Probe Model: STM-Pt

AppNano etched STM probes are made from 99.95% platinum wire (0.25 mm diameter). The probes are produced by cutting wire to achieve a tip radius of less than 20 nm.

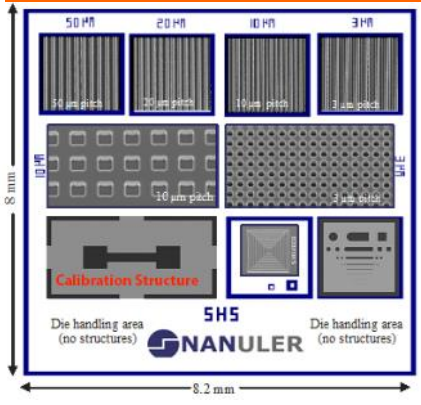
Ordering Information	
Part Number	**# of Tips**
STM-Pt-5	5

Etched Platinum Probes for STM

AppNano can provide computer controlled, custom etched STM probes made from 99.95% platinum wire. Quotations and details can be requested by email; please contact sales@appnano.com.

Additionally AppNano can provide custom sizing of Etched Tungsten Probes with length up to 17 mm. Please contact for enquiries regarding sizing and custom orders.

Chip Features (All dimensions in µm)		
Step height	Dog bone	200 x 1000
Magnification boxes	Four concentric boxes	Pitch: 2, 5, 10 & 50
Gratings	Four different patterns	Pitch: 3, 10, 20 & 50
Grids	Two grids	Pitch: 3 & 10
Multipurpose structures	Circle/Bar/Lines/Square arrays	1, 2, 5, 10, 20, 50, 100 & 200



Options	
SiO_2 SHS (µm)	0.1, 0.2, .5 , 1
Si SHS (µm)	5 , 10, 25, 50
Metal coating (M)	Cr (optional)
Mounting (Q)	36x36x6 mm^3
Mounting Disc	15 mm Dia

Mounting

Packaginbg

Ordering options	
Substrate	OX - SiO_2 Si - Silicon
Step height (µm)	0.1/0.2/0.5/1/5/25
Metal coating	M
Mounting options	Unmounted Metal Disc (D) Quartz (Q)

How to order
STEP-Substrate-Step height-Metal coating-Mounting
For example:
Metal coated, Quartz mounted, 1 µm step height on silicon oxide substrate is:
STEP-OX-1-M-Q

Chart of Probes

Application	Probe Model	Description	Cantilever Length (µm)	Spring Constant (N/m)	Resonance Frequency (kHz)	Options
High Resolution Imaging	ACT-SS	Tapping Mode, Super Sharp Probe	125	34	290	A
	ACL-SS	Long, Tapping Mode, Super Sharp Probe	225	58	190	A
	ACST-SS	Soft Tapping Mode, Super Sharp Probe	150	7.8	150	A
	FORT-SS	Force Modulation, Super Sharp Probe	225	1.6	61	A
	SHOCON-SS	Short, Contact Mode, Super Sharp Probe	225	0.14	21	A
	SICON-SS	Contact Mode, Super Sharp Probe	450	0.29	15	A
Ultra-High Frequency	ACCESS-UHF	Ultra-High Frequency Probes	55	115	1100	A
Plateau Probes	ACT-PTU	High Frequency Plateau Probes	125	79	300	N/A
	FORT-PTU	Medium Frequency Plateau Probes	225	3.4	60	N/A
	SICON-PTU	Low Frequency Plateau Probes	450	0.31	13	N/A
Ball Probes	ACTA-B50	Tapping Mode, 50 nm Ball	125	37	300	A
	FORTA-B50	Force Modulation Mode, 50 nm Ball	225	1.6	61	A
	SICONA-B50	Contact Mode, 50nm Ball	450	0.29	15	A
Colloidal Probes	ACTA-BSG-A	ACTA Tipless with BSG Colloidal, Size A	125	34	300	A, G, GG
	FORTA-BSG-A	FORTA Tipless with BSG Colloidal, Size A	225	1.6	61	A, G, GG
	SICONA-BSG-A	SICONA Tipless with BSG Colloidal, Size A	450	0.29	15	A, G, GG

Option Definitions: A = Aluminum Reflex Coating; C = Custom Tilt & Spike Length; G = Gold Reflex Coating; TL = Tipless

Chart of Probes

Application	Probe Model	Description	Cantilever Length (µm)	Spring Constant (N/m)	Resonance Frequency (kHz)	Options
Electric Force Microscopy	ANSCM-PA	High Spring Constant EFM Probe	125	34	290	N/A
	ANSCM-PT	Medium Spring Constant EFM Probe	225	1.6	61	N/A
	ANSCM-PC	Low Spring Constant EFM Probe	450	0.29	15	N/A
Magnetic Force Microscopy	MAGT-LM	Low Moment MFM Probes	225	1.6	61	N/A
	MAGT	Medium Moment MFM Probes	225	1.6	61	N/A
	MAGT-HM	High Moment MFM Probes	225	1.6	61	N/A
Tip View	ACCESS-NC	Non-Contact/Tapping Mode Probes	150	93	320	A, GG
	ACCESS-FM	Force Modulation Probes	245	2.7	60	A
	ACCESS-EFM	Electric Force Mode Probes	245	2.7	60	GG, PtIr
	ACCESS-C	Contact Mode Probes	450	0.30	16	A, G
Doped Diamond	DD-ACTA	Tapping Mode or Hard Contact Mode	125	34	290	N/A
	DD-FORTA	Force Modulation Mode	225	1.6	61	N/A
	DD-SICONA	Contact Mode Probe	450	0.29	15	N/A
High Aspect Ratio	HART0	No Tilt Compensation, 1, 2, 4 µm spike	125	34	290	A, C
	HART3	3° Tilt Compensation, 1, 2, 4 µm spike	125	34	290	A, C
	HART12	12° Tilt Compensation, 2, 4, 6 µm spike	125	34	290	A, C

Option Definitions: A = Aluminum Reflex Coating; C = Custom Tilt & Spike Length; G = Gold Reflex Coating; TL = Tipless

Chart of Probes

Application	Probe Model	Description	Cantilever Length (µm)	Spring Constant (N/m)	Resonance Frequency (kHz)	Options
Non-Contact / Tapping Mode	ACT	Silicon Tapping Mode Probe	125	34	290	A, G, GG, TL
	ACL	Long Cantilever Tapping Mode Probe	225	58	190	A, G, GG, TL
	FORT	Force Modulation Mode Probe	225	1.6	61	A, G, GG, TL
	ACST	Silicon Soft Tapping/Contact Mode Probe	150	7.8	150	A, G, GG, TL
	HYDRA6R-100N	Silicon Nitride Probe, Rectangular Cantilever	100	0.284	66	G, GG, TL
	HYDRA6V-100N	Silicon Nitride Probe, V-Shape, Narrow Cantilever	100	0.292	66	G, GG, TL
	HYDRA6V-100W	Silicon Nitride Probe, V- Shape, Wide Cantilever	100	0.405	67	G, GG, TL
Contact Mode	SICON	Silicon Contact Mode Probe	450	0.29	15	A, G, GG, TL
	SHOCON	Short Cantilever Contact Mode Probe	225	0.14	21	A, G, GG, TL
	HYDRA6R-200N	Silicon Nitride, Rectangular Cantilever	200	0.035	17	G, GG, TL
	HYDRA6V-200N	Silicon Nitride, V- Shape, Narrow Cantilever	200	0.045	17	G, GG, TL
	HYDRA6V-200W	Silicon Nitride, V-Shape, Wide Cantilever	200	0.081	17	G, GG, TL
Force Curve Liquid	HYDRA2R-100N	Nitride Probe, Rectangular Cantilever	100	0.011	21	G, GG, TL
	HYDRA2R-50N	Nitride Probe, Rectangular Cantilever	50	0.084	77	G, GG, TL
	VScan-Air	Silicon Nitride Probe, V-Shape	100	0.292	66	A
4 in 1 Probes	Hydra-All	Four Silicon Nitride Probes on One Chip: HYDRA6V-100N, 100W, 200N, 200W				G
	Nitra-All	Four Probes with Silicon Nitride Cantilevers and Silicon Nitride Tips on One Chip: HYDRA6V-100N, 100W, 200N, 200W				N/A

Option Definitions: A = Aluminum Reflex Coating; C = Custom Tilt Compensation & Spike Length; G = Gold Reflex Coating; GG = Gold Reflex & Tip Coating; TL = Tipless

USA Customers :

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