

AFM/STM ACCESSORIES & SUPPLIES

AFM/STM Specimen Preparation, Specimen Storage, Calibration and Consumables



AFM/STM Specimen Discs



PELCO® AFM/STM Diskenser
& Disc Carriers



PELCO® AFM/STM Workstation
& Disc Grippers



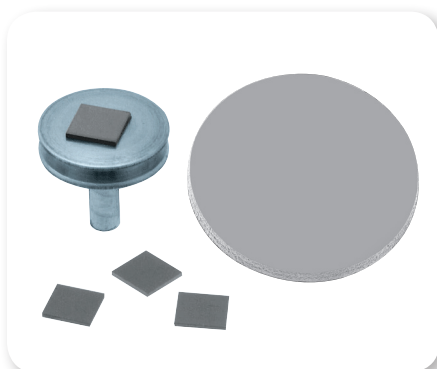
AFM/STM Disc Storage Boxes



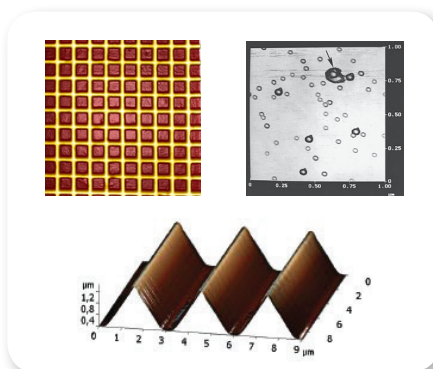
AFM Mounts & Disc Media



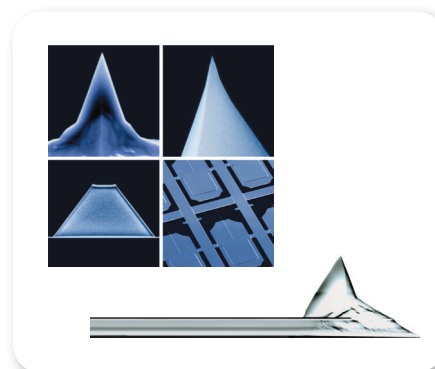
Disc Punches



Silicon Chips & PELCO® Si₃N₄ Discs



AFM Calibration Standards



AFM Probes

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AFM/STM SUPPLIES & ACCESSORIES

AFM/STM Specimen Discs; Disc Carriers; Disc Pickup Tool; Mica Discs; Glass Coverslips



AFM/STM METAL SPECIMEN DISCS

High quality magnetic stainless steel (alloy 430) discs for Atomic Force Microscopy are offered, with smooth edges and consistently flat surfaces. The AFM/STM discs are 22 gauge which is .0299" (0.76mm) with a range of .0269 to .0329" (0.68 to 0.84mm) thickness. Available in 6, 10, 12, 15 and 20mm diameter, supplied in packs of

50 in a clear tube which will fit into the PELCO® AFM/STM Disk dispenser (see below).

| | | |
|-------|-----------------------------------|----------------|
| 16223 | AFM/STM Specimen Discs, 6mm..... | pkg/50/100/150 |
| 16207 | AFM/STM Specimen Discs, 10mm..... | pkg/50/100/150 |
| 16208 | AFM/STM Specimen Discs, 12mm..... | pkg/50/100/150 |
| 16218 | AFM/STM Specimen Discs, 15mm..... | pkg/50/100/150 |
| 16219 | AFM/STM Specimen Discs, 20mm..... | pkg/50/100/150 |

PELCO® GOLD COATED AFM METAL SPECIMEN DISCS

Advanced Nanotechnology Specimen Support



High quality gold coated magnetic stainless steel (alloy 430) discs for Atomic Force Microscopy coated with 1 micron of gold. The discs are supplied in PELCO® AFM Disc Carriers. They are available in 10, 12 and 15mm diameter.

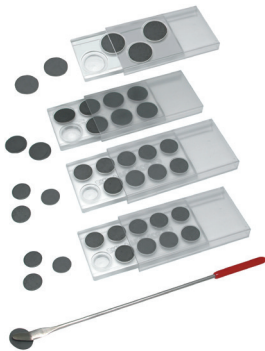
| | | |
|---------|---|------|
| 16207-G | PELCO® AFM Metal Specimen Discs, Gold Coated, 10mm dia., 10 discs in AFM Disc Carrier | each |
| 16208-G | PELCO® AFM Metal Specimen Discs, Gold Coated, 12mm dia., 10 discs in AFM Disc Carrier | each |
| 16218-G | PELCO® AFM Metal Specimen Discs, Gold Coated, 15mm dia., 8 discs in AFM Disc Carrier | each |
| 16219-G | PELCO® AFM Metal Specimen Discs, Gold Coated, 20mm dia., 4 discs in AFM Disc Carrier | each |



PELCO® AFM DISKDISPENSER

A practical way to store and dispense AFM discs. The plastic tubes in which the discs are packaged may be inserted into the PELCO® Disk dispenser. With a turn of the cylinder one disc is dispensed, ready to be picked up with the PELCO® Disc Gripper as shown to the right. The PELCO® Disk dispenser will dispense either 10, 12 or 15mm Discs.

| | | |
|-------|--------------------------------|------|
| 16204 | PELCO® AFM Diskdispenser | each |
|-------|--------------------------------|------|



PELCO® AFM DISC CARRIERS & AFM DISC PICKUP TOOL

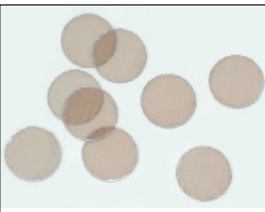
An inexpensive way to store 10, 12, 15 and 20mm discs in a dust-free environment. Discs are placed face down into a stepped cavity where the specimen is protected. The cavity allows for a maximum specimen height of 3.2mm (1/8"). They are retrieved by using the convenient PELCO® AFM Disc Pickup Tool, comprised of a plastic handle, stainless steel shaft and a magnetic

pad on the tip. Fingers need not touch the disc. Sliding cover. Box size: 76.2 L x 40 W x 7.5 H (mm) (3" L x 1.58" W x .295" H)

| | | |
|-------|--|------|
| 16209 | PELCO® AFM Disc Carrier, 10mm, (holds 10)..... | each |
| 16210 | PELCO® AFM Disc Carrier, 12mm, (holds 10)..... | each |
| 16214 | PELCO® AFM Disc Carrier, 15mm, (holds 8)..... | each |
| 16206 | PELCO® AFM Disc Carrier, 20mm, (holds 4)..... | each |



| | | |
|-------|--|------|
| 16220 | PELCO® AFM Disc Magnetic Pickup Tool | each |
|-------|--|------|



AFM MICA DISCS

Highest quality grade V1 mica, 0.21mm (.0085") thick. Interleaved, in packages of 10.

Available in four diameters: 10mm (0.39"); 12mm (0.47") 15mm (0.59"); 20mm (0.79")

| | | |
|-------|--|--------|
| 50 | Highest Grade V1 AFM Mica Discs, 10mm..... | pkg/10 |
| 50-12 | Highest Grade V1 AFM Mica Discs, 12mm..... | pkg/10 |
| 50-15 | Highest Grade V1 AFM Mica Discs, 15mm..... | pkg/10 |
| 50-20 | Highest Grade V1 AFM Mica Discs, 20mm..... | pkg/10 |



ROUND GLASS COVERSGLIPS

10mm, thickness #1.5 (0.16 to 0.19mm) sold in package of 100.

12mm, thickness #1 (0.13 to 0.17mm) approx. 173 per 1/4 oz.

15mm, thickness #1 (0.13 to 0.17mm) approx. 111 per 1/4 oz.

| | | |
|--------|----------------------------------|---------|
| 260368 | Coverslips, Glass, 10mm dia..... | pkg/100 |
| 26023 | Coverslips, Glass, 12mm dia..... | 1/4 oz |
| 26024 | Coverslips, Glass, 15mm dia..... | 1/4 oz |



PELCO® AFM ATOMIC FORCE MICROSCOPY WORKSTATION

Turned from solid aluminum, this workstation features an adjustable internal magnet to securely hold a metal AFM Specimen Disc in place. A tray around the circumference of the central disc holder may be used to catch residue or hold additional discs.

| | |
|-------|---|
| 15010 | PELCO® AFM Workstation.....each |
| 16220 | PELCO® AFM Disc Pickup Tool (previous page)each |



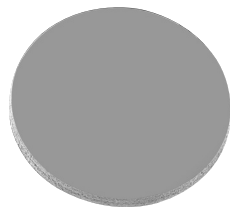
PELCO® AFM DISC GRIPPERS

Specially designed rubber coated tips for picking up AFM discs from a flat surface. Transfer Atomic Force Microscopy Discs from Dispenser to PELCO® AFM Workstation to Microscope and to PELCO® AFM Disc Carrier or AFM Disc Storage Box with ease.



| | |
|------|---|
| 1671 | PELCO® 10mm AFM Disc Gripperseach |
| 1668 | PELCO® 12mm AFM Disc Gripperseach |
| 1669 | PELCO® 15mm AFM Disc Gripperseach |
| 1672 | PELCO® 20mm AFM Disc Gripperseach |

PELCO® SILICON NITRIDE COATED 3MM DISCS



These 3mm blank silicon discs have a 50nm ultra low stress silicon nitride layer (Si_3N_4) on both sides and can be used as specimen discs for AFM applications which need a Si_3N_4 background. Provide smooth background: Surface roughness has RMS (Rg) of 0.65 \pm 0.06nm which gives a mean roughness (RA) of 0.45 \pm 0.02nm

Film Thickness: 50nm ultra low stress Si_3N_4 on both sides

Disc Thickness: 200 μ m silicon support

Disc Diameter: 3mm

Surface Roughness: The RMS (Rq) is 0.65 \pm 0.06nm which gives a mean roughness (Ra) of 0.45 \pm 0.02nm

Packaging: The PELCO® Silicon Aperture Frames are packaged under cleanroom conditions in the PELCO® #160 TEM Grid Storage box. Each box holds 10 discs.

| | |
|----------|---|
| 21555-10 | PELCO® Silicon Nitride 3mm Discs pkg/10 |
|----------|---|

CROSS SECTION AFM MOUNTS & AFM SAMPLE HOLDERS

A convenient way to clamp and position cross sectional samples for AFM imaging. These holders are all made from high quality magnetic stainless steel (alloy 430) so they can be easily attached to the magnetic sample holder of the AFM system. Small 12mm diameter will make the cross section holders compatible with most AFM systems on the market.



| | |
|----------|---|
| 16213-6 | 90° AFM Sample Mount. Use (conductive) adhesive to mount specimen..... each |
| 16213-10 | 90° AFM Sample Mount with Spring Clip to conveniently mount thin cross section sample..... each |
| 16213-4 | Set Screw Vise to mount AFM samples up to 4mm thickness. Allen key for set screw included..... each |
| 16213-1 | Dual Set Screw Vise to AFM mount samples up to 1mm thickness. Allen key for set screws included..... each |

PELCO® X-TREME AFM/STM DISC STORAGE BOX



Very strong and rugged clear polycarbonate box to store stainless steel AFM discs with 6, 10, 12, 15 or 20mm diameter. The PELCO® X-TREME storage box is water-tight, crushproof and dustproof. Strong hinges, locking clasps and O-ring seal makes this box suitable for transport, shipping and storage of the stainless steel AFM

discs. Ideal for storing calibration and test samples. The box has a single pole magnetic layer in the base with a size of 47 x 86mm (1.85" x 3.4"). A marker pen can be used to write on the magnetic material. OD 112 x 77 x 36mm (4.4" x 3" x 1.4"), maximum specimen height is 21mm (0.81").

Storage capacity: 5 ea of the Ø20mm AFM discs; 8 ea of the Ø15mm AFM discs; 10 ea of the Ø12mm AFM discs; 21 ea of the Ø6mm AFM discs.

| | |
|-------|---|
| 16224 | PELCO® X-TREME AFM Disc Storage Boxeach |
|-------|---|

PELCO® AFM DISC STORAGE BOXES

These storage boxes have a single pole magnetic layer in the base of the box to store stainless AFM discs with 10, 12, 15 or 20mm diameter.

Large storage box holds up to 20 AFM discs. Inside measurements of the styrene box are 152 x 51 x 18mm (6" x 2" x 11/16"). Box has a clear lid and a black base.

Small storage box holds up to 4 discs. Inside measurements of the styrene box are 70 x 28 x 18mm (2-3/4" x 1-1/8" x 11/16"). Box has a clear lid and a blue base.

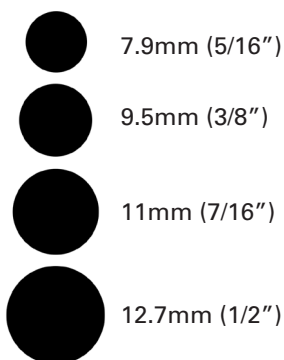


| | |
|-------|---|
| 16201 | PELCO® Single AFM/STM Disc Storage Box, Small pkg/5 |
| 16203 | PELCO® AFM Disc Storage Box, smalleach |
| 16212 | PELCO® AFM Disc Storage Box, largeeach |

AFM SUPPLIES & ACCESSORIES

Disc Punches; Silicon Chips; AFM Cantilever Tweezers; Gold Coated Slides & Coverslips

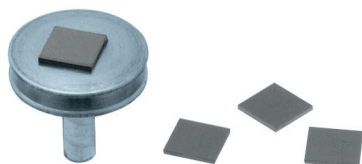
DISC PUNCHES



Maximum thickness for punching: 0.067" (1.7mm)

| | | |
|-------|---|------|
| 54740 | Disc Punch, 7.9mm Ø circle (5/16") | each |
| 54741 | Disc Punch, 9.5mm Ø circle (3/8") | each |
| 54742 | Disc Punch, 11mm Ø circle (3/16") | each |
| 54743 | Disc Punch, 12.7mm Ø circle (5/16") | each |

SILICON CHIP SPECIMEN SUPPORTS



Si-chips are opaque, of low electrical resistance and have surface properties equal to glass (including smoothness). They are chemically inert and make good substrates for growing or mounting cells. Si-chips are precleaned before packaging. Also ideal for imaging small particles due to low background signal.

Availability: 4" wafer is precut into 5 x 7mm, 5 x 5mm or 10 x 10mm chips that can be easily separated in the laboratory.

Properties:

Orientation (111)

Resistance 1-30 Ohms

Type P (Boron) (1 primary flat)

No SiO₂ top coating

Wafer thickness is 18-21 mil

Wafer is polished on one side

After dicing they are rinsed in DI water for cleaning

| | | |
|-------|--|------|
| 16007 | 4" (10cm) dia., 5 x 7mm diced Silicon Wafer, 187 chips/wafer..... | each |
| 16008 | 4" (10cm) dia., 5 x 5mm diced Silicon Wafer, 270 chips/wafer..... | each |
| 16006 | 4" (10cm) dia., 10 x 10mm diced Silicon Wafer, 55 chips/wafer..... | each |

AFM CANTILEVER TWEEZERS - STAINLESS STEEL



Easily grasp AFM cantilevers / probes with these precise non-magnetic stainless steel, tweezers. 4-5/8" (117mm) long.



| | | |
|------|--------------------------------------|------|
| 5599 | AFM Cantilever Tweezers, NM-SS | each |
|------|--------------------------------------|------|

PELCO® GOLD COATED MICROSCOPE SLIDES



High quality glass, standard microscope slides coated with 50nm of gold with a 5nm chromium adhesion layer between the glass slide

surface and the gold coating. Can be used for a wide range of nanotechnology, biotechnology and AFM applications. Also suitable as an opaque microscopy support. Both Cr and Au are evaporated on the glass slide using a vacuum evaporation system. The gold surface is not atomically flat, but has bumps in the nm range. The gold slides are individually packed in a slide mailer. The gold slides are autoclavable.

Glass Slide: 75 x 25mm , 1mm thickness, soda lime glass

Chromium Adhesion Layer Thickness: 5nm

Gold Layer Thickness: 50nm (+/- 5nm)

| | | |
|---------|--|------|
| 26002-G | Gold Coated 75 x 25mm Microscope Slide, 50nm Au .. | each |
|---------|--|------|

PELCO® GOLD COATED MICROSCOPE SLIDES



High quality, borosilicate glass coverslips coated with 50nm of gold with a 5nm chromium adhesion layer between the cover-slip surface and the gold coating. Can be used for

a wide range of nanotechnology, biotechnology and AFM application. Both Cr and Au are evaporated on the glass coverslips using a vacuum evaporation system. The gold surface is not atomically flat, but has bumps in the nm range. The coverslips are sold in packs of 2 and are packed in an X0 Gel-Pak box. The gold coated coverslips are autoclavable.

Glass Coverslip Size: Ø16mm with thickness #1 or 22 x 22mm with thickness #2

Glass Type: Schott D263M borosilicate

Chromium Adhesion Layer Thickness: 5nm

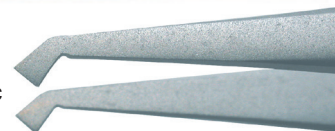
Gold Substrate Layer Thickness: 50nm (±5nm)

| | | |
|----------|---|------|
| 260156-G | Gold Coated 22 x 22mm Glass Coverslips, 50nm Au ... | each |
| 260374-G | Gold Coated Ø16mm Glass Coverslips, 50nm Au..... | each |

AFM CANTILEVER TWEEZERS - TITANIUM

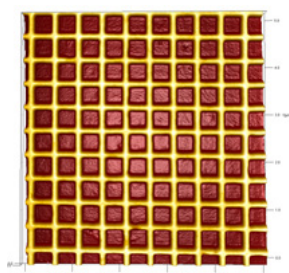


Easily grasp AFM cantilevers / probes with these precise titanium, absolutely non-magnetic tweezers. 4-5/8" (117mm) long.



| | | |
|---------|---|------|
| 5596-TI | AFM Cantilever Tweezers, Titanium | each |
|---------|---|------|

2000 LINES/MM CROSS LINE GRATING REPLICA



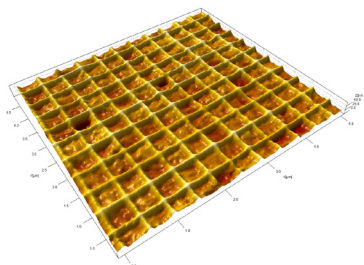
2,000 lines/mm cross line grating replica is suitable for X-Y calibration. The replicas have well-defined trench type grooves, which makes it easy to determine the 500nm pitch.

The 677-AFM Grating Replica is made of cellulose acetate. It replaces the previous #607-AFM Grating Replica with 463nm pitch.

The 677-STM Grating Replica is a carbon replica with Au/Pd shadowing supported on a 400 square mesh, 3mm copper TEM grid which is mounted on a 12mm disc. It replaces the previous #607-STM Grating Replica with 463nm pitch.

- 677-AFM X-Y Cross Line Grating Replica, 2000 lines/mm, Cellulose Acetate, Mounted on 12mm Specimen Disc.....each
- 677-STM X-Y Cross Line Grating Replica, 2000 lines/mm, Carbon/..... Au/Pd Coated, Mounted on 12mm Specimen Disc.....each

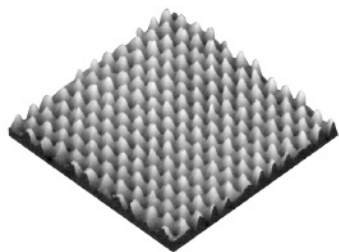
2,160 WAFFLE GRATING REPLICA FOR STM



The 607-STM Grating Replica is a carbon replica with Au/Pd shadowing for X-Y calibration with 2,160 lines/mm crossed lines. Made on a 400 square mesh, 3mm copper TEM grid; mounted on a 12mm stainless steel STM disc.

- 607-STM X-Y Cross Line Grating Replica, Carbon/Au/Pd Coated, mounted on 12mm specimen disceach

HIGHLY ORIENTED PYROLYTIC GRAPHITE – HOPG



HOPG is widely used as a substrate for specimens to be examined in scanning probe microscopes (SPM, STM and AFM). It may also be used as a calibration specimen. HOPG consists of layered planes of carbon atoms (002) which are highly oriented with respect to each other. This parallel is characterized by the mosaic spread angle.

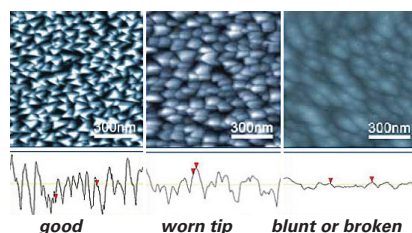
HOPG grade ZYB with a mosaic spread of $1.2^\circ \pm 0.2^\circ$ with a grain size of up to 1µm

- 626-1 HOPG grade ZYB, 10 x 10mm x 2mm.....each

TipChecker FOR AFM PROBES

When imaging a sample by AFM, it is imperative to know the condition of the AFM probe, since this determines the quality and correctness of the image. The TipChecker is an SPM sample for fast, convenient and efficient determination of the AFM tip condition. The clear differences between the tips becomes apparent even with a single scan line. The TipChecker offers a fast and easy way to compare and categorize differ-

ent AFM tips with respect to tip apex, shape and sharpness. The TipChecker sample enables checking if the tip is still good, starts showing wear or is blunted or broken without the need for scanning an entire image or using SEM inspection. The Tip Checker sample works perfectly with Auto Tip Qualification and Tip Characterization software that is available on the market.

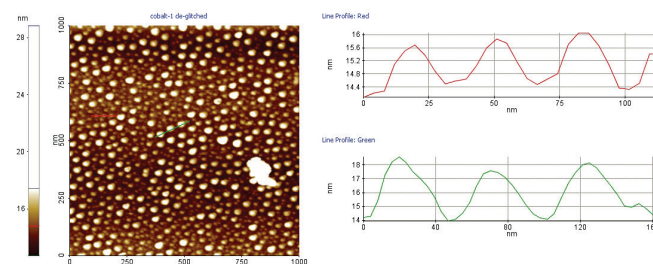


Figures showing a comparison between different AFM probe tips used to image the TipChecker sample. Scan is 1x1µm for all images, height is 100nm. Each image is shown with a representative cross-section scan.

The BudgetSensors TipChecker sample consists of an extremely wear-resistant thin film coating deposited on a silicon chip. The thin film coating shows a granular, sharply peaked nanostructure ideal for reversely imaging an AFM probe's apex. The die size of the BudgetSensors TipChecker is 5x5mm and is completely coated with the thin film. It comes glued onto a 12mm diameter, stainless steel, magnetic disc, ready to be placed into your AFM set.

- TC1 BudgetSensors TipChecker for AFM Probes.....each

PELCO® TIP & RESOLUTION TEST SPECIMEN



This product is intended for checking the tip sharpness (not height calibration); AFM tips wear down and can get damaged resulting in blurry lines, especially at the nano scale.

A single layer of cobalt particles provide an excellent and stable substrate for AFM tip characterization and instrument operation. Image at top demonstrates height calibration at 1nm (red line profile) and 3nm (green line profile) on the standard to indicate a sharp tip. Can be used in water as long as there are no chemicals present which would react with the substrate or the Co particles.

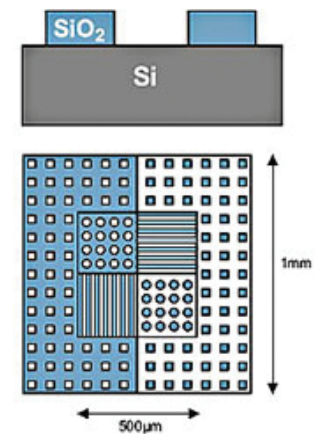
The Co particles are flattened half spheres (droplets) with the radius typically larger than the height. There is a distribution of particle heights between 1 and 5nm.

Available on 5x5mm silicon wafer chips, unmounted or mounted, on 12mm stainless steel metal disc. Tip characterization down to angstrom resolution is easily attained. Ready-to-scan test specimen.

- 628 PELCO® AFM Tip and Resolution Test Specimen, Unmounted.....each
- 628-AFM PELCO® AFM Tip and Resolution Test Specimen, Mount AFM.....each

HS-SERIES AFM CALIBRATION STANDARDS

Step heights of 20, 100 or 500nm.



The HS-series calibration standards offers an easy and reliable way to calibrate AFM systems. Primarily designed for accurate Z-axis calibration, the standards also offer X- and Y-axis calibration for bigger scanners in the 40-100µm range. The structure symmetry enables calibration without the need to rotate and re-align the sample in between X- and Y-axis calibration.

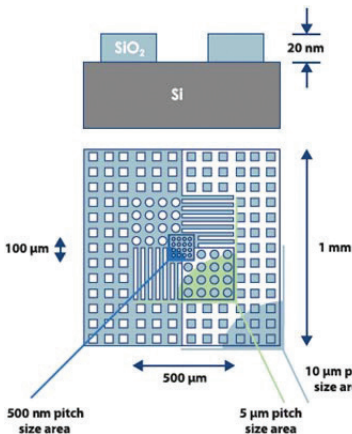
The HS-series feature silicon dioxide structure arrays on a 5 x 5mm silicon chip. The fabrication process ensures excellent uni-

formity of the structures across the chip. There are three step heights available with nominal values of: 20nm, 100nm, and 500nm. The actual value will be supplied with the delivered calibration standard. Arrays of structures with different shape and pitch are integrated on the chip. The larger square of 1 x 1mm contains square pillars and holes with a 10µm pitch. The smaller center square of 500 x 500µm contains circular pillars and holes as well as lines in both X- and Y-direction with a 5µm pitch.

The silicon chips are available unmounted or mounted on a 12mm standard AFM disc using a high quality electrically conductive epoxy.

| | | |
|-------------|---|------|
| HS-20MG | AFM Calibration Standard, step height 20nm, mounted | each |
| HS-20MG-UM | AFM Calibration Standard, step height 20nm, unmounted..... | each |
| HS-100MG | AFM Calibration Standard, step height 100nm, mounted | each |
| HS-100MG-UM | AFM Calibration Standard, step height 100nm, unmounted..... | each |
| HS-500MG | AFM Calibration Standard, step height 500nm, mounted | each |
| HS-500MG-UM | AFM Calibration Standard, step height 500nm, unmounted..... | each |

CS AFM XYZ CALIBRATION STANDARD



The CS-20NG represents an advanced XYZ calibration grid that enables reliable calibration of AFM systems down to the nanometer level. The XYZ calibration standard features silicon dioxide structures on a 5 x 5mm silicon chip. The calibration area is in the middle of the chip and can be easily located by the optical system of the AFM. The structure step height is in the range of 20nm. The actual height value will be supplied with the delivered calibration standard. CS-20NG has three different x-y array sizes, all with the same 20nm height. The large 1 x 1mm square contains square pillars and holes with a 10µm pitch.

CS-20NG has three different x-y array sizes, all with the same 20nm height. The large 1 x 1mm square contains square pillars and holes with a 10µm pitch.

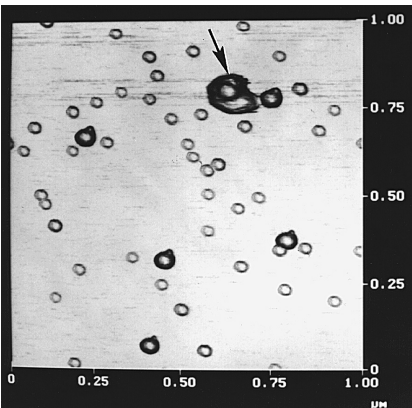
The middle square contains circular pillars, holes and lines with a 5µm pitch. The small central area contains circular holes with a 500nm pitch. The CS-20NG is suitable for both lateral and vertical AFM scanner calibration. The structure symmetry enables calibration in one step without the need to rotate the sample between X- and Y-calibration.

Vertical accuracy is 2% of the actual value which corresponds to ±0.4nm. The lateral pitch accuracy for the 5µm and 10µm patterns is 0.1µm. For the 500nm pitch region, the lateral accuracy is 10nm.

The XYZ calibration standard is mounted on a 12mm, standard AFM disc using a high quality electrically conductive epoxy resin.

| | | |
|---------|--|------|
| CS-20NG | AFM XYZ Calibration Standard, mounted on a 12mm AFM disc | each |
|---------|--|------|

AFM GOLD CALIBRATION KIT



- Characterized colloidal gold particles for:
- Characterization of scanning tip geometry
 - Reliable calibration of the vertical scale of piezoelectric response
 - Characterizing vertical dimensions of coadsorbed biomolecules

Three sizes of colloidal gold particles are available in a convenient kit form. The kit contains 8 numbered 15mm AFM discs with mica attached for calibration and tip characterization. Remaining colloidal gold can be used for coadsorption with biomolecules or other samples.

16200 and 16205 Kits Contain:

PELCO® 15mm AFM Disc Carrier

15mm AFM Discs, numbered with 9.9mm Mica Discs attached, 8 ea., in a 16214 PELCO® Disc Carrier

PELCO® AFM Disc Pickup Tool

Gold Colloid, 5nm Range, 500µl

Gold Colloid, 15nm Range, 500µl

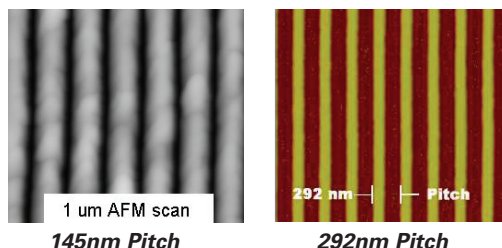
Gold Colloid, 30nm Range, 500µl

Poly-L-Lysine, 0.1%, 500µl

Protocol & Reprint (see below)

| | | |
|-------|---|------|
| 16200 | PELCO® AFM Gold Standard Kit | each |
| 16205 | PELCO® AFM Gold Standard Kit with 2 Additional .. Gold Sizes (10 and 20nm Range)..... | each |

Vesenska J, Manne S, Giberson R, Marsh T, and Henderson E, 1993. Colloidal Gold Particles as an Incompressible Atomic Force Microscope Imaging Standard for Assessing the Compressibility of Biomolecules. Biophysical Journal 65:1-6



HIGH MAGNIFICATION, HIGH RESOLUTION REFERENCE & CALIBRATION STANDARDS

Holographic Grating for AFM, SEM, Auger and FIB

Precision, holographic patterns, provide accurate calibration and feature high stability and usability. Moderate ridge heights are convenient for AFM. Specimens provide good contrast for secondary and backscatter imaging with SEM. They enable accurate calibration for high resolution, nanometer-scale measurements. Available with 70, 145 and 292nm pitch.

145nm Pitch Reference Standard for Very High Resolution Calibration

Precision holographic pattern for accurate calibration for high resolution, nanometer scale measurements.

Period: 145nm pitch nominal, one dimensional array. Accuracy is +/- 1nm. Calibration certificate will give the actual pitch of the standard.

Surface Structure: Aluminum lines on glass, 4 x 6mm dimensions. Line height (about 100nm) and line width (about 75nm) are not calibrated.

Usability: The calibrated pattern covers the entire standard. There is sufficient usable area to make tens of thousands of measurements without reusing any areas contaminated or altered by previous scans.

AFM: Use in contact, tapping and other modes with image sizes from 250nm to 10µm. Available unmounted or mounted on a 12mm steel AFM disc.

Certification: Comes with a non-traceable manufacturer's certificate stating average pitch, based on batch measurements.

| | | |
|----------|--|------|
| 642-1AFM | 145nm Very High Resolution AFM Reference Standard on 12mm steel disc | each |
| 642-1 | 145nm Very High Resolution AFM Reference Standard, Unmounted | each |

292nm Pitch High Magnification, High Resolution Calibration Standard

Precision holographic grating standard with high contrast and excellent edge definition.

Period: 292nm pitch nominal, one dimensional array. Accuracy is +/- 1%. Calibration certificate will give the actual pitch of the standard.

Surface Structure: Titanium lines on Silicon, 4 x 3mm dimensions. Line height (about 30nm) and line width (130nm) are not calibrated.

Usability: The calibrated pattern covers the entire chip. There is sufficient usable area to make tens of thousands of measurements without reusing any areas contaminated or altered by previous scans.

AFM: Use in contact, tapping and other modes with image sizes from 500nm to 20µm. Mounted on a 12mm steel AFM disc.

Certification: There is a version with a non-traceable manufacturer's certificate stating average pitch, based on batch measurements.

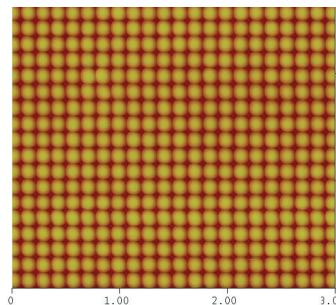
There is also the traceable, certified version measured in comparison with a standard calibrated at PTB (Physikalisch-Technischen Bundesanstalt in Braunschweig, Germany, is the German counterpart of NIST). The standard is NIST traceable by virtue of the mutual recognition agreement by NIST and PTB.

| | | |
|-----------|--|------|
| 643-1AFM | 292nm High Resolution AFM Reference Standard on 12mm steel disc, Certified..... | each |
| 643-1 | 292nm High Resolution AFM Reference Standard, Unmounted, Certified | each |
| 643-11AFM | 292nm High Resolution AFM Reference Standard on 12mm steel disc, Certified, Traceable..... | each |
| 643-11 | 292nm High Resolution AFM Reference Standard, Unmounted, Certified, Traceable..... | each |

2D HOLOGRAPHIC ARRAY STANDARDS

Precision, holographic pattern providing accurate calibration in the horizontal plane for very high resolution, nanometer-scale measurements with 144nm and 300nm pitch.

144nm Very High Resolution 2D Calibration Standard



Period: 144nm pitch, two-dimensional array. Accurate to ± 1 nm. Refer to calibration certificate for actual pitch.

Surface: Aluminum bumps on Silicon, 4 x 3mm die. Bump height (about 90nm) and width (about 75nm) are not calibrated.

Usability: The calibrated pattern covers the entire chip. There is sufficient usable area to make tens of thousands of measurements without reusing any areas altered or contaminated by previous scans.

AFM: Use in contact, intermittent contact (TappingMode™) and other modes with image sizes from 250nm to 10mm. Available unmounted or mounted on 12mm steel discs.

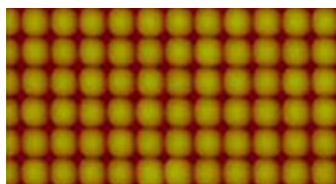
SEM: This specimen works well at all accelerating voltages. Normally supplied unmounted. Can be mounted on a stub of your choice.

Model 2D: This Calibration Reference specimen comes with a non-traceable, manufacturer's certificate. This states the average period, based on batch measurements.

Model 2DUTC: This Traceable, Certified Standard is a select grade. Each standard is individually measured in comparison with a similar specimen calibrated at PTB. (PTB, Physikalisch-Technischen Bundesanstalt, is the German counterpart of NIST.) The uncertainty of single pitch values is typically ± 1.4 nm (95% confidence interval). Multi-pitch measurements provide the usual square-root of N improvement in precision.

| | |
|-----------------|--|
| 16465-2D | 144nm 2D Pattern Calibration Standard, Unmounted, Certifiedeach |
| 16465-2D-AFM | 144nm 2D Pattern Calibration Standard on 12mm steel disc, Certifiedeach |
| 16465-2DUTC | 144nm 2DUTC Pattern Calibration Standard, Unmounted, Certifiedeach |
| 16465-2DUTC-AFM | 144nm 2DUTC Pattern Calibration Standard, on 12mm steel disc, Certified, Traceable ...each |

300nm Very High Resolution 2D Calibration Standard



Period: 300nm pitch nominal, one dimensional array. Calibration certificate will give the actual pitch of the standard.

Surface Structure: Aluminum bumps on Silicon, 4 x 3mm

die: Bump height (about 50nm) and width (about 150nm) not calibrated.

Usability: The calibrated pattern covers the entire chip. There is sufficient usable area to make thousands of measurements without reusing any areas contaminated or altered by previous scans.

AFM: Use in contact, tapping and other modes with image sizes from 500nm to 20nm. Mounted on a 12mm steel AFM disc.

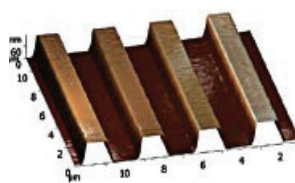
SEM: Auger, FIB: Can be used for a wide range of accelerating voltage (1kV-20kV) and calibrates images from 5kX to 200kX. Can be supplied unmounted or mounted on an SEM stub of your choice. SEM Mount selection A-M.

Certification: Supplied with a non-traceable manufacturer's certificate stating average pitch, based on batch measurements.

| | |
|------------|--|
| 16475-1AFM | 300nm 2D Resolution AFM Reference Standard on a 12mm steel Disc, Certifiedeach |
| 16475-1 | 300nm 2D Resolution AFM Reference Standard on a 12mm steel Disc, Certifiedeach |

AFM, STM, SPM CALIBRATION SPECIMENS

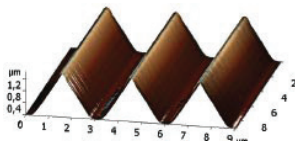
A complete selection of useful, precise, practical calibration and test specimens for scanning probe microscopy (SPM, AFM and STM) applications. Included are calibration specimens for Z-axis, X- or Y-axis, X/Y/Z direction, linearity and tip sharpness parameters.



Block Test Gratings for Z-axis

Selection of 3 block type test gratings with different step heights intended for Z-axis calibration of scanning probe microscopes and linearity measurements.

| | |
|------------------------|---|
| Structure: | Si Wafer with SiO ₂ layer for grating |
| Pattern Type: | 1-Dimensional (in Z-axis direction) |
| Step Heights: | 20 \pm 1nm for TGZ-20; 115 \pm 2nm for TGZ-100; 550 \pm 3nm for TGZ-500 |
| Period: | 3 \pm 0.01 μ m |
| Chip Size: | 5 x 5 x 0.5mm |
| Effective Area: | Central square of 3 x 3mm |
| 629-10 | Calibration grating TGZ-20, Z=18.5nmeach |
| 629-10AFM | Calibration grating TGZ-20, Z=18.5nm, mounted on 12mm AFM disceach |
| 629-20 | Calibration grating TGZ-100, Z=108.5nmeach |
| 629-20AFM | Calibration grating TGZ-100, Z=108.5nm, mounted on 12mm AFM disceach |
| 629-30 | Calibration grating TGZ-500, Z=535.5nmeach |
| 629-30AFM | Calibration grating TGZ-500, Z=535.5nm, mounted on 12mm AFM disceach |



Triangular Test Grating for X- or Y-axis

The TGT-1500 test grating is intended for SPM calibration in X- or Y-axis, determination of lateral

and vertical scanner nonlinearity, detection of angular distortion and tip characterization, 3 μ m pitch.

| | |
|----------------------|--|
| Structure: | Si wafer with grating in top surface |
| Pattern Type: | 1-D array of triangular steps with precise linear and angular dimensions |
| Edge Angle: | Aprox. 70 degrees |

Edge Radius: $\leq 10\text{nm}$
Pattern Height: $1.8\mu\text{m}$ (non-calibrated for information only)
Period: $3 \pm 0.01\mu\text{m}$
Chip Size: $5 \times 5 \times 0.5\text{mm}$
Effective Area: Central square of $3 \times 3\text{mm}$

629-40 Test grating TGT-1500, $3\mu\text{m}$ pitch each
 629-40AFM Test grating TGT-1500, $3\mu\text{m}$ pitch, mounted on 12mm AFM disc..... each

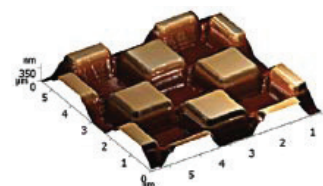


Test Grating for Tip Sharpness

The TGTZ-400 test grating is intended for 3-D visualization of the scanning tip, determination of tip sharpness parameters, tip degradation and contamination control.

Structure: Si wafer with grating in top surface
Pattern Type: Array of sharp tips
Tip Angle: About 50 degrees
Tip Radius: $\leq 10\text{nm}$
Tip Height: $0.3 - 0.7\mu\text{m}$
Period: $3 \pm 0.01\mu\text{m}$
Diagonal Period: $2.12\mu\text{m}$
Chip Size: $5 \times 5 \times 0.5\text{mm}$
Effective Area: Central square of $2 \times 2\text{mm}$

629-50 Test grating TGTZ-400, 300-700nm tips..... each
 629-50-AFM Test grating TGTZ-400, 300-700nm tips, mounted on 12mm AFM disc each



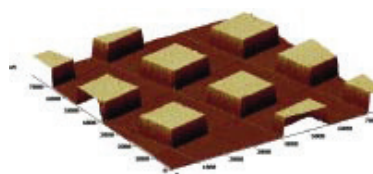
Test Grating for Lateral Calibration

The TG3D-3000/600 test grating with its 3-Dimensional array is intended for lateral calibration of SPM scanners, detection of lateral nonlinearity, hysteresis, creep, cross-coupling effects and for determination of the tip aspect ratio.

Structure: Si wafer with grating in top surface
Pattern Type: Chessboard like array of square pillars with sharp undercut edges
Height: $0.3 - 0.6\mu\text{m}$
Top Square Size: $1.2 \times 1.2\mu\text{m}$
Edge Radius: $\leq 10\text{nm}$
Period: $3 \pm 0.05\mu\text{m}$
Chip Size: $5 \times 5 \times 0.5\text{mm}$
Effective Area: Central square of $3 \times 3\text{mm}$

Note: Height and top square dimensions are given for information only (non calibrated values).

629-60 Test grating TG3D-3000/600, pillars each
 629-60-AFM Test grating TG3D-3000/600, pillars, mounted on 12mm AFM disc..... each



Test Grating for X-, Y- and Z-direction

The TG3D-3000/20 test grating with its truly 3-Dimensional structure is intended for simultaneous

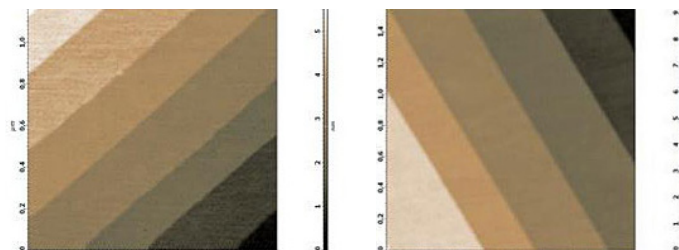
calibration in X-, Y- and Z-direction, lateral calibration of SPM scanners and detection of any lateral nonlinearity, hysteresis, creep and cross-coupling effects.

Structure: Si wafer with SiO_2 layer for grating
Pattern Type: 3-Dimensional array of small squares
Height: $20 \pm 1.5\text{nm}$
Square Size: $1.5 \pm 0.15\mu\text{m}$
Period: $3 \pm 0.05\mu\text{m}$
Chip Size: $5 \times 5 \times 0.5\text{mm}$
Effective Area: Central square of $3 \times 3\text{mm}$

Note: The precision on the height is based on the measurement of 5 gratings (randomly selected from a batch of 300 gratings) by an SPM calibrated by a PTB certified TGZ-20 grating. The basic step height can vary from the specified one within 10% (example: step height can be $22 \pm 1.5\text{nm}$).

629-70 Test grating TG3D-3000/20, squares each
 629-70-AFM Test grating TG3D-3000/20, squares, mounted on 12mm AFM disc..... each

Si-STEP Calibration Sample



6H-SiC (0001) based calibration sample which is designed to perform easy calibrations of an AFM scanner vertical movements in several nanometers interval. The simplicity of calibration of the calibration process is provided by the nearly uniform distribution of half-monolayer high steps (either 0.75 or 1.5nm) on the sample surface demonstrating both chemical and mechanical stability. The step height corresponds to the half of the lattice constant of the 6H-SiC crystal in the (0001) direction.

Structure: Si with steps
Single Step Height: $0.75\text{nm} / 1.5\text{nm}$
Average Inter-step Distance: $0.15-0.4\mu\text{m} / 0.2-0.5\mu\text{m}$
Mis-orientation of Surface: $\sim 0.2^\circ / \sim 0.3^\circ$
Average Inter-step Roughness: 0.09nm
Chip Size: $5 \times 5 \times 0.3\text{mm}$

629-85 SiC-STEP Calibration Sample with 0.75nm Step height, unmounted..... each
 629-85-AFM SiC-STEP Calibration Sample with 0.75nm Step height, mounted on 12mm AFM disc..... each
 629-90 SiC-STEP Calibration Sample with 1.5nm Step height, unmounted..... each
 629-90-AFM SiC-STEP Calibration Sample with 1.5nm Step height, mounted on 12mm AFM disc..... each

AFM Probes Quality Meets Price

The right choice of AFM probes is extremely important for the quality of your AFM work. The BudgetSensors AFM probes are an excellent choice for today's high demands in nanotech research. Designed by specialists in AFM, they combine the latest technology of AFM tip/cantilever manufacturing with a realistic pricing. Made of monolithic silicon, they fit into most commercially available AFM's (DI Nanoscope, PSI, JEOL, NT-MDT, Asylum, VEECO, WiTec, etc) and outperform all other silicon AFM probes on the market when it comes to value, sharpness, symmetry and consistency. The BudgetSensors AFM probes are specifically designed for different AFM modes and are available with a variety of coatings to give the highest resolution needed for cutting edge nanoscale imaging.

If there are any doubts regarding compatibility of your AFM system with the BudgetSensors AFM probes, please contact us at sales@tedpella.com.

Silicon AFM probes products:

- **Tap300** series for tapping mode
- **Tap150G** series for soft tapping mode
- **Tap190G** series with longer cantilever for tapping mode
- **Multi75** series for force modulation mode
- **Contact** series for contact mode and pulse force mode
- **Magnetic AFM Probe**, an excellent choice for MFM applications
- **New!** All-In-One series with four cantilevers

Some AFM systems, such as NanoScale, require alignment grooves on the back side of the AFM holder chip for correct holding and calibration of each AFM probe. All products with alignment grooves have "-G" in their product number. Available AFM Probes with alignment grooves are: Tap150-G; Tap190-G; Multi75AI-G; Multi75E-G; Multi75M-G; ContAI-G and Electri-G.

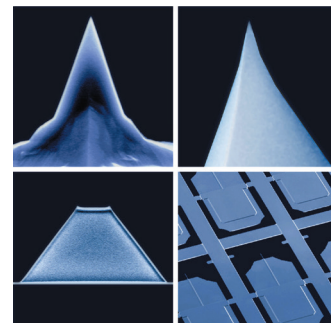
Please Note: The presence of the alignment Grooves does not affect the AFM probe in systems that do not require this feature. AFM probes with grooves have the same specifications and pricing as the equivalent probes without alignment grooves.

Order a combination of whatever probes you want. BudgetComboBox on the web page gives you the freedom to choose freely your personalized box with AFM probes out of any available BudgetSensors AFM Probe models you need.

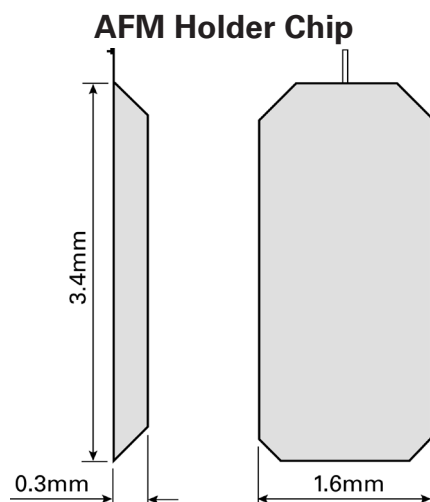
NEW! Budget Sensors TipChecker, an SPM sample for fast, convenient and efficient determination of the AFM tip condition.

AFM probes are all available with some or all of the following high quality coatings (depending on series):

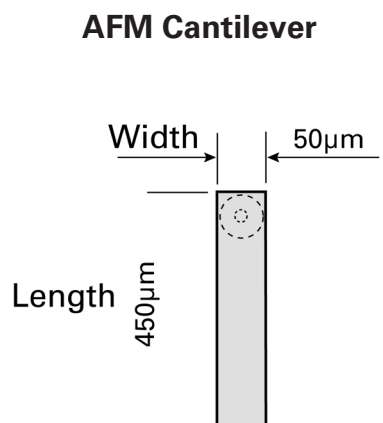
| | |
|----------------|--|
| AI | Aluminium coating of the cantilever for enhanced reflectivity |
| Electri | Chromium/Platinum electrically conductive coating for Electric Modes |
| GD | Partial gold coating of the cantilever for enhanced reflectivity for special applications such as in liquids |
| GB | Overall gold coating of the cantilever where the probe acts as an electrode |
| M | Magnetic Coating |
| DLC | Diamond-like-Coating on tip side of cantilever |



Technical information and dimensions for the BudgetSensor AFM holder, cantilever and tip:

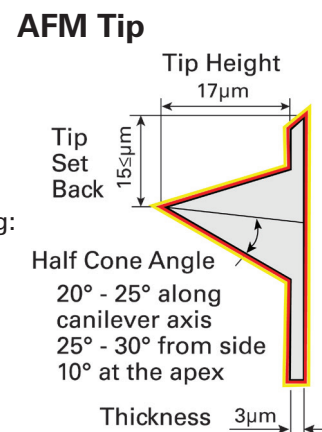


The AFM Holder Chip fits most commercial AFM's as it has industry standard size. It is compatible with DI Nanoscope, PSI, JEOL, NT-MDT, Asylum, VEECO, WiTec and other commercial AFM's



The AFM Cantilever is micromachined monolithic Silicon, comprising excellent uniformity. It provides high quality imaging for all standard AFM's.

Cantilever Coating:
■ 10nm Cr
■ 60nm Au



The AFM Tip is a micromachined monolithic Silicon probe, exhibiting excellent uniformity and a sharp tip radius. The consistent tip radius of less than 10nm gives good resolution and reproducibility. The probes (except the Silicon Nitride tip) feature an "on scan angle" symmetric tip to provide a more symmetric representation of features over 200nm.