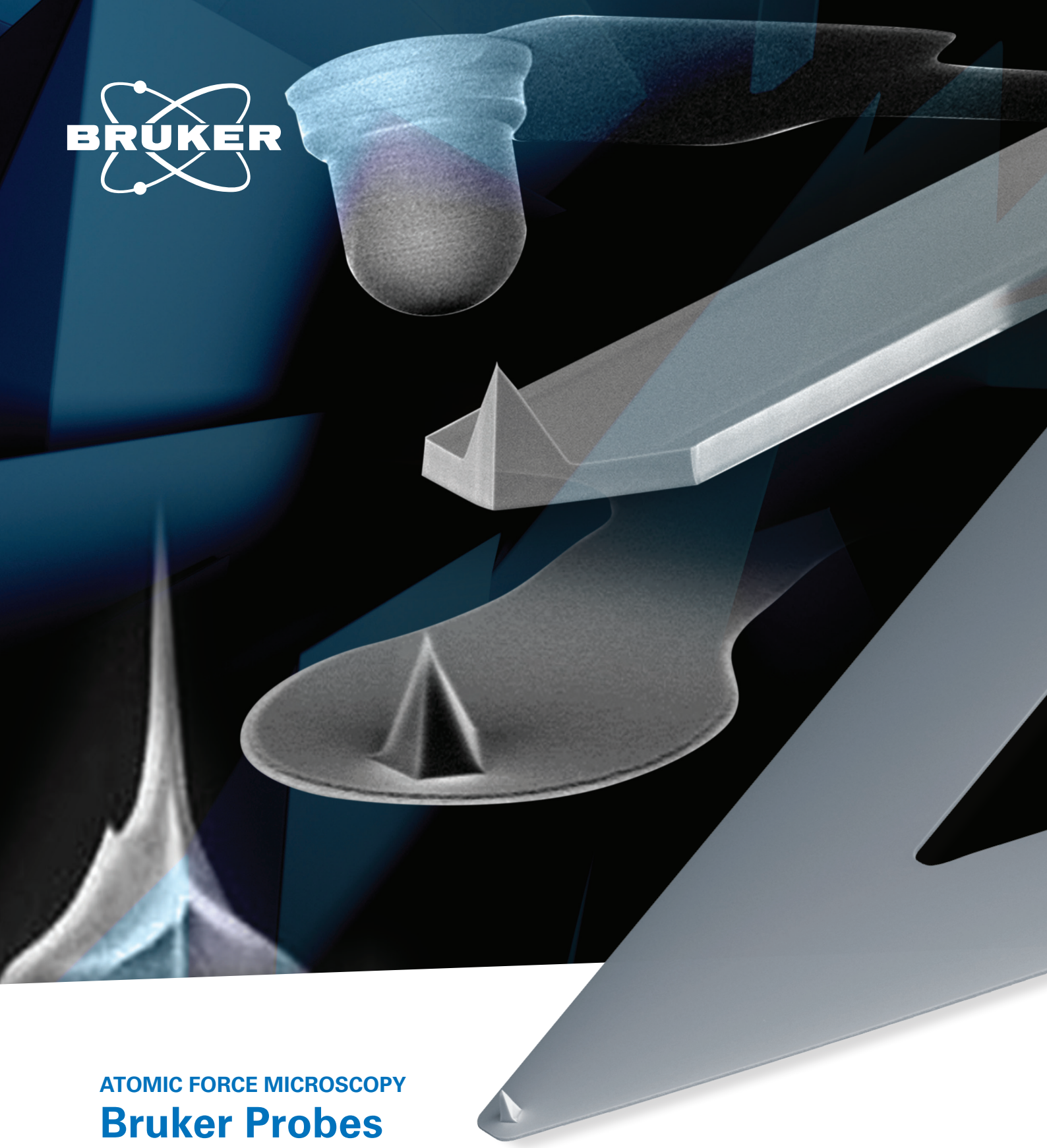


ATOMIC FORCE MICROSCOPY

Bruker Probes

AFM Expertise Built Into Every Probe

Bruker AFM Probes

Where Expertise Meets Innovation

Bruker has consistently driven and shaped the future of the atomic force microscope (AFM) industry. As such, we have gained an intimate understanding of the value of each high-performance AFM component, including the AFM probe. Our dedication to manufacturing quality and cutting-edge probes, coupled with an unsurpassed expertise in AFM, ensures innovative solutions that include instrument, probe, applications assistance, and service support.

Why Bruker AFM Probes?

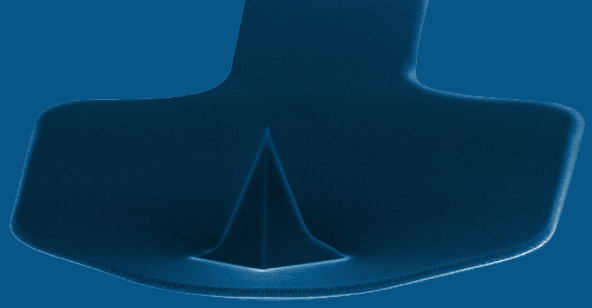
We are the only major AFM equipment manufacturer that also owns and operates a probes nanofabrication facility, and our broad experience enables us to design and fabricate a wide range of probe types to directly address the evolving needs of AFM users. Bruker's performance silicon and silicon nitride probes are ideal for general-purpose imaging of a wide range of samples in air and fluid, while our specialty probes are designed for more complex experiments, such as measuring electrical or mechanical properties of materials.

What makes shopping for probes with us unique:

- A strong focus on development and innovation, with the frequent release of new probes that align with our customers' needs
- An online web store with probe specifications, AFM-related accessories, and the latest discounts
- Worldwide regional depots stocked with ready-to-ship probes in simplified packaging, ensuring the fastest delivery times

How should this document be used?

This guide details some of our most popular probes, categorized by application. You can learn how to decipher probe names from the handy reference table, explore application-specific recommendations, and make probe specification comparisons. For even more information, the latest promotions, and to place an order, visit www.BrukerAFMprobes.com.

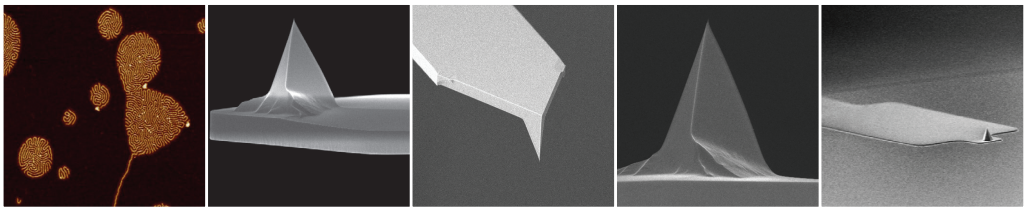


Probes Terminology Reference Table

TESP	Tapping etched silicon probe
V	Visible tip
V2	Version 2
R	Rotated tip
M	Magnetic coating
-525	525 kHz resonant frequency
-300	300 kHz resonant frequency
-150	150 kHz resonant frequency
-125	125 nm probe radius
-30	30 nm probe radius
ScanAsyst	Typically used in PeakForce Tapping
SAA	ScanAsyst-Air
HPI	High performance industrial
SNL	Silicon nitride lever
HIRS	High resolution
+	Small tip radii
SS	Super-sharp
HAR	High aspect ratio
BNT	Bruker NanoTube
FIB	Focused ion beam milled
SPH	Spherical tip
DD	Doped-diamond tip coating
DT	Deep trench, for AutoAFM line
SCM	Scanning capacitance microscopy
FastScan	Fast tapping applications
PFT	PeakForce Tapping
SCD	Single-crystal diamond
SYM	Symmetrical tip
ASYM	Asymmetrical tip
nanoIR	Nanoscale infrared spectroscopy
STM	Scanning tunneling microscopy

Standard and High Resolution Topography in Air

RECOMMENDED	RTESPA-300	OTESPA-R4	TESPA-V2	SCANASYST-AIR-HPI
r [nm]	8	7	7	2
f [KHz]	300	300	320	55
k [N/m]	40	40	37	0.25
Mode	Tapping	Tapping	Tapping	PeakForce Tapping



Polymer brushes imaged using PeakForce Tapping mode.

TESPA-V2 and RTESPA-300: most popular probes for tapping mode operation of surface topography with tight dimensional specifications

SCANASYST-AIR-HPI: premier choice for topography imaging in Bruker's PeakForce Tapping® mode, with a small tip radius for high-resolution images and a low spring constant for controlled low-force imaging

ALTERNATIVES	Descriptions	Tip Radius [nm]	Frequency [KHz]	Spring Constant [N\m]
SCANASYST-AIR	Ultra-High Res, Low Force, SYM	2	70	0.4
FESPA-V2	High Res/Performance, ASYM	8	75	2.8
NCHV-A	High Res, Cost Effective, ASYM	8	320	40
FMV-A	High Res, Cost Effective, ASYM	8	75	2.8
TESPA-V2-SS	Ultra-High Res, High Performance, SYM	2	320	37

High Aspect Ratio

RECOMMENDED	PFDT350	FIB2-100A	TESPA-HAR	BNT-500-12
r [nm]	10	10	10	8
f [KHz]	55	320	320	320
k [N/m]	0.25	42	42	42
Mode	PeakForce Tapping	Tapping, DT	Tapping, DT	Tapping, DT, Profiling

Patterned resist lines of 70 nm width.

PeakForce Deep Trench (PFDT) Probes: high-aspect tips on a low spring constant SiN cantilever for use with Bruker's PeakForce Tapping. DT mode is only available on Bruker's AutoAFM product line

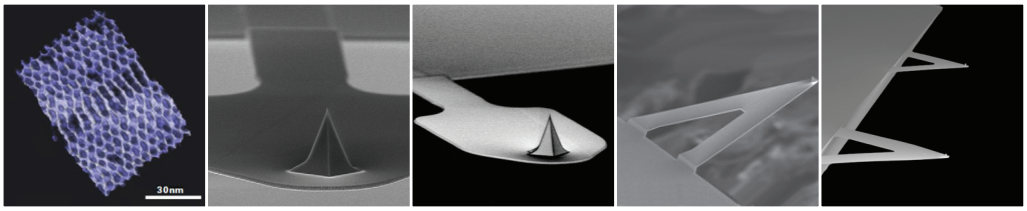
Focused Ion Beam (FIB) Probes: high-aspect probes on standard Si cantilevers for TappingMode™

Bruker NanoTube (BNT) Probes: a diamond-like carbon spike grown with electron beam deposition for best performance and longevity

ALTERNATIVES	Descriptions	Tip Radius [nm]	Frequency [KHz]	Spring Constant [N\m]
PFDT2500	HAR, Lowest Force, PFT-based DT Probe	30	130	0.4
FIB8-600A	HAR, FIB, Tapping-based DT Probe	10	320	42
DRPFC25-250	HAR, Low Force, PFT-based DT Probe	8	130	3
AD-40-P20	Conductive, SCD, Wear resistant, Pillar	20	180	40
BNT-100-3	HAR, High Repeatability, BNT Probe	8	300	40

High-Resolution BioAFM

RECOMMENDED	PEAKFORCE-HIRS-F-B	PEAKFORCE-HIRS-F-A	SCANASYST-FLUID+	SNL-10
r [nm]	1	1	2	2
f [KHz]	100	165	150	18–65
k [N/m]	0.12	0.35	0.7	0.06–0.35
Mode	PeakForce Tapping	PeakForce Tapping	PeakForce Tapping	Tapping



Origami DNA imaged in liquid using PeakForce Tapping mode.

PEAKFORCE-HIRS-F-B:
best-in-class for ultra-sharp PeakForce Tapping-based single biomolecule imaging in fluid

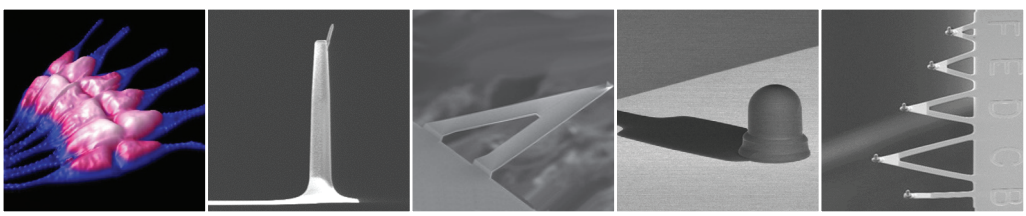
PEAKFORCE-HIRS-F-A:
optimized for molecular lattice imaging

SNL-10:
industry standard for high-performance imaging with tapping mode in fluid

ALTERNATIVES	Descriptions	Tip Radius [nm]	Frequency [KHz]	Spring Constant [N\m]
SCANASYST-FLUID	High Res, Lowest force, SYM	20	150	0.7
MLCT	Multi-lever, Lowest Force, SYM	20	7–125	0.01–0.6
MSCT	Multi-lever, High Res, SYM	10	7–125	0.01–0.6
MSNL-10	Multi-lever, Ultra High Res, SYM	2	7–125	0.01–0.6
DNP-S10	Multi-lever, High Res, Low Force, SYM	10	18–65	0.06–0.35

Cell Imaging and Colloid-Like Probes

RECOMMENDED	PFQNM-LC-V2	SCANASYST-FLUID	SAA-SPH-10UM	MLCT-SPH-10UM-DC
r [nm]	70	20	10000	10000
f [KHz]	85	150	13	3–17.5
k [N/m]	0.1	0.7	0.25	0.01–0.7
Mode	PeakForce Tapping	PeakForce Tapping	Force Curves	Force Curves



Live diatoms in sea water using PeakForce Tapping mode (30 µm scan).

PFQNM-LC-V2:
combines a low, certified spring constant with an 18 µm-tall probe post terminating in a electron-beam deposited spike with an individually-inspected 70 nm tip radius

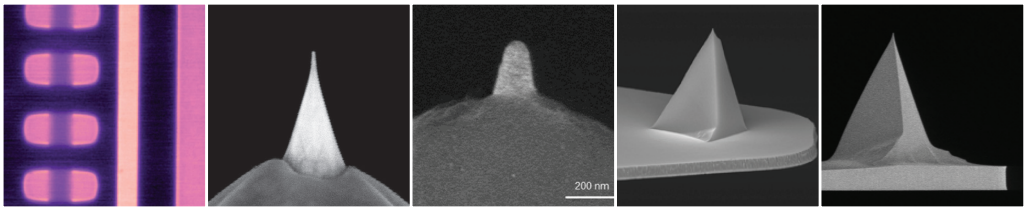
SCANASYST-FLUID:
not too sharp, not too dull radius ideal for force measurements and imaging

Bruker Sphere Probes:
replace the hassle of making colloid probes and choose from three available sphere sizes

ALTERNATIVES	Descriptions	Tip Radius [nm]	Frequency [KHz]	Spring Constant [N\m]
SAA-SPH-1UM	Colloid-Like, Low Force, SPH	1000	40	0.25
MLCT-SPH-1UM-DC	Multi-lever, Colloid-Like, SPH, Drift Comp.	1000	3–17.5	0.01–0.7
MLCT-SPH-1UM	Multi-lever, Colloid-Like, SPH	1000	3–17.5	0.01–0.7
MLCT-SPH-10UM	Multi-lever, Colloid-Like, SPH	10000	3–17.5	0.01–0.7
DNP-10	Multi-lever, Low Force, SYM	20	18–65	0.06–0.35

Contact-Based Electrical Modes: C-AFM, SCM, SSRM, sMIM, PFM

RECOMMENDED	AD-40-AS	PEAKFORCE-SECM	PFTUNA	SCM-PIC-V2
r [nm]	10	25	25	25
f [KHz]	180	69	70	10
k [N/m]	40	1.5	0.4	0.1
Mode	PFT, Tapping, Contact	PeakForce Tapping	PeakForce Tapping	Contact



Capacitance image of Si device using sMIM.

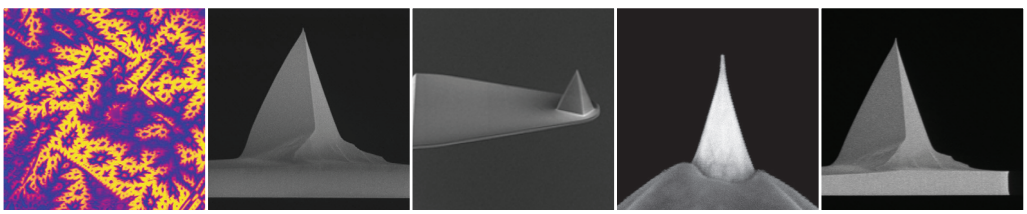
AD-40-AS:
highly conductive sharp diamond probe that uses a wear-resistant diamond tip to ensure the best possible nanomechanical and electrical performance

PFTUNA and SCM-PIC-V2:
workhorse, value proposition probes for conductive AFM, scanning capacitance, scanning spreading resistance and more

ALTERNATIVES	Descriptions	Tip Radius [nm]	Frequency [KHz]	Spring Constant [N\m]
AD-2.8-AS	Conductive, SCD, Wear resistant, Sharp	10	65	2.8
DDESP-FM-V2	Conductive, Wear Resistant, DD	100	105	6
SCM-PTSI	Conductive, Sharp, Wear Resistant, PtSi	15	75	2.8
CONTV-PT	Conductive, Cost Effective, Pt Coated	25	13	0.2
RMN-12PT400B	Conductive, Full Metal, Pt Probe	<20	5	0.3

Intermittent Electrical Modes: EFM, MFM, KPFM

RECOMMENDED	MESP-V2	PFQNE-AL	AD-2.8-AS	SCM-PTSI
r [nm]	35	5	10	15
f [KHz]	75	300	65	75
k [N/m]	3	0.8	2.8	2.8
Mode	Tapping	PeakForce Tapping	PeakForce Tapping	PFT, Tapping, Contact



Ni-Mn-Ga single crystals imaged using MFM.

MESP-V2:
hard cobalt-chrome coating tailored for high sensitivity and magnetic contrast leads to this probe being industry-standard for MFM

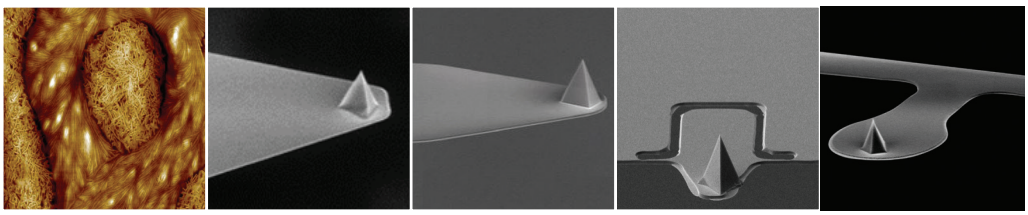
PFQNE-AL :
ideally suited for measurements using Bruker's PeakForce KPFM™ module due to the low spring constant and large quality factor

SCM-PTSI:
multipurpose probe useful for EFM/KPFM or SCM/CAFM with the platinum silicide providing hardness, wear resistance enhanced conductivity and a high-resolution tip

ALTERNATIVES	Descriptions	Tip Radius [nm]	Frequency [KHz]	Spring Constant [N\m]
AD-40-AS	Conductive, SCD, Wear resistant, Sharp	10	180	40
SCM-PIT-V2	High-Performing, Electrical Studies, ASYM	25	75	3
MESP-RC-V2	High-Performing, Magnetic Studies, SYM	35	150	5
DDESP-V2	Conductive, Low Force, Wear Resistant	100	450	80
DDESP-FM-V2	Conductive, Low Force, Wear Resistant	100	105	6

High Speeds in Fluid or Air

RECOMMENDED	FASTSCAN-A	FASTSCAN-C	HISPEED-FLUID	FASTSCAN-D-SS
r [nm]	5	5	8	1
f [KHz]	1400	300	120 (in fluid)	110 (in fluid)
k [N/m]	18	0.8	0.35	0.25
Mode	PFT, Tapping	PFT, Tapping	PFT, Tapping	PFT, Tapping



High-speed scan of PEO using SCANASYST-HR probe.

ALTERNATIVES	Descriptions	Tip Radius [nm]	Frequency [KHz]	Spring Constant [N\m]
FASTSCAN-A-G	Highest Speed, Precise Force, Au-Coated	5	1400	18
FASTSCAN-B	Highest Speed, Precise Force	5	450	1.8
FASTSCAN-B-SS	Highest Speed, Precise Force, Super Sharp	1	450	1.8
FASTSCAN-D	Highest Speed, Precise Force	5	110 (in fluid)	0.25
SCANASYST-AIR-HR	High Speed, Low Force, High Res, MultiMode®	2	130	0.4

FASTSCAN Probes:
designed specifically for imaging on Bruker's Dimension FastScan® AFM, delivering extreme imaging speed without loss of resolution or force control

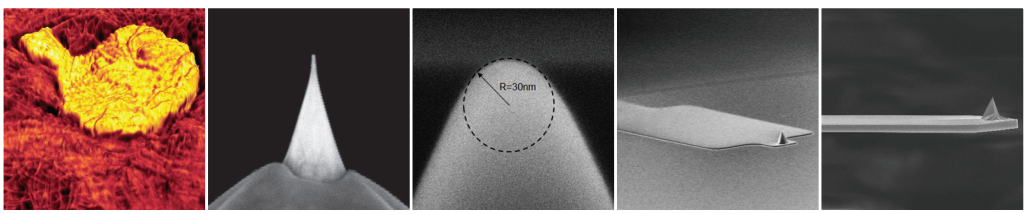
FASTSCAN-A:
uses a short ~30 µm long triangular SiN cantilever with a 1.4 MHz resonant frequency but only a 17 N/m spring constant

FASTSCAN-C:
designed for imaging in fluid and has a 300 kHz resonant frequency with a 0.8 N/m spring constant

FASTSCAN-D-SS:
has a novel 16 µm-long paddle cantilever with a 110 kHz resonant frequency in fluid, 0.25 N/m spring constant, and a super-sharp tip for an ideal speed/resolution combination in fluid

Nanomechanics: Indentation, Contact Resonance, Lithography, and More

RECOMMENDED	AD-40-AS	RTESPA-150-30	SAA-HPI-30	DDLTESP-V2
r [nm]	10	30	30	100
f [KHz]	180	150	55	280
k [N/m]	40	5	0.25	95
Mode	Tapping, Contact, PFT	Tapping, Force Curves	PFT, Force Curves	Tapping, Force Curves



PEO and sPP image collected using PeakForce QNM®.

ALTERNATIVES	Descriptions	Tip Radius [nm]	Frequency [KHz]	Spring Constant [N\m]
NM-RC	High Force, Sharp, SCD, Conical Tip	10	750	350
RTESPA-300-30	High-Performing, Medium Force, Controlled Radius	30	300	40
RTESPA-525-30	High-Performing, High Force, Controlled Radius	30	525	200
SAA-HPI-DC-125	High-Performing, Low Force, Controlled Radius	125	55	0.25
DDESP-FM-V2	Conductive, Low Force, Wear Resistant	100	105	6

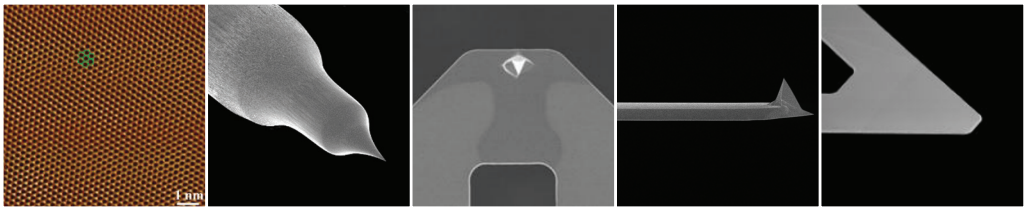
RTESPA-150-30:
built on our high performing RTESPA base probe, this version has a mid 150 kHz resonant frequency, a Doppler vibrometer-calibrated 5 N/m spring constant and a controlled 30 nm radius for accurate nanomechanical mapping on medium-soft samples in air using modes such as FASTForce Volume™ or PeakForce QNM

SAA-HPI-30:
provides accurate nanomechanical properties for soft polymers in the kPa to MPa modulus range

DDLTESP-V2:
a versatile, consistent-tip, conductive probe with a wear resistant coating and high spring constant for hard material samples

STM, nanoIR, and More

RECOMMENDED	TT10	VITA-DM-NANOTA-200	PR-UM-TnIR-A	NP-O10
r [nm]	<50 nm	15	20	n/a
f [KHz]	n/a	65	75	18-65
Mode	STM	Thermal	nanoIR, Tapping	Force Curves



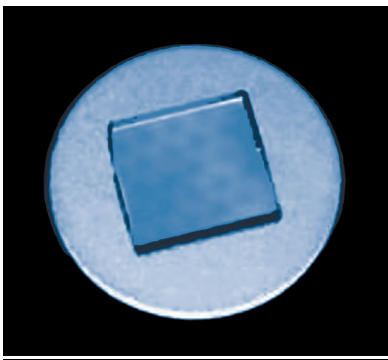
STM image of graphene on Ge.

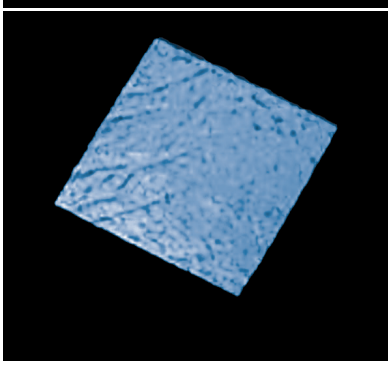
ALTERNATIVES	Descriptions	Tip Radius [nm]	Frequency [KHz]	Spring Constant [N\m]
PT10	Platinum Iridium, STM, Electrical Studies	<50	n/a	n/a
PR-UM-CniR-B	Au-coated, nanoIR Studies, High Res	20	13	0.2
PR-UM-TniR-D	Au-Coated, nanoIR Studies, High Res	20	300	40
CLFC-NOCAL	Multi-lever, Low Force, Tipless	n/a	18–293	0.16–10.4
MLCT-O10	Multi-lever, Lowest Force, Tipless	n/a	3–17.5	0.01–0.7

TT10:
a 8 mm-long, 0.25mm-diameter, etched tungsten tip, perfect for STM imaging

NP-O10:
substrate chip with four V-shaped cantilevers, already Au-coated and ready for bespoke tip or cantilever customization for specific experiments

PR-UM-TnIR:
probes with front and backside gold coating for use with nanoscale infrared spectroscopy enabled platforms





Samples

	Description
SAPPHIRE-12M	Sapphire sample (12 mm) mounted for use as hard substrate for deflection sensitivity determination
PFM-SMPL	Periodically poled lithium niobate for use with piezoforce microscopy (PFM) mode
PFKPFM-SMPL	A sample with Au, Al, and silicon features able to be scanned in a single image for use with Kelvin probe microscopy (KPFM) mode
RS	A titanium roughness sample used with tip evaluation software for probe shape diagnosis

Substrates

	Description
MICA	AFM sample mica disks (12 mm diameter) for use as an atomically flat substrate on which to deposit various AFM samples
HOPG-12M	Graphite for use in depositing various AFM samples onto to have a clean, atomically flat, and conductive background

Accessories

	Description
PFQNM-SMPKIT-12M	PeakForce QNM sample kit of PDMS, PS, PS-LDPE, silica, sapphire, HOPG, and titanium samples for various AFM uses
SD-101	12 mm-diameter steel discs on which to mount various AFM samples/ substrates
VGRP-15M	A calibration artifact, 180 nm depth, 10 µm pitch, Pt coated

AFM Probe Models	Probe Attributes						AFM Mode							Life Science Samples						Materials Samples			
														Cells		Tissues		Bio-molecules		Polymers/ Soft samples		Hard Samples	
	Spring Constant [N/m]	Frequency [kHz]	Tip Radius [nm]	Cantilever Material	Tip Material	Reflex/ Tip Coating	Fast Scanning	PeakForce Tapping	Tapping	Contact	Force Curves	Electrical	Magnetic	Air	Liquid	Air	Liquid	Air	Liquid	Air	Liquid	Air	Liquid
RTESPA-300	40	300	8	Si	Si	Al/none			●							●		●		●		●	
VTESPA-300	42	300	5	Si	Si	Al/none			●							●		●		●		●	
TESPA-V2	37	320	7	Si	Si	Al/none			●							●		●		●		●	
SCANASYST-AIR-HPI	0.25	55	2	SiN	Si	Al/none		●			●					●		●		●		●	
PFDT350	0.25	55	10	SiN	DLC	Al/none		●			●					●		●		●		●	
FIB2-100A	42	320	10	Si	Si	Al/none			●											●		●	
TESPA-HAR	42	320	10	Si	Si	Al/none			●											●		●	
BNT-500-12	42	320	8	Si	DLC	Al/none			●											●		●	
PEAKFORCE-HIRS-F-B	0.12	100	1	SiN	Si	Au/none		●			●								●		●		●
PEAKFORCE-HIRS-F-A	0.35	165	1	SiN	Si	Au/none		●			●								●		●		●
SCANASYST-FLUID+	0.7	150	2	SiN	Si	Au/none		●			●						●		●		●		●
SNL-10	0.06-0.35	18-65	2	SiN	Si	Au/none		●	●	●	●						●		●		●		●
PFQNM-LC-V2	0.1	85	70	SiN	DLC	none/Au		●	●		●			●	●	●	●			●	●		
SCANASYST-FLUID	0.7	150	20	SiN	SiN	Au/none		●			●						●		●		●		●
SAA-SPH-10UM	0.25	13	10000	SiN	SiN	Au/none		●			●				●		●				●		
MLCT-SPH-10UM-DC	0.01-0.7	3-17.5	10000	SiN	SiN	none/Au		●			●				●		●				●		
AD-40-AS	40	200	10	Si	Si	Au/SCD		●	●	●	●	●										●	
PEAKFORCE-SECM	1.5	69	25	Si	Pt	Au/SiO2		●			●	●									●		●
PFTUNA	0.4	70	25	SiN	Si	Ptlr/Ptlr		●				●								●		●	
SCM-PIC-V2	0.1	10	25	Si	Si	Ptlr/Ptlr				●		●								●		●	
MESP-V2	3	75	35	Si	Si	CoCr/ CoCr		●	●			●	●							●		●	
PFQNE-AL	0.8	300	5	SiN	Si	Al/none		●	●			●								●		●	
AD-2.8-AS	2.8	75	10	Si	Si	Au/SCD		●	●	●	●	●								●		●	
SCM-PTSI	2.8	75	15	Si	Si	Al/PtSi		●	●			●								●		●	
FASTSCAN-A	17	1400	5	SiN	Si	Al/none	●	●	●							●		●		●		●	
FASTSCAN-B	1.8	450	5	SiN	Si	Au/none	●	●	●									●		●	●	●	●
FASTSCAN-C	0.8	300	5	SiN	Si	Au/none	●	●	●						●		●		●				
FASTSCAN-D	0.25	110	5	SiN	Si	Au/none	●	●	●						●		●		●				
RTESPA-150-30	5	150	30	Si	Si	Al/DLC		●	●		●									●		●	
SAA-HPI-30	0.25	55	30	SiN	Si	Al/DLC		●	●		●									●		●	
DDLTESP-V2	95	280	100	Si	Si	Al/DD		●	●		●	●										●	
TT10	NA	NA	<1	W	W	NA						●										●	
VITA-DM-NANOTA-200	NA	NA	NA	Si	Si	NA		●	●	●	●									●		●	
PR-UM-TnIR-A	3	75	20	Si	Si	Au/Au		●	●	●	●	●								●		●	
PR-UM-TnIR-D	40	300	20	Si	Si	Au/Au			●		●	●								●		●	
NP-O10	0.06-0.35	18-65	NA	SiN	NA	Au/None		●	●	●	●				●		●		●		●		

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