NANOSENSORS™
The World Leader in Scanning Probes

Special Developments List (version 6.2)

Please be aware that all these Special Developments are not standard products.
Therefore, specifications are not guaranteed and may change, datasheets may not be available, price may change, delivery time could be longer than usual and subsequent delivery may not be possible.

Price and delivery time on request. For ordering, please use the codes starting with SD-…

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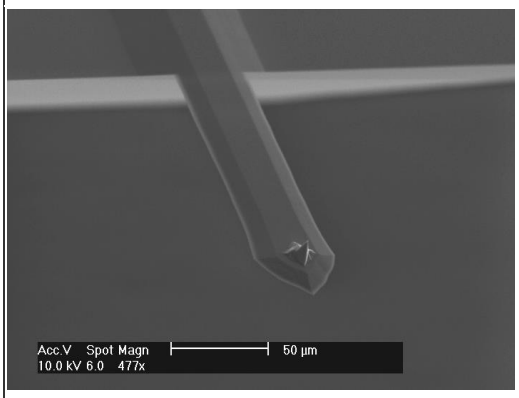
A) AFM Cantilevers and material variations

PointProbePlus (PPP) AFM Probes with extraordinary mechanical properties:
→ High Softness → High Stiffness → High Frequency



AFM Tip: Silicon

Radius [nm]	< 10 (PPP) / < 5 (SSS [1])
Height [µm]	10 - 15

AFM Cantilevers: Silicon. Different versions are available:

	SD-T1L450	**SD-T1L450B**	**SD-T1L225**
Resonance Frequency [kHz]	6	6	25
Force Constant [N/m]	0.01	0.02	0.1
CB length [µm]	450	450	225
CB width [µm]	23	48	23
CB thickness [µm]	1.0	1.0	1.0
Coating	70 nm Au on detector side (optional)	-	-

	SD-T2L125	**SD-T5L450B**	**SD-T5L225**
Resonance Frequency [kHz]	150	35	130
Force Constant [N/m]	2	3	14
CB length [µm]	125	450	225
CB width [µm]	25	58	33
CB thickness [µm]	2.0	5.0	5.0
Coating	70 nm Au on detector side (optional)	-	-

	SD-T7L100	**SD-T10L100**	**SD-NCVH**
Resonance Frequency [kHz]	850	1'000	1'200
Force Constant [N/m]	600	2'000	66
CB length [µm]	100	100	45
CB width [µm]	38	45	25
CB thickness [µm]	7.0	10.0	1.8
Coating	30 nm Al on detector side (optional)		

	SD-SSS-T10L250[1]	**SD-TL-T4L90**[2]
Resonance Frequency [kHz]	220	680
Force Constant [N/m]	120	110
CB length [µm]	250	90
CB width [µm]	45	30
CB thickness [µm]	10.0	4.0
Coating	-	-

[1] *SuperSharpSilicon (SSS) AFM* [2] *TipLess*

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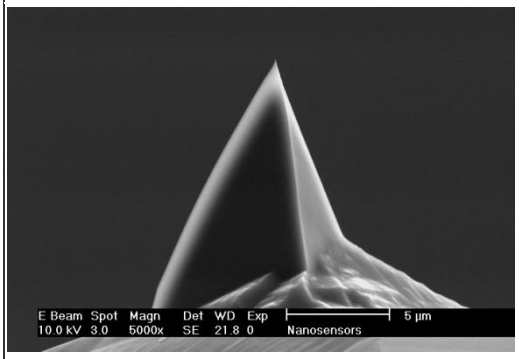
Other mechanical properties available on request

AFM Support chip: Silicon

Phosphorus doped PointProbePlus (PPP) AFM Probes



AFM Tip: Phosphorus doped Silicon

Radius [nm]	< 10
Height [µm]	10 - 15

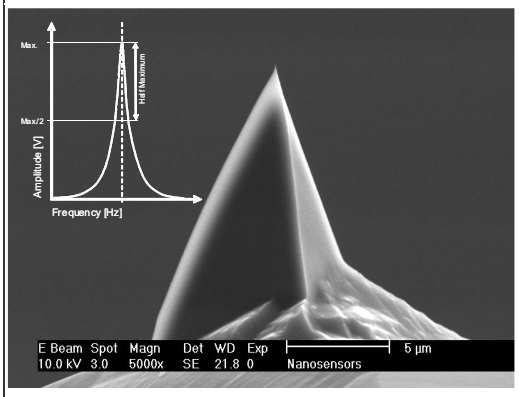
AFM Cantilevers: Phosphorus doped Silicon. Different versions are available:

	SD-P-NCH*	**SD-P-FM**	**SD-P-CONT**
Resonance Frequency [kHz]	330	75	13
Force Constant [N/m]	42	2.8	0.2
CB length [µm]	125	225	450
CB width [µm]	30	28	50
CB thickness [µm]	4.0	3.0	2.0
Coating	30 nm Al on detector side (optional)	-	-

**Optional: Rotated AFM tip*

AFM Support chip: Phosphorus doped Silicon

Low Q- / High Q-Factor AFM Probes



AFM Tip: Silicon

Radius [nm]	< 10
Height [µm]	10 - 15

AFM Cantilevers: Silicon. Different versions are available:

	SD-LQNCHR	**SD-QNCHR**	**SD-QFMR**
Resonance Frequency [kHz]	330	330	75
Force Constant [N/m]	42	42	2.8
CB length [µm]	125	125	225
CB width [µm]	30	30	28
CB thickness [µm]	4.0	4.0	3.0
Coating	30 nm Al on detector side (partial coating)		
Q-Factor in UHV	2'000	>30'000	

AFM Support chip: Silicon

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B) Special Coatings

Coatings

AFM Tips: PointProbePlus, Arrow, ATEC,…

AFM Cantilevers: NC, FM, CONT,…

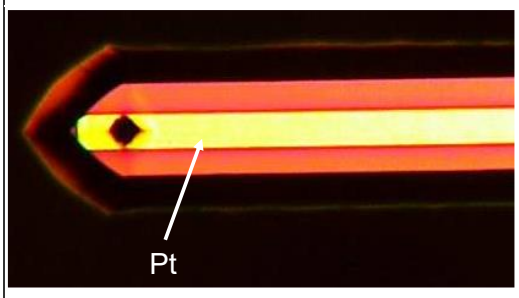
AFM Support chips: Silicon, Pyrex

Coatings: Material: Ag, Al, Au, Cr, FeNi, Ir, Ni, NiCo, Pt, Rh, Ti
additional materials available upon request
Side: frontside (TipSide, TS), backside (DetectorSide, DS)
both sides (BothSides, BS)

Some restrictions concerning coating thickness and AFM probe types could occur (due to technical problems)

Examples:		
	SD-NCHAu25:	25 nm Au (TS) / 70 nm Au (DS)
	SD-CONTTuR:	40 nm Tungsten (TS) / 40 nm Tungsten + 30 nm Al (DS)
	SD-CONTPt40:	40 nm Pt (BS)
	SD-EFM60:	60 nm Pt (BS)
	SD-ZEILR60:	60 nm Al (DS)
	SD-DT-CONT:	non-conductive Diamond coating (TS)
	SD-DT-NCL:	non-conductive Diamond caoting (TS)
	SD-CDTP-NCHR:	200 nm conductive Diamond coating

Partial Coatings of AFM Cantilevers



Coatings: Material: Ag, Al, Au, Cr, FeNi, Ir, Ni, NiCo, Pt, Rh,Ti
additional materials available upon request
Side: frontside (TipSide, TS), backside (DetectorSide, DS), both sides (BothSides, BS)
Minimal feature size: 10 µm
Alignment accuracy: ~ 5 µm

Note: Reflex coating on ATEC is possible

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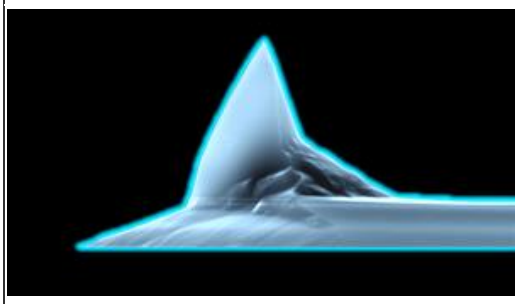
PointProbePlus (PPP) AFM Probes with very thin Silicon Nitride layer



AFM Tip: Silicon

Radius [nm]	< 20
Height [µm]	10 - 15
Coating	10 nm Silicon Nitride

Other AFM tips / coating thicknesses available on request

AFM Cantilevers: Silicon. Different versions are available:

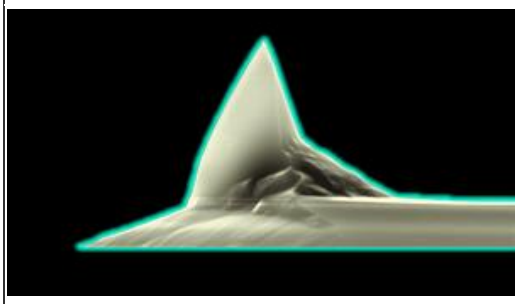
	SD-FM-SiN	**SD-CONT-SiN***
Resonance Frequency [kHz]	75	13
Force Constant [N/m]	2.8	0.2
CB length [µm]	225	450
CB width [µm]	28	50
CB thickness [µm]	3.0	2.0
Coating	70 nm Au on detector side	

** Rotated tip*

Other mechanical properties available on request

AFM Support chip: Silicon

PointProbePlus (PPP) AFM Probes with Diamond-like Carbon Coating



AFM Tip: Silicon

Radius [nm]	< 20
Height [µm]	10 - 15
Coating	15 nm Diamond-like Carbon (DLC)

AFM Cantilevers: Silicon. Different versions are available:

	SD-DLC-NCHR	**SD-DLC-NCLR**
Resonance Frequency [kHz]	330	190
Force Constant [N/m]	42	48
CB length [µm]	125	225
CB width [µm]	30	37.5
CB thickness [µm]	4.0	7.0
Coating	30 nm Al on detector side	

AFM Support chip: Silicon

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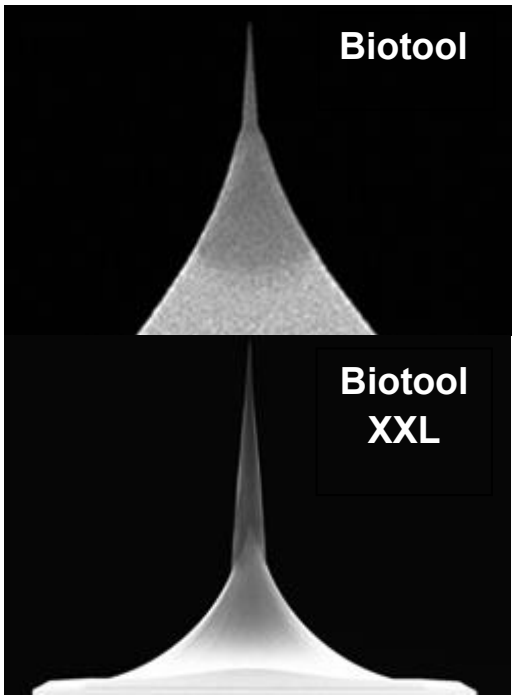
C) AFM Tips modifications

Biotool / Biotool XXL



These AFM probes have been developed in collaboration with nanotools®

AFM Tips: Quartz-like / High Dense Diamond Like Carbon (DLC) spike

	SD-qp-BioAC-Bio	SD-qp-BioAC-BioXXL
Radius [nm]	25	25
Height [µm]	Quartz.: 6.5 DLC: 0.5	Quartz.: 6.5 DLC: 8.5
Orientation [°]	0	12 (tilt compensated)

AFM Cantilever: Quartz-like

	SD-qp-BioAC-Bio / SD-qp-BioAC-BioXXL
Resonance Frequency [kHz]	50
Force Constant [N/m]	0.1
CB length [µm]	60
CB width [µm]	25
CB thickness [µm]	0.4
Coating tip side	20 nm Au (spike remains uncoated)
Coating detector side	70 nm Au

AFM Support chip: Silicon

Also available through nanotools®

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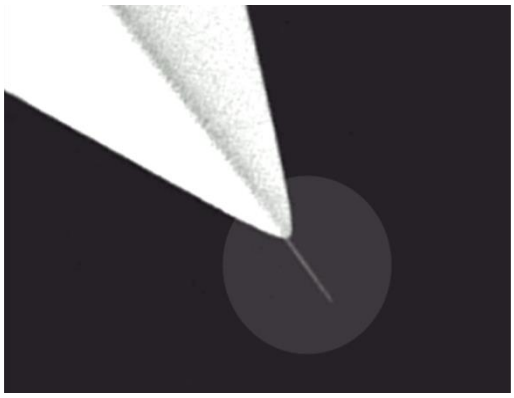
Carbon NanoTip



These AFM probes have been developed in collaboration with nanotools®

AFM Tip: Silicon / High Dense Diamond Like Carbon (DLC) spike

Radius [nm]	2 (< 5 guaranteed)
Height [µm]	Si : 10 - 15 / DLC : 0.125
Orientation [°]	13 (tilt compensated)

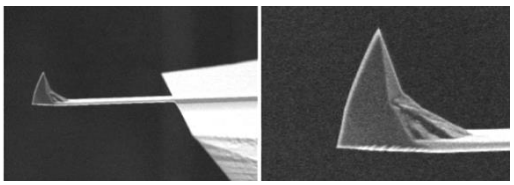
AFM Cantilevers: Silicon

	SD-aCNT-NCH	SD-aCNT-FM
Resonance Frequency [kHz]	330	75
Force Constant [N/m]	40	2.8
CB length [µm]	125	225
CB width [µm]	30	28
CB thickness [µm]	4.0	3.0

AFM Support chip: Silicon

Also available through nanotools®

Extra Tall PointProbePlus AFM Tips



AFM Tip: Silicon

Radius [nm]	< 10
Height [µm]	50 - 60

AFM Cantilevers: Silicon. Different versions are available:

	SD-PXL-NCL	SD-PXL-FM	SD-PXL-CONT	SD-PXL-CONTSC
Resonance Frequency [kHz]	105	45	7	8
Force Constant [N/m]	60	7.0	0.2	0.2
CB length [µm]	225	225	450	225
CB width [µm]	60 - 85	55 - 80	50 -80	45 – 75
CB thickness [µm]	6.0	3.0	2.0	1.0

AFM Support chip: Silicon

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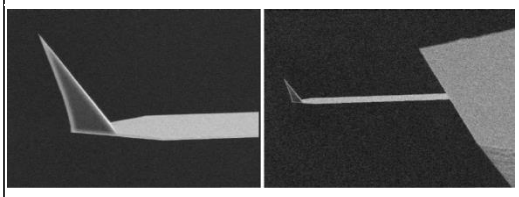
Extra Tall ATEC AFM Tips



AFM Tip: Silicon

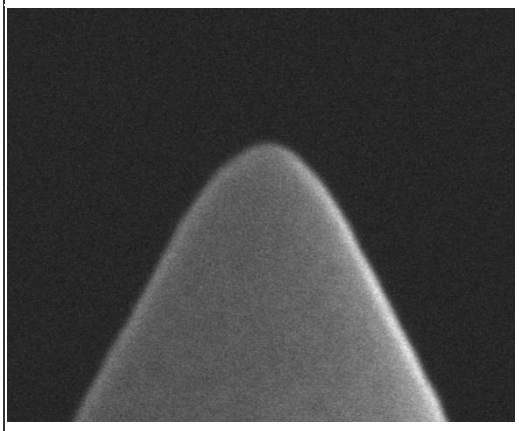
Radius [nm]	< 10
Height [µm]	30 - 40

AFM Cantilevers: Silicon. Different versions are available:

	SD-AXL-NC	SD-AXL-FM	SD-AXL-CONT
Resonance Frequency [kHz]	200	75	20
Force Constant [N/m]	45	3.0	0.2
CB length [µm]	240	240	240
CB width [µm]	41	38	37
CB thickness [µm]	7.3	3.0	1.2

AFM Support chip: Silicon

Rounded AFM Tips R30



AFM Tip: Silicon

Radius [nm]	30
Height [µm]	10 - 15

AFM Cantilevers: Silicon. Different versions are available:

	SD-R30-NCH	SD-R30-FM	SD-R30-CONT
Resonance Frequency [kHz]	330	75	13
Force Constant [N/m]	42	2.8	0.2
CB length [µm]	125	225	450
CB width [µm]	30	28	50
CB thickness [µm]	4.0	3.0	2.0
Coating	-	25 nm PtIr on both sides (optional)	70 nm Au on detector side (optional)

AFM Support chip: Silicon

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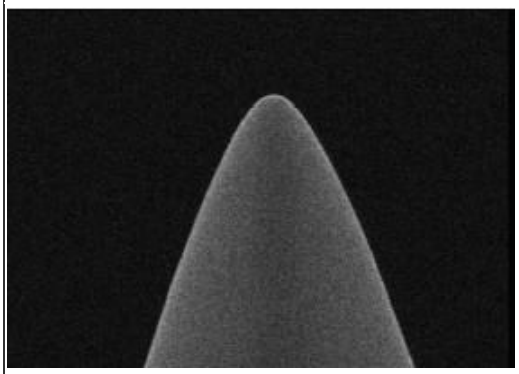
Rounded AFM Tips R150



AFM Tip: Silicon

Radius [nm]	90 (from front) / 160 (from side)
Height [µm]	10 - 15

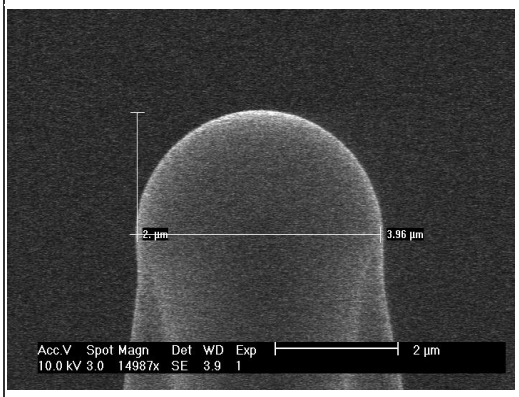
AFM Cantilevers: Silicon. Different versions are available:

	SD-R150-NCH	SD-R150-NCL	SD-R150-FM
Resonance Frequency [kHz]	330	190	75
Force Constant [N/m]	42	48	2.8
CB length [µm]	125	225	225
CB width [µm]	30	38	28
CB thickness [µm]	4.0	7.0	3.0
Coating	-	-	-

	SD-R150-CONT	SD-R150-T3L450B
Resonance Frequency [kHz]	13	20
Force Constant [N/m]	0.2	0.7
CB length [µm]	450	450
CB width [µm]	50	53
CB thickness [µm]	2.0	3.0
Coating	-	25 nm PtIr on both sides (optional)

AFM Support chip: Silicon

Sphere AFM Tips



AFM Tips: Silicon / Silicon Oxide. Different versions are available:

	S	M	L
Sphere diameter [µm]	0.8	2.0	4.0
Height [µm]	10 - 15		

AFM Cantilevers: Silicon. Different versions are available:

	SD-Sphere-NCH	SD-Sphere-FM	SD-Sphere-CONT
Resonance Frequency [kHz]	330	75	13
Force Constant [N/m]	42	2.8	0.2
CB length [µm]	125	225	450
CB width [µm]	30	28	50
CB thickness [µm]	4.0	3.0	2.0

AFM Support chip: Silicon

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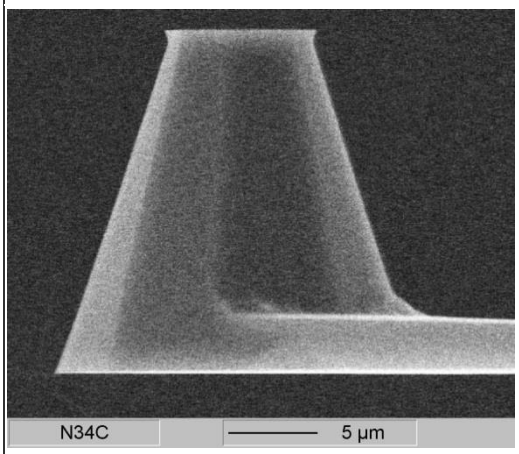
Large Plateau AFM Tips



AFM Tip: Silicon

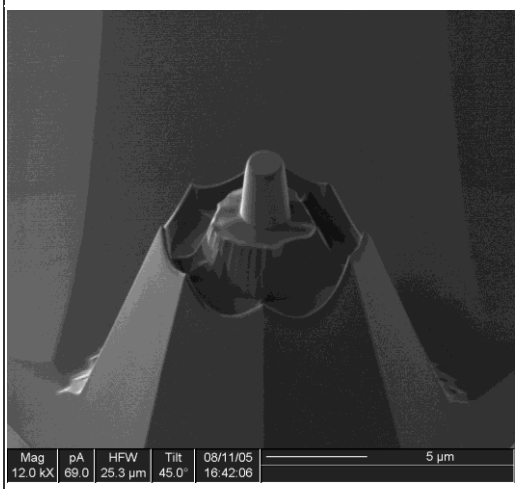
Plateau diameter [µm]	8 - 12
Height [µm]	15

AFM Cantilevers: Silicon. Different versions are available:

	SD-PL-NCH	SD-PL-NCL	SD-PL-FM	SD-PL-CONT
Resonance Frequency [kHz]	330	190	75	13
Force Constant [N/m]	42	48	2.8	0.2
CB length [µm]	125	225	225	450
CB width [µm]	30	38	28	50
CB thickness [µm]	4.0	7.0	3.0	2.0
Coating	30 nm Al on detector side (optional)	-	30 nm Al on detector side (optional) or 25 nm PtIr on both sides (optional)	30 nm Al on detector side (optional) or 70 nm Au on both sides (optional)

AFM Support chip: Silicon

Plateau AFM Tips



AFM Tip: Silicon

Plateau diameter [µm]	1.8 (typical)
Rod height [µm]	> 2.0
Overall height [µm]	10 - 15

AFM Cantilevers: Silicon. Different versions are available:

	SD-PL2-NCH	SD-PL2-NCL
Resonance Frequency [kHz]	330	190
Force Constant [N/m]	42	48
CB length [µm]	125	225
CB width [µm]	30	38
CB thickness [µm]	4.0	7.0
Coating	30 nm Al on detector side (optional)	

AFM Support chip: Silicon

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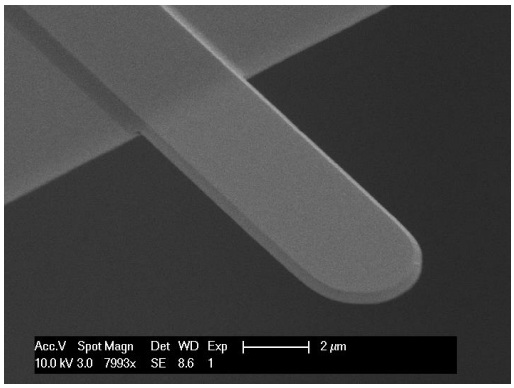
D) Ultra-Short AFM Cantilevers

Ultra-Short Tipless AFM Cantilevers



AFM Tip: none

AFM Cantilevers: Quartz-like. Different versions are available:

	SD-USC-F5-k30-TL	SD-USC-F2-k3-TL	SD-USC-F1.2-k7.3-TL
Resonance Frequency [kHz]	5’000	2’000	1’200
Force Constant [N/m]	30	3	7.3
CB length [µm]	10	10	20
CB width [µm]	5	5	10
CB thickness [µm]	0.68	0.28	0.67
Coating	30 nm Au on both sides		

	SD-USC-F1.5-k0.6-TL	SD-USC-F1.2-k0.15-TL	SD-USC-F0.3-k0.3-TL
Resonance Frequency [kHz]	1’500	1’200	330
Force Constant [N/m]	0.6	0.15	0.3
CB length [µm]	7	7	20
CB width [µm]	3	2	10
CB thickness [µm]	0.10	0.08	0.19
Coating	20 nm Au on both sides		30 nm Au on both sides

AFM Support chip: Silicon with Alignment Grooves

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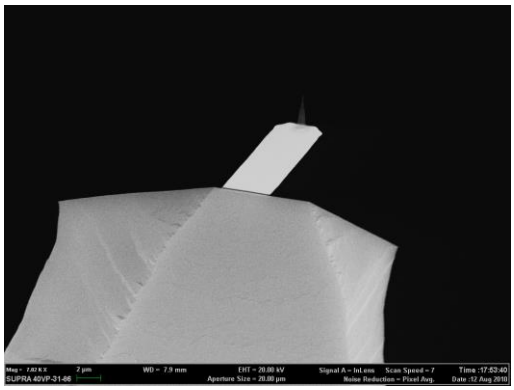
Ultra-Short Silicon Nitride AFM Cantilevers



These AFM probes have been developed in collaboration with nanotools®

AFM Tip: High Density Carbon / Diamond Like Carbon (HDC/DLC)

Radius [nm]	< 10
Height [µm]	> 2

AFM Cantilevers: Silicon Nitride. Different versions are available:

	SD-USC-SiN 0.5MHz	**SD-USC-SiN 1.2MHz**	**SD-USC-SiN 3MHz**	**SD-USC-SiN 6MHz**
Resonance Frequency [kHz]	500	1'200	3'000	6'000
Force Constant [N/m]	0.2	0.4	0.9	45
CB length [µm]	13.5	6.8	4.2	9.5
CB width [µm]	4.5	4.5	2.3	4.5
CB thickness [µm]	0.10	0.06	0.06	0.50
Coating	40 nm Au on detector side	30 nm Au on detector side		70 nm Au on detector side

AFM Support chip: Silicon

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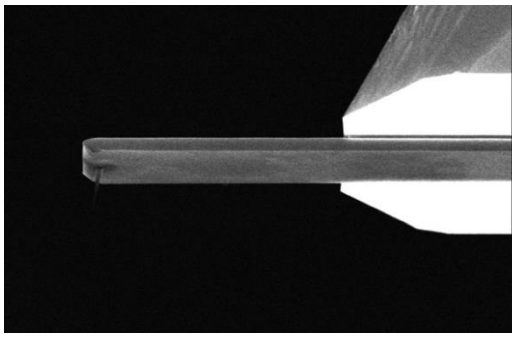
High Frequency AFM Probes



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AFM Tip: High Density Carbon / Diamond Like Carbon (HDC/DLC)

Radius [nm]	< 10
Height [µm]	2.5

AFM Cantilevers: Silicon Nitride. Different versions are available:

Hard cantilevers (for air)	**SD-HFP-H27R**	**SD-HFP-H45R**	**SD-HFP-HU45R**
Resonance Frequency [kHz]	2'700	4'500	4'500
Force Constant [N/m]	40	47	32
CB length [µm]	20	15	20
CB width [µm]	10	5	10
CB thickness [µm]	0.77	0.77	0.16
CB cross-section	rectangular	rectangular	U-profile
Coating	30 nm Al on detector side		

Soft cantilevers (for liquid)	**SD-HFP-S04AuD**	**SD-HFP-S07AuD**	**SD-HFP-S08TiD**
Resonance Frequency [kHz]	360	660	800
Force Constant [N/m]	0.4	0.6	0.5
CB length [µm]	20	15	15
CB width [µm]	10	5	5
CB thickness [µm]	0.16	0.16	0.16
CB cross-section	rectangular		
Coating	30 nm Au on detector side		30 nm Ti on detector side

AFM Support chip: Silicon

Special Developments List (version 6.2)

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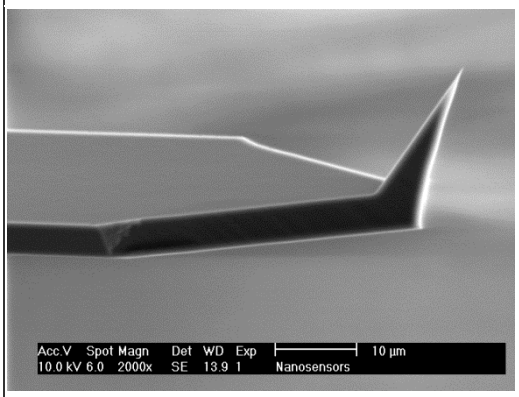
Price and delivery time on request. For ordering, please use the codes starting with SD-…

E) Special AFM Probes

AdvancedTEC™ with Alignment Grooves



AFM Tip: Silicon

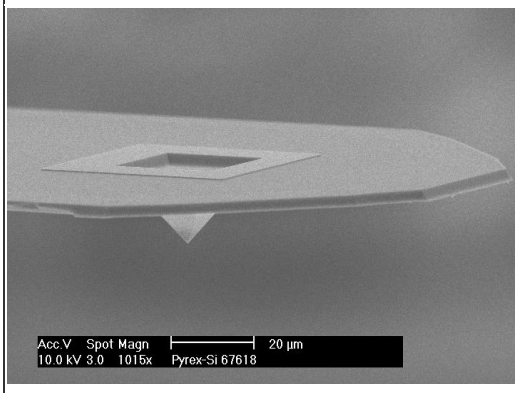
Radius [nm]	< 10
Height [µm]	15 - 20

AFM Cantilevers: Silicon. Different versions are available:

	SD-ATEC-NCLwG	SD-ATEC-NCLwGR
Resonance Frequency [kHz]	155	155
Force Constant [N/m]	33	33
CB length [µm]	250	250
CB width [µm]	40	40
CB thickness [µm]	7.0	7.0
Coating	-	30 nm Al on detector side

AFM Support chip: Silicon with Alignment Grooves

Hollow SiO_2 AFM Tip on Silicon AFM Cantilevers



AFM Tip: Hollow SiO_2

Radius [nm]	150 (including coating)
Height [µm]	16
Setback [µm]	75
Tip Coating	250 nm Al (optionally without coating)

AFM Cantilevers: Silicon. Different versions are available:

	SD-HTT-NC	SD-HTT-CONT
Resonance Frequency [kHz]	58	11
Force Constant [N/m]	43	0.6
CB length [µm]	400	400
CB width [µm]	150	150
CB thickness [µm]	7.5	1.8

AFM Support chip: Pyrex glass

Special Developments List (version 6.2)

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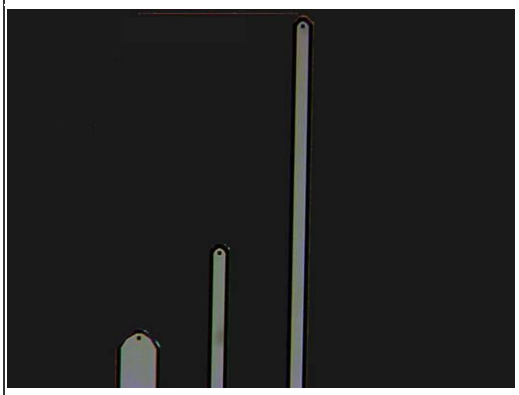
Pierced Cantilever AFM Probes

Tipless AFM Cantilevers with Hole for Sphere gluing



AFM Tip: Hole instead of tip

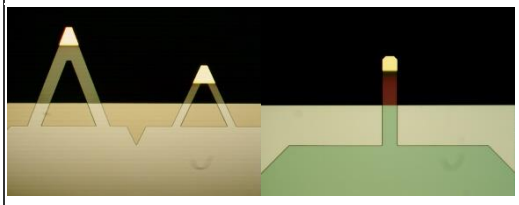
Size [µm]	4 x 4

AFM Cantilevers: Silicon. Multi-cantilevers chip with 3 cantilevers:

	SD-PD-TRI *NCH*	**SD-PD-TRI *FM***	**SD-PD-TRI *CONT***
Resonance Frequency [kHz]	330	75	13
Force Constant [N/m]	42	2.8	0.2
CB length [µm]	100	210	500
CB width [µm]	50	30	30
CB thickness [µm]	2.7	2.7	2.7

AFM Support chip: Silicon

uniqprobe Tipless AFM Cantilevers



AFM Tip: none

AFM Cantilevers: Quartz-like. Different versions are available:

	SD-qp-BioT-TL		**SD-qp-CONT-TL**	**SD-qp-SCONT-TL**
Shape of the cantilevers	triangular		rectangular	
Resonance Frequency [kHz]	55	16	32	13
Force Constant [N/m]	0.4	0.09	0.1	0.01
CB length [µm]	100	200	130	130
CB width [µm]	2x 19	2x 33	40	40
CB thickness [µm]	0.9	0.9	0.75	0.35
Coating	60 nm Au on detector side (partial coating)*			

** Optionally available without coating **(uncoated cantilevers are transparent!)***

AFM Support chip: Silicon with Alignment Grooves

Special Developments List (version 6.2)

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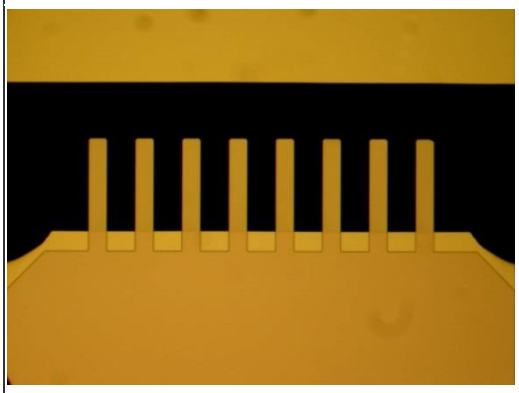
Price and delivery time on request. For ordering, please use the codes starting with SD-…

uniqprobe Tipless AFM Cantilevers Arrays



AFM Tip: none

AFM Cantilevers: Quartz-like. Different versions are available:

	SD-qp-TL8a	SD-qp-TL8b
Shape of the cantilevers	rectangular	
Resonance Frequency [kHz]	4.0	2.3
Force Constant [N/m]	0.02	0.004
CB length [µm]	500	500
CB width [µm]	100	100
CB thickness [µm]	1.2	0.7
Number of cantilevers	8	8
Pitch [µm]	250	250
Coating sample facing side	30 nm Au*	
Coating detector side	20 nm Au*	

** Optionally available without coating **(uncoated cantilevers are transparent!)***

AFM Support chip: Silicon. Dimensions: L=3.4 mm; l=3.1 mm; t=315 µm

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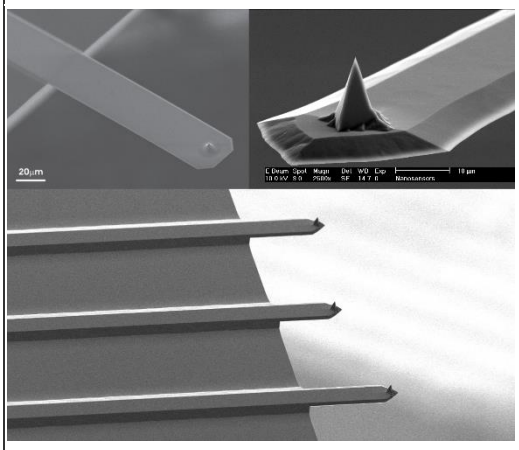
MAC Mode AFM Cantilevers for Keysight / Agilent / Molecular Imaging



AFM Tips: Different versions are available:

	SD-MAC-Type2 SD-MAC-Type9	SD-MAC-Type7 SD-MAC-Type8
Material	Silicon	Quartz-like
Radius [nm]	< 10	< 10
Height [µm]	10 – 15	7

AFM Cantilevers: Different versions are available:

	SD-MAC-Type2	SD-MAC-Type7	SD-MAC-Type8
Material	Silicon	Quartz-like	Quartz-like
Resonance Frequency [kHz]	75	43	48
Force Constant [N/m]	2.8	0.14	0.3
CB length [µm]	225	125	125
CB width [µm]	30	35	35
CB thickness [µm]	3.0	0.75	1.0
Coating	75 nm Ni on detector side	40 nm Ni on detector side	

	SD-MAC-Type9		
	CB 1	**CB 2**	**CB 3**
Material	Silicon		
Resonance Frequency [kHz]	90	130	65
Force Constant [N/m]	1.0	2.0	0.6
CB length [µm]	110	90	130
CB width [µm]	33	33	33
CB thickness [µm]	1.0	1.0	1.0
Coating	60 nm Ni on detector side		

AFM Support chip: Silicon

Special Developments List (version 6.2)

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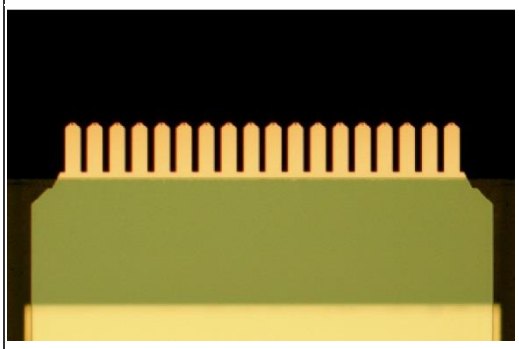
Silicon Nitride Arrays with AFM Tips (NanoInk, Inc® compatible)



AFM Tip: Silicon Nitride

Radius [nm]	< 10
Height [µm]	3.5

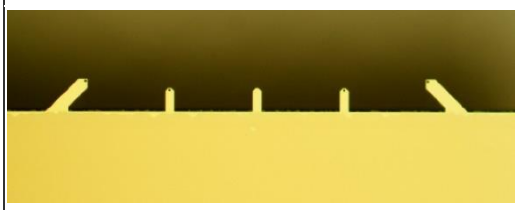
AFM Cantilevers: Silicon Nitride. Different versions are available:

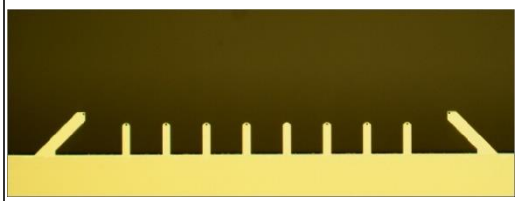
	SD-PNP-Array1	**SD-PNP-Array2** *up / down left–right*	**SD-PNP-Array3**
Shape of the cantilevers	rectangular		triangular
Resonance Frequency [kHz]	70	30 / 17-30	70
Force Constant [N/m]	0.5	0.2 / 0.07-0.2	0.3
CB length [µm]	100	150 / 200-150	100
CB width [µm]	40	50 / 45-50	2x 14
CB thickness [µm]	0.55	0.55	0.55
Number of cantilevers	18	18 / 3-3	12
Pitch [µm]	60	70 / 70-70	66
Coating	60 nm Au on detector side		

NanoInk, Inc® is a registered trademark of NanoInk, Inc.

AFM Support chip: Pyrex glass

nAmbition Silicon Nitride Arrays





AFM Tip: Silicon Nitride

Radius [nm]	< 15
Height [µm]	3.5

AFM Cantilevers: Silicon Nitride. Different versions are available:

	SD-nAmbition-Array5 *Reference CB (45° tilted) / Measurement CB*	**SD-nAmbition-Array10** *Reference CB (45° tilted) / Measurement CB*
Shape of the cantilevers	rectangular	
Resonance Frequency [kHz]	23 / 94	11 / 42
Force Constant [N/m]	0.03 / 0.17	0.01 / 0.05
CB length [µm]	100 / 50	144 / 75
CB width [µm]	30 / 20	30 / 20
CB thickness [µm]	0.24	0.24
Number of cantilevers	2 / 3 (1 without tip)	2 / 8 (1 without tip)
Pitch [µm]	200	100
Coating	30 nm Au on both sides	

AFM Support chip: Pyrex glass

Special Developments List (version 6.2)

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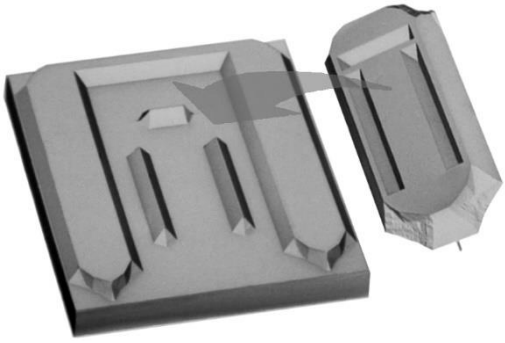
F) Diverse (AFM related)

Alignment Chip



Alignment Chip features:

- reproducible positioning of the AFM probe
- easy tip exchange without readjustment of AFM cantilever deflection system
- fits on all NANOSENSORS™ AFM probes of the PointProbe® Plus and PointProbe® Plus XY-Alignment Series
- high stability because of a chromium coating

	SD-ALIGN
Dimensions [µm]	3400 x 2900
Thickness without probe [µm]	525
Thickness with mounted probe [µm]	700
Tip repositioning accuracy (same probe) [µm]	± 2
XY-Align. Series: Tip repositioning accuracy (any probe) [µm]	± 8

2D200 Pitch-Grating

Chip: Silicon

Chip size [mm]	5 x 7
Active area size [µm]	100 x 100

Lattice:

Pitch [nm]	200
Accuracy of pyramid position [nm]	± 10
Accuracy of pyramid pitch (10x10 µm² scan) [%]	± 0.1
Accuracy of pyramid pitch (100x100 µm² scan) [%]	±0.01

Pyramids:

Edge length of square pyramids [nm]	approx.. 100
Sidewall angle (versus wafer surface) [°]	54.7
Accuracy of sidewall angle [°]	± 0.5
Depth of pyramids [nm]	approx.. 70

Special Developments List (version 6.2)

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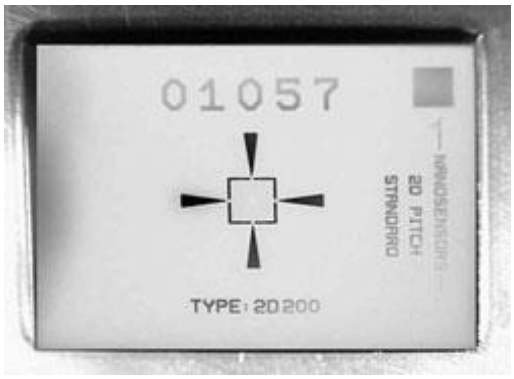
2D300 Pitch-Grating



Chip: Silicon

Chip size [mm]	5 x 7
Active area size [µm]	100 x 100

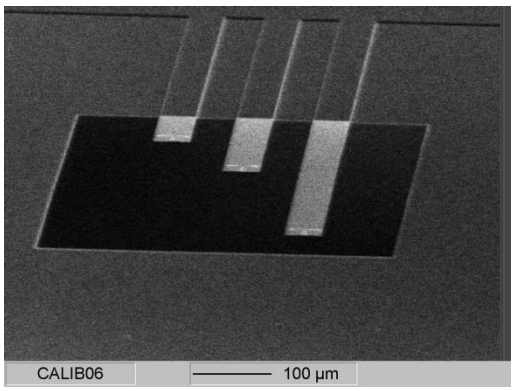
Lattice:

Pitch [nm]	300
Accuracy of pyramid position [nm]	± 10
Accuracy of pyramid pitch (10x10 µm² scan) [%]	± 0.1
Accuracy of pyramid pitch (100x100 µm² scan) [%]	±0.01

Pyramids:

Edge length of square pyramids [nm]	approx.. 100
Sidewall angle (versus wafer surface) [°]	54.7
Accuracy of sidewall angle [°]	± 0.5
Depth of pyramids [nm]	approx.. 70

CalibLever



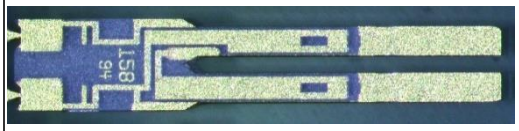
AFM Tip: none

AFM Cantilevers: Multi-cantilevers chip with 3 AFM cantilevers:

	SD-CalibLever *CB450*	**SD-CalibLever *CB200***	**SD-CalibLever *CB80***
Resonance Frequency [kHz]	14	65	330
Force Constant [N/m]	0.21	2.1	25
CB length [µm]	465	215	95
CB width [µm]	50	50	50
CB thickness [µm]	2.15	2.15	2.15

AFM Support chip: Silicon

Quartz Tuning Fork



Quartz Tuning Fork Type E158-24

Properties:

	SD-TF
Resonance Frequency [kHz]	approx. 32.768
Force Constant [N/m]	approx. 1900
Prong length [µm]	2300
Prong width [µm]	216
Prong thickness [µm]	125

Optionally available mounted on a ceramic plate (SD-QTFM)

Special Developments List (version 6.2)

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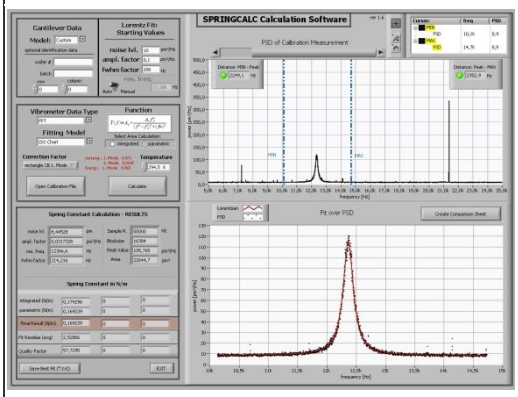
Spring Constant Calibrated AFM Cantilevers



Determination of the mechanical properties of AFM cantilevers by Laser Doppler Vibrometry

Data: Resonance Frequency
Force Constant
Quality Factor (Q-Factor)

Accuracy: Resonance Frequency: better than 0.1 %
Force Constant: better than 5 % (k < 1 N/m)
better than 10% (1 N/m < k < 10 N/m)
better than 20% (10 N/m < k < 100 N/m)
Quality Factor (Q-Factor): better than 3%

Service available for all products with cantilevers having a Force Constant < 100 N/m
Measurement traceable with PTB certified Force Standard

Special Developments List (version 6.2)

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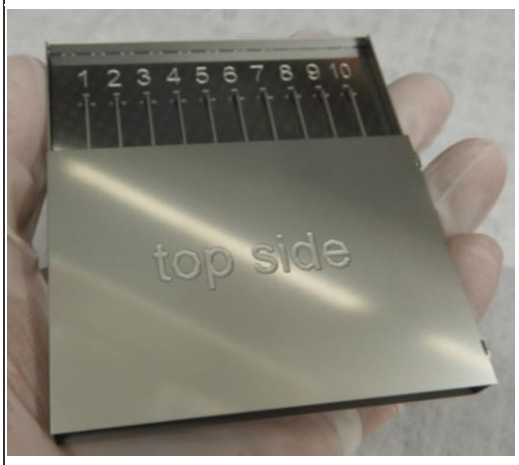
Stainless Steel AFM Probes Box (Gel and plastics free)



NANOSENSORS™ developed a box fabricated solely from metal avoiding the usage of adhesion gel and plastics.
These boxes are especially suited for applications that are extremely sensitive to organic molecules such as tip enhanced infra-red spectroscopy.

The box can be used for transport and storage.
Each box has a capacity of 10 AFM probes that are individually fixed by a movable clamp.

Product order codes are marked with 'MB'. Apart from packaging the products are identical to their base products:

	PPP-CONTPt-MB	PPP-EFM-MB	PPP-NCSTPt-MB	PPP-NCLPt-MB
Resonance Frequency [kHz]	13	75	160	190
Force Constant [N/m]	0.2	2.8	7.4	48
CB length [µm]	450	225	150	225
CB width [µm]	50	28	27	38
CB thickness [µm]	2.0	3.0	2.8	7.0
Coating	25 nm PtIr5 on both sides			

	PPP-NCHPt-MB	PPP-CONTAu-MB	PPP-NCSTAu-MB	PPP-NCHAu-MB
Resonance Frequency [kHz]	330	13	160	330
Force Constant [N/m]	42	0.2	7.4	42
CB length [µm]	125	450	150	125
CB width [µm]	30	50	27	30
CB thickness [µm]	4.0	2.0	2.8	4.0
Coating	25 nm PtIr5 on both sides	Au on both sides		

	PPP-NCHAu25-MB	PPP-NCHR-MB	ATEC-NCAu-MB	PtSi-FM-MB
Resonance Frequency [kHz]	250	330	335	75
Force Constant [N/m]	35	42	45	2.8
CB length [µm]	125	125	160	225
CB width [µm]	30	30	45	28
CB thickness [µm]	3.8	4.0	4.6	3.0
Coating	25 nm Au on tip side, 70 nm Au on detector side	30 nm Al on detector side	Au on both sides	25 nm PtSi on both sides

Special Developments List (version 6.2)

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	PtSi-NCH-MB
Resonance Frequency [kHz]	330
Force Constant [N/m]	42
CB length [µm]	125
CB width [µm]	30
CB thickness [µm]	4.0
Coating	25 nm PtSi on both sides

Other AFM probe types available on request.

Special Developments List (version 6.2)

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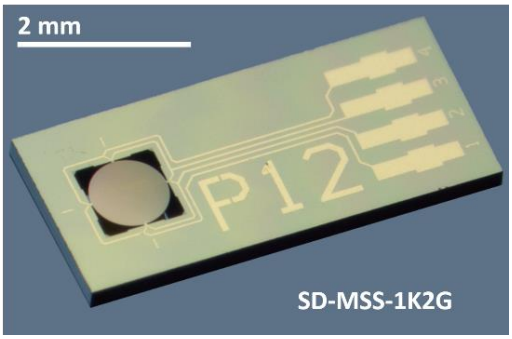
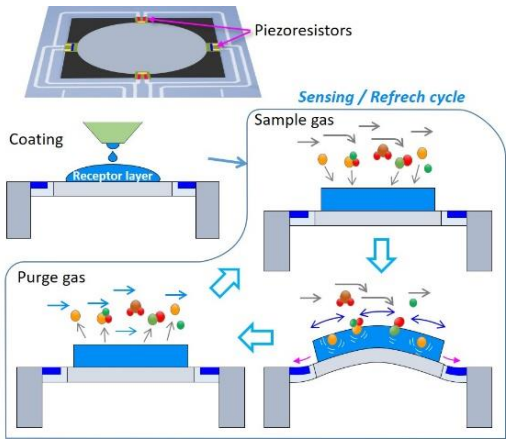
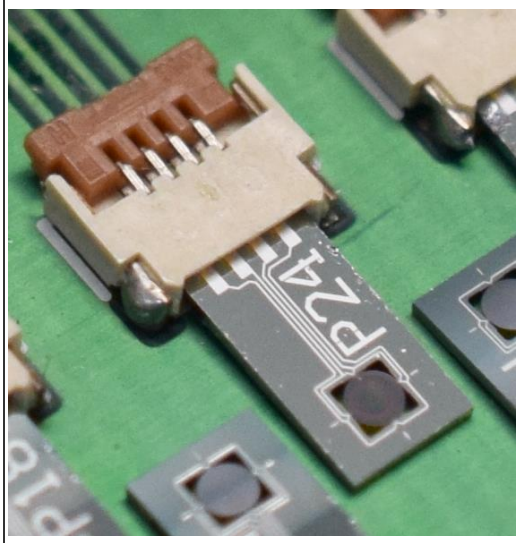
G) Nanomechanical Sensors

Membrane-type Surface-stress Sensor (SD-MSS)







(i) for gas/odor sensing

Type:
Silicon membrane platform supported with four beams on which piezoresistors are embedded. SD-MSS-1K2GP has a passivation on the electrodes for “liquid” applications.

Applications:
Electronic nose, gas/odor sensing, human breath analysis *e.g.*, for cancer research (note: for these applications, an appropriate receptor layer must be coated on the membrane by user).

Working Principle:
Surface-stress yielded by the coated receptor layer absorbing gas/odor molecules deforms the membrane and the supporting beams, which induces resistance change of the piezoresistor. By measuring the resistance change, the magnitude of the target parameter can be estimated.

	SD-MSS-1K2G	SD-MSS-1K2GP
Membrane size [µm]	1000 (round)	
Membrane thickness [µm]	2.8 (typical)	
Chip dimensions [mm]	5.5 x 2.5 x 0.3	
Resistance value [kΩ]	2 – 6	
Electric configuration	Full bridge, 4 pads, 0.5 mm pitch	
Coating	No	
Electrode passivation	No	Yes

Easy Plug-in Connection:
These sensors fit to a commercial FPC (Flexible Printed Circuit) / FFC (Flexible Flat Cable) connectors with 0.5 mm pitch.

For more information please visit http://mss-sensor.com

Special Developments List (version 6.2)

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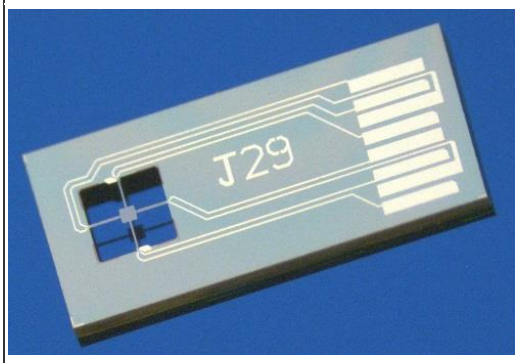
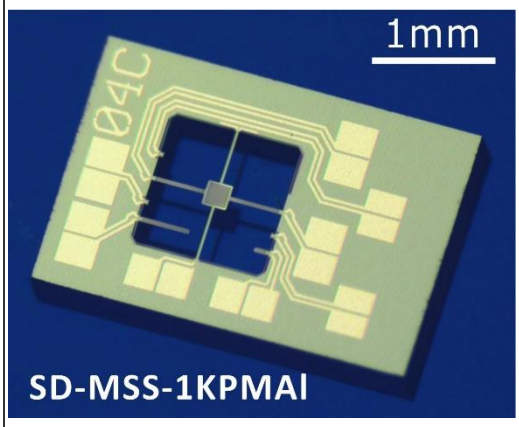
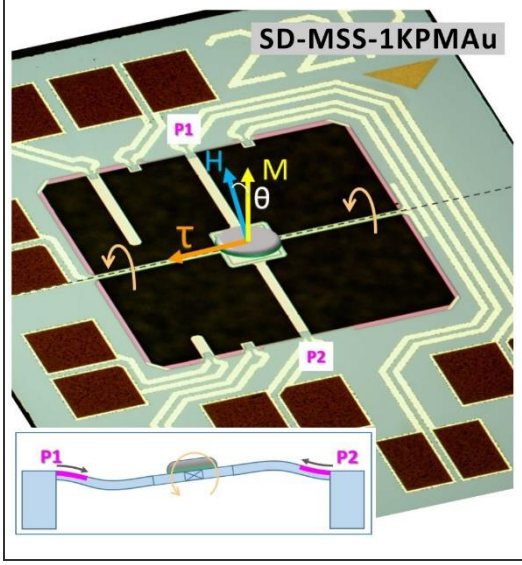
Membrane-type Surface-stress Sensor (SD-MSS)







(ii) for static/pulsed-field torque magnetometry

Type: Silicon membrane platform supported with four beams, designed to rotate along with a torsional axis. A yielded torque is measured by embedded piezoresistors on the bending axis.

Applications:
Nanomechanical sensing, material assessment, static/pulsed-field torque magnetometry, force sensing, etc.

Working Principle: A sample attached to the platform tends to align with the applied magnetic field, which twists the torsional axis and bends the bending axis on which piezoresisors are embedded. By measuring the resistance change, the magnitude of the yielded force can be estimated.

	SD-MSS-1KTM	SD-MSS-1KPMAl	SD-MSS-1KPMAu
Membrane size [µm]	200 (square)		
Membrane thickness [µm]	2.8 (typical)		
Chip dimensions [mm]	5.5 x 2.5 x 0.3	3.0 x 2.0 x 0.3	
Resistance value [kΩ]	0.3 – 1.2		
Electric configuration	Separated, 8 pads, 0.25 (0.5) mm pitch	***Aluminum*** pads for wire bonding or gluing	***Gold*** pads for wire bonding or gluing
Piezoresistive cantilever	No	120 µm, 400 µm	

For more information please visit http://mss-sensor.com

Special Developments List (version 6.2)

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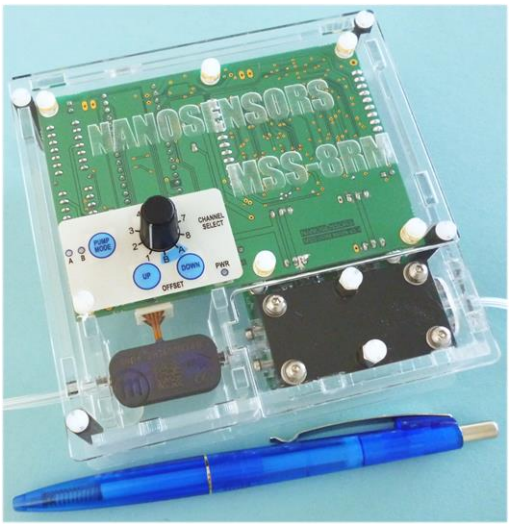
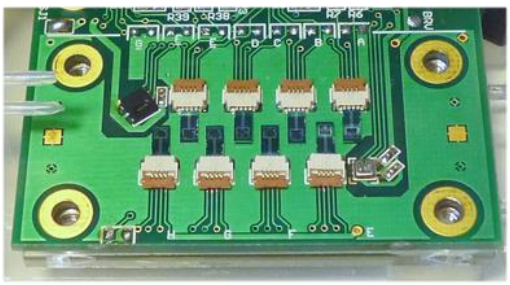
Price and delivery time on request. For ordering, please use the codes starting with SD-…

MSS 8 Channel Readout Module (SD-MSS-8RM)





MSS 8 Channel Readout Module (MSS-8RM) is a basic electronic module to operate and to readout ***NANOSENSORS™ MSS***, up to 8 sensors simultaneously, under a hardware configuration for electronic nose/odor sensing. ***MSS-8RM*** contains two air pumps and users can examine self-prepared ***MSS*** under different gas flow conditions.

MSS-8RM is designed as simple as possible so that users can learn about a basic electronic-nose system and further improve the system performance. It has the followings features.

- **Arduino** microcontroller board and software
- Two air pumps integrated
- Two discrete sensors (Sensirion SHT21, Bosch BME280) integrated
- Only USB power
- 10 SD-MSS chips (SD-MSS-1K2G) included in the package

Note that MSS-8RM does not include any data processing functions to distinguish one sample from the other. You will get raw numerical data of the sensor responses under different conditions as final output.

For more information please visit http://mss-sensor.com