ADVANCED DIAMOND TECHNOLOGIES, INC.

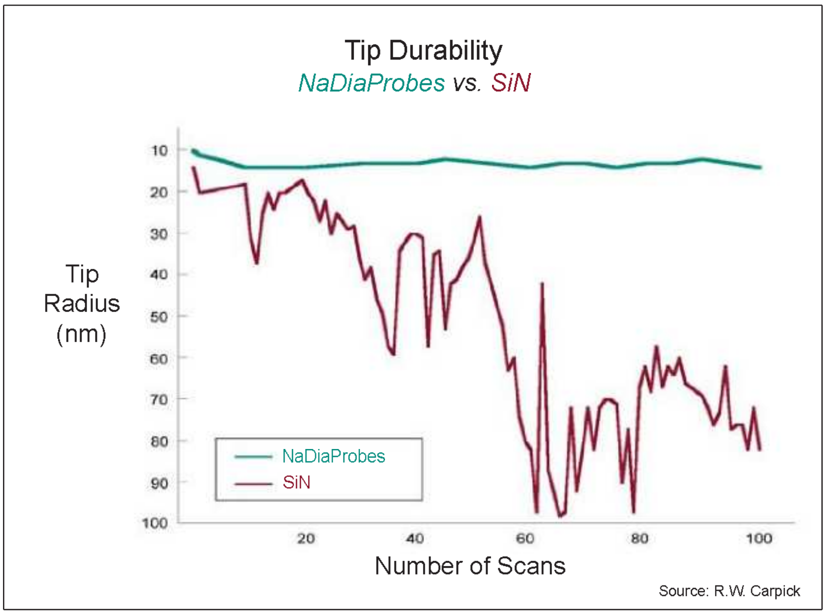
NaDiaProbes®—All-Diamond AFM Probes

Leveraging diamond's wear resistance and chemical inertness

Advanced Diamond Technologies' (ADT) NaDiaProbes are changing the field for Atomic Force Microscopy (AFM). NaDiaProbes are made entirely of diamond — both the tip and cantilever—in a monolithic process, and this leverages the beneficial attributes of diamond for use in commercial atomic force microscopes. Diamond has long been recognized as the optimal material for scanning probe microscope applications, but until now the available technology—diamond-coated cantilevers or mounted pieces of diamond—has been unable to meet industry requirements for sharpness, reproducibility and affordability.

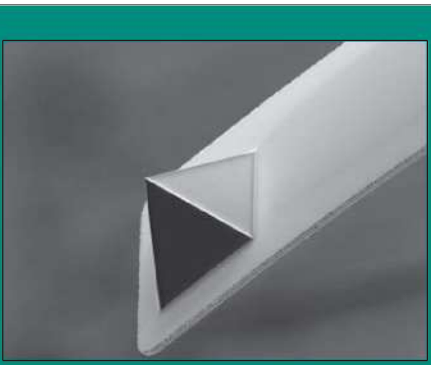
Outperforms Si, SiN Probes and Diamond Coated Probes

Problems associated with silicon (Si) and silicon nitride (SiN) probes such as wear resistance and reactivity are overcome with NaDiaProbes due to diamond's intrinsic hardness and inertness. With imaging results frequently better than 20 nm, NaDiaProbes outperform diamond-coated silicon probes in image resolution. NaDiaProbes exhibit imaging performance comparable to standard SiN probes but with over 100x less wear rates.



Source: R.W. Carpick

While imaging a hard surface in contact mode, NaDiaProbes maintained tip size (radius) for 100 scans. Over the same material, the SiN probes wore out.



Modes and Applications

NaDiaProbes have a chip geometry that allows use in most standard AFM tools. All NaDiaProbes have an aluminum reflective coating. NaDiaProbes can be used for the following AFM scanning modes:

- Conductive Microscopy
- Dynamic (Tapping) Mode
- Contact Mode

NaDiaProbes are excellent for the following applications:

- Electrically Conductive AFM (C-AFM)
- Oxidation Nanolithography
- Wear Resistance on Hard Substrate
- Long Tip Lifetime (Quality Control)

Made of UNCD

NaDiaProbes are made using ADT's multicrystalline diamond, UNCD®, which has many of the outstanding characteristics of diamond such as hardness, modulus and fracture toughness. Because of UNCD's hardness, the tips resist damage which enhances resolution and increases tip lifetimes. UNCD also has diamond's exceptional surface properties of low friction and stiction for superior all-around imaging performance particularly on soft materials.

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Conductive Probes

Conductive NaDiaProbes are all-diamond probes with the cantilever and the probe tip made of electrically conductive UNCD® with a resistivity less than 1 ohm-cm. In addition to being electrically conductive, NaDiaProbes display superior wear properties and long lifetimes. Therefore, users who are frustrated with the delamination of conductive metal coatings will be pleased to know NaDiaProbes are conductive inside and out.
No coating — all conductive diamond.

SSRM ♦ Oxidation Nanolithography ♦ E-Chem AFM ♦ Piezo-Force Microscopy

Dynamic Mode

Dynamic (tapping) mode NaDiaProbes are designed for the most common use of AFM probes — tapping a surface. Due to diamond's superior wear properties, these probes are designed for imaging hard surfaces, any application where long tip life is desirable (quality control processes) and applications where silicon tips may break easily. Therefore NaDiaProbes are also excellent for new AFM users.

Wear Resistance on Hard Surfaces ♦ Nanomanufacturing

Contact Mode

Contact mode NaDiaProbes are designed for imaging hard surfaces for many scans. Extremely wear resistant, NaDiaProbes last orders of magnitude longer than silicon nitride (SiN) or silicon (Si) probes. Extremely durable, NaDiaProbes are also perfect for new users or applications where a Si tip may break easily.

Scanning Hard Surfaces ♦ Quality Control ♦ New Users ♦ Long Tip Lifetimes

For a complete list of NaDiaProbe specifications and ordering information, please visit ***www.thindiamond.com***.

UNCD Properties and NaDiaProbe Advantages

UNCD Properties	NaDiaProbe Advantages
Extreme hardness and strength	Robust probes with excellent imaging resolution
High modulus and low dissipation	High frequency for dynamic imaging
Extremely wear resistant	Consistent imaging resolution when scanning hard surfaces Holds dimensional tolerances for metrology and quality control applications
Low film stress	Cantilevers, regardless of length, maintain planar integrity
Chemically inert and stable	Resists build-up of debris when imaging soft materials Resists fouling of biomaterials

Advanced Diamond Technologies, Inc.

T: 815.293.0900
E info@thindiamond.com
www.thindiamond.com

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This product is protected by one or more of the following
U.S. and foreign patents: 5,989,511; 6,592,839; 7,128,889;
5,849,079; 5,772,760. Additional patents pending.

ADVANCED DIAMOND TECHNOLOGIES, INC.

NaDiaProbes — *All-Diamond AFM Probes Specifications*

ND-DTI Series: Dynamic Mode Probes

Tip

Shape:	(311) Pyramid
Height:	5.66 µm
Radius:	10-30 nm (nominal-guaranteed < 50 nm)
Material:	UNCD (polycrystalline diamond)

Cantilever

Tip Setback:	9 µm
Coating:	60 nm reflective aluminum coating
Curvature:	Nominally less than 3 degrees
Chip:	Standard size Pyrex (3.6 x 1.5 x 0.5 mm)

SKU	Force Constant (N/m)		Frequency (kHz)		Length (µm)	Width (µm)	Thickness (µm)	Cantilever	MSRP
	nominal	range	nominal	range	(± 5)	(± 2)	(± 0.05)		(pack of 4)
ND-DTI series: Dynamic Mode Probes									
ND-DTIRS-4	35	30-50	310	200-400	120	33	3	1 per chip	$249
ND-DTIRL-4	30	25-45	240	150-350	130	33	3	1 per chip	$249

ND-CTI Series: Contact Mode Probes

Tip

Shape:	(111) Pyramid
Height:	5.66 µm
Radius:	15-30 nm (nominal - guaranteed < 50nm)
Material:	UNCD (polycrystalline diamond)

Cantilever

Tip Setback:	9 µm
Coating:	60 nm reflective aluminum coating
Curvature:	Nominally less than 3 degrees
Chip:	Standard size Pyrex (3.6 x 1.5 x 0.5 mm)

SKU	Chip Image	Cantilever	Force Constant (N/m)		Frequency (kHz)		Length (µm)	Width (µm)	Thickness (µm)	MSRP (pack of 4)
			nominal	range	nominal	range	(± 5)	(± 2)	(± 0.05)	
ND-CTIR1-4		Short Medium Long	0.35 0.17 0.04	0.25-0.45 0.10-0.25 0.02-0.05	35 17 12	20-50 10-25 6-20	225 325 425	30 40 20	1 1 1	$249
ND-CTIR2-4		Short Medium Long	0.23 0.08 0.05	0.15-0.30 0.05-0.10 0.03-0.07	40 12 8	20-60 6-20 4-16	225 425 500	20 40 40	1 1 1	$249
ND-CTIT1-4		Short Long	1.28 0.46	1.00-1.50 0.30-0.60	48 24	25-70 12-40	200 300	25 41	1 1	$249
ND-CTIT2-4		Short Long	0.71 0.04	0.50-0.95 0.02-0.05	50 23	25-75 12-45	200 300	17 23	1 1	$249
ND-CTIT3-4		Short Long	1.28 0.46	.00-1.50 0.30-0.60	48 24	25-70 12-40	200 300	7 23	1 1	$249
ND-CTIT4-4		Short Long	0.71 0.04	0.50-0.95 0.02-0.05	50 23	25-75 12-45	200 300	17 23	1 1	$249

Temporarily Out of Stock

ND-CTC Series: Conductive Probes Available

All of the above probes are available using electrically conductive diamond and sold on a wafer scale (approximately 300 probes per wafer). Call ADT for more information at (+01) 815.293.0900 or email sales@thindiamond.com.

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Advanced Diamond Technologies, Inc.
(815) 293.0900
info@thindiamond.com
www.thindiamond.com

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Additional patents pending.