Probe Selection

The quality of data obtained with the Dimension Icon is strongly dependent on the type and quality of the probe in use. Traditional triangular silicon nitride cantilever probes are robust and relatively inexpensive. Etched silicon cantilevers with integrated tips have a higher aspect ratio and smaller end radius than silicon nitride. The choice of probe depends on multiple variables, such as application and imaging environment. For example, the smaller end radius of etched silicon tips creates greater pressure between the tip and sample. Consequently, these probes are not recommended for soft samples.

NOTE: The Dimension FastScan system is specially designed to work with certain unique probes, designed for higher bandwidth scanning. These probes require a small laser spot size. Consequently, they should be used only with the Dimension FastScan scanner, which supports small laser spot sizes.

For the applications listed below, click to view a table of probe types and characteristics to help you make the optimal choice for your experiment. Further information is also available regarding Probe Selection for Specific Modes.

Life Sciences

Biomolecules

Probe Family/Model		Imaging Environment		Nominal Specifications			Coatings		Probe Attributes		AFM Mode				
		Liquid	**Air**	**Force Constant (N/m)**	**Resonant Frequency (kHz)**	**Radius of Curvature (nm)**	**Back Side**	**Tip Side**		**Peak Force/ ScanAsyst**	**Tapping**	**Contact**	**Force Curves**	**Electrical**	**Magnetic**
Silicon	TESPA	–	✔	42	320	8	Al	None	Highest resolution, Asymmetric tip	–	✔	–	–	–	–
	RTESPA	–	✔	40	300	8	Al	None	Highest resolution, Symmetric tip	–	✔	–	–	–	–
	NCHV-A	–	✔	42	320	10	Al	None	High resolution, Asymmetric tip	–	✔	–	–	–	–
	DNP-S	✔	✔	0.06–0.58	18–57	10	Au	None	High resolution, Low force, Symmetric tip (sharpened)	–	✔	✔	✔	–	–
	MSCT	✔	✔	0.01–0.5	7–120	10	Au	None	High resolution, Lowest force, Symmetric tip (sharpened)	–	✔	✔	✔	–	–
Silicon Nitride	SNL	✔	✔	0.06–0.58	18–57	2	Au	None	Ultra-high resolution, Low force, Symmetric tip (extremely sharp)	–	✔	✔	✔	–	–
	MSNL	✔	✔	0.01–0.5	7–120	2	Au	None	Ultra-high resolution, Lowest force, Symmetric tip (extremely sharp)	–	✔	✔	✔	–	–
	ScanAsyst - Air	✔	✔	0.2–0.8	45–95	2	Al	None	Ultra-high resolution, lowest force, symmetric tip (extremely sharp)	✔	–	–	–	–	–
	ScanAsyst - Fluid	✔	–	0.35–1.4	100–200	20	Au	None	High resolution, lowest force, symmetric	✔	–	–	–	–	–

Probe Family/Model	Imaging Environment		Nominal Specifications			Coatings		Probe Attributes		AFM Mode				
	Liquid	Air	Force Constant (N/m)	Resonant Frequency (kHz)	Radius of Curvature (nm)	Back Side	Tip Side		Peak Force/ ScanAsyst	Tapping	Contact	Force Curves	Electrical	Magnetic
ScanAsyst - Fluid+	✔	–	0.35–1.4	100–200	2	Au	None	Ultra-high resolution, lowest force, symmetric tip (extremely sharp)	✔	–	–	–	–	–
FastScan-A	–	✔	10–25	0.8–2 MHz	8	Al	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	–	✔	–	–	–	–
FastScan-B	✔	–	1–3	300–600	8	Ti/Au	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✔	✔	–	✔	–	–
FastScan-C	✔	–	0.4–1.2	130–290	8	Ti/Au	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✔	✔	–	✔	–	–

Cells

Probe Family/Model		Imaging Environment		Nominal Specifications			Coatings		Probe Attributes		AFM Mode				
		Liquid	Air	Force Constant (N/m)	Resonant Frequency (kHz)	Radius of Curvature (nm)	Back Side	Tip Side		Peak Force/ ScanAsyst	Tapping	Contact	Force Curves	Electrical	Magnetic
Silicon Nitride	DNP	✔	–	0.06–0.58	18–57	20	Au	None	Low force, Symmetric tip	–	✔	✔	✔	–	–
	MLCT	✔	–	0.01–0.5	7–120	20	Au	None	Lowest force, Symmetric tip	–	✔	✔	✔	–	–
	FastScan-B	✔	–	1–3	300–600	8	Ti/Au	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✔	✔	✔	✔	–	–
	FastScan-C	✔	–	0.4–1.2	130–290	8	Ti/Au	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✔	✔	✔	✔	–	–

Tissues

Probe Family/Model		Imaging Environment		Nominal Specifications			Coatings		Probe Attributes		AFM Mode				
		Liquid	Air	Force Constant (N/m)	Resonant Frequency (kHz)	Radius of Curvature (nm)	Back Side	Tip Side		Peak Force/ ScanAsyst	Tapping	Contact	Force Curves	Electrical	Magnetic
Silicon	TESPA	–	✔	42	320	8	Al	None	Highest resolution, Asymmetric tip	–	✔	–	–	–	–

Probe Family/Model		Imaging Environment		Nominal Specifications			Coatings		Probe Attributes		AFM Mode				
		Liquid	Air	Force Constant (N/m)	Resonant Frequency (kHz)	Radius of Curvature (nm)	Back Side	Tip Side		Peak Force/ ScanAsyst	Tapping	Contact	Force Curves	Electrical	Magnetic
	RTESPA	–	✔	40	300	8	Al	None	Highest resolution, Symmetric tip	–	✔	–	–	–	–
	NCHV-A	–	✔	42	320	10	Al	None	High resolution, Asymmetric tip	–	✔	–	–	–	–
	DNP	✔	–	0.06–0.58	18–57	20	Au	None	Low force, Symmetric tip	–	✔	✔	✔	–	–
	DNP-S	✔	–	0.06–0.58	18–57	10	Au	None	High resolution, Low force, Symmetric tip (sharpened)	–	✔	✔	✔	–	–
	MLCT	✔	–	0.01–0.5	7–120	20	Au	None	Lowest force, Symmetric tip	–	✔	✔	✔	–	–
	MSCT	✔	–	0.01–0.5	7–120	10	Au	None	High resolution, Lowest force, Symmetric tip (sharpened)	–	✔	✔	✔	–	–
	SNL	✔	–	0.06–0.58	18–57	2	Au	None	Ultra-high resolution, Low force, Symmetric tip (extremely sharp)	–	✔	✔	✔	–	–
	MSNL	✔	–	0.01–0.5	7–120	2	Au	None	Ultra-high resolution, Lowest force, Symmetric tip (extremely sharp)	–	✔	✔	✔	–	–
Silicon Nitride	ScanAsyst - Air	✔	✔	0.2–0.8	45–95	2	Al	None	Ultra-high resolution, lowest force, symmetric tip (extremely sharp)	✔	–	–	–	–	–
	ScanAsyst - Fluid	✔	–	0.35–1.4	100–200	20	Au	None	High resolution, lowest force, symmetric tip (sharpened)	✔	–	–	–	–	–
	ScanAsyst - Fluid+	✔	–	0.35–1.4	100–200	2	Au	None	Ultra-high resolution, lowest force, symmetric tip (extremely sharp)	✔	–	–	–	–	–
	FastScan-B	✔	–	1–3	300–600	8	Ti/Au	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✔	✔	–	✔	–	–
	FastScan-C	✔	–	0.4–1.2	130–290	8	Ti/Au	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✔	✔	–	✔	–	–

Materials

Polymers/Soft Samples

Probe Family/Model	Imaging Environment		Nominal Specifications			Coatings		Probe Attributes	AFM Mode					
	Liquid	Air	Force Constant (N/m)	Resonant Frequency (kHz)	Radius of Curvature (nm)	Back Side	Tip Side		Peak Force/ ScanAsyst	Tapping	Contact	Force Curves	Electrical	Magnetic

Probe Family/Model		Imaging Environment		Nominal Specifications			Coatings		Probe Attributes		AFM Mode				
		Liquid	Air	Force Constant (N/m)	Resonant Frequency (kHz)	Radius of Curvature (nm)	Back Side	Tip Side		Peak Force/ ScanAsyst	Tapping	Contact	Force Curves	Electrical	Magnetic
Silicon	FESP	–	✓	2.8	75	< 10	None	None	High resolution, Lower force, Asymmetric tip	–	✓	–	✓	–	–
	TESPA	–	✓	42	320	8	Al	None	Highest resolution, Asymmetric tip	–	✓	–	✓	–	–
	LTESP	–	✓	48	190	< 10	None	None	Highest resolution, Long lever, Asymmetric tip	–	✓	–	✓	–	–
	NCHV-A	–	✓	42	320	10	Al	None	High resolution, Asymmetric tip	–	✓	–	✓	–	–
	DNP	✓	✓	0.06–0.58	18–57	20	Au	None	Low force, Symmetric tip	–	✓	✓	✓	–	–
	MLCT	–	✓	0.01–0.5	7–120	20	Au	None	Lowest force, Symmetric tip	–	–	✓	✓	–	–
	SNL	✓	✓	0.06–0.58	18–57	2	Au	None	Ultra-high resolution, Low force, Symmetric tip (extremely sharp)	–	✓	✓	✓	–	–
	ScanAsyst - Fluid+	✓	✓	0.2–0.8	45–95	2	Al	None	Ultra-high resolution, lowest force, symmetric tip (extremely sharp)	✓	–	–	–	–	–
	ScanAsyst - Fluid+	✓	–	0.35–1.4	100–200	20	Au	None	High resolution, lowest force, symmetric tip (sharpened)	✓	–	–	–	–	–
Silicon Nitride	ScanAsyst - Fluid+	✓	–	0.35–1.4	100–200	2	Au	None	Ultra-high resolution, lowest force, symmetric tip (extremely sharp)	✓	–	–	–	–	–
	FastScan-A	–	✓	10–25	0.8–2 MHz	8	Al	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✓	✓	–	✓	–	–
	FastScan-B	✓	–	1–3	300–600	8	Ti/Au	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✓	✓	–	✓	–	–
	FastScan-C	✓	–	0.4–1.2	130–290	8	Ti/Au	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✓	✓	✓	✓	–	–

Hard Samples

Probe Family/Model	Imaging Environment		Nominal Specifications			Coatings		Probe Attributes		AFM Mode				
	Liquid	Air	Force Constant (N/m)	Resonant Frequency (kHz)	Radius of Curvature (nm)	Back Side	Tip Side		Peak Force/ ScanAsyst	Tapping	Contact	Force Curves	Electrical	Magnetic

Probe Family/Model		Imaging Environment		Nominal Specifications			Coatings		Probe Attributes		AFM Mode				
		Liquid	Air	Force Constant (N/m)	Resonant Frequency (kHz)	Radius of Curvature (nm)	Back Side	Tip Side		Peak Force/ ScanAsyst	Tapping	Contact	Force Curves	Electrical	Magnetic
Silicon	TESPA	–	✓	42	320	8	Al	None	Highest resolution, Asymmetric tip	–	✓	–	–	–	–
	RTESPA	–	✓	40	300	8	Al	None	Highest resolution, Symmetric tip	–	✓	–	–	–	–
	NCHV-A	–	✓	42	320	10	Al	None	High resolution, Asymmetric tip	–	✓	–	–	–	–
	MESP-RC	–	✓	2.8	75	25	Co/Cr	Co/Cr	High performance, Magnetic characterization, Asymmetric tip	–	✓	–	–	✓	✓
Modified Silicon	SCM-PIC	–	✓	0.2	13	20	PtIr	PtIr	High performance, Electrical characterization, Asymmetric tip	–	–	✓	–	✓	–
	SCM-PIT	–	✓	2.8	75	20	PtIr	PtIr	High performance, Electrical characterization, Asymmetric tip	–	✓	–	–	✓	–
	DDESP	–	✓	42	320	35	Doped Diamond	Al	Conductive, with increased wear resistance	–	–	✓	–	✓	–
	DNP	✓	✓	0.06–0.58	18–57	20	Au	None	Low force, Symmetric tip	–	✓	✓	–	–	–
	SNL	✓	✓	0.06–0.58	18–57	2	Au	None	Ultra-high resolution, Low force, Symmetric tip (extremely sharp)	–	✓	✓	–	–	–
	ScanAsyst - Fluid+	✓	✓	0.2–0.8	45–95	2	Al	None	Ultra-high resolution, lowest force, symmetric tip (extremely sharp)	✓	–	–	–	–	–
	ScanAsyst - Fluid+	✓	–	0.35–1.4	100–200	20	Au	None	High resolution, lowest force, symmetric tip (sharpened)	✓	–	–	–	–	–
Silicon Nitride	ScanAsyst - Fluid+	✓	–	0.35–1.4	100–200	2	Au	None	Ultra-high resolution, lowest force, symmetric tip (extremely sharp)	✓	–	–	–	–	–
	FastScan-A	–	✓	10–25	0.8–2 MHz	8	Al	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✓	✓	–	✓	–	–
	FastScan-B	✓	–	1–3	300–600	8	Ti/Au	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✓	✓	–	✓	–	–
	FastScan-C	✓	–	0.4–1.2	130–290	8	Ti/Au	None	Highest resolution, symmetric tip, higher optical sensitivity and lower force	✓	✓	✓	✓	–	–

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