

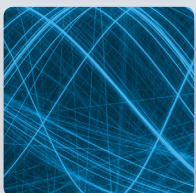
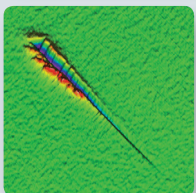
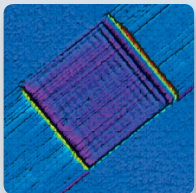
## Hysitron TriboScope

- Delivering Quantitative, Rigid-Probe Nanoindentation and Nanotribology to Atomic Force Microscopy

# Hysitron TriboScope

## Enhance the Characterization Capabilities of Your AFM

Bruker's Hysitron TriboScope® delivers quantitative, rigid-probe nanoindentation and nanotribological characterization capabilities to the world of atomic force microscopy. The Hysitron TriboScope interfaces with Bruker's Dimension Icon®, Dimension Edge™, and MultiMode® 8 AFMs to expand the characterization capabilities of these microscopes. By utilizing a rigid test probe, the TriboScope removes the intrinsic limitations, variability, and complexity associated with cantilever-based measurements to deliver quantitative and repeatable mechanical and tribological characterization over nanometer-to-micrometer length scales.



### The TriboScope Advances Your Research with Innovative Testing Modes

#### Quasi-Static Nanoindentation

Perform quantitative measurement of elastic modulus, hardness, creep, stress relaxation, and fracture toughness of localized microstructures, interfaces, small surface features, and thin films.

#### In-Situ SPM Imaging

Utilize the same test probe for testing and topographic imaging for nanometer precision test placement accuracy and the ability to characterize post-test material deformation behavior.

#### ScanningWear

Raster scan the test probe over the sample surface at a user-definable force setpoint for quantitative wear resistance characterization at the nanoscale.

#### NanoScratch

Perform quantitative scratch/mar resistance, friction coefficient, and thin film adhesion measurements with Bruker's exclusive 2D lateral force transducer technology.

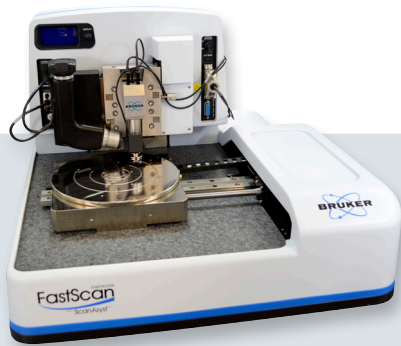
#### nanoDMA III - Dynamic Nanoindentation

Continuously measure elastic-plastic and viscoelastic properties as a function of indentation depth, frequency, and time with Bruker's nanoDMA® III option.

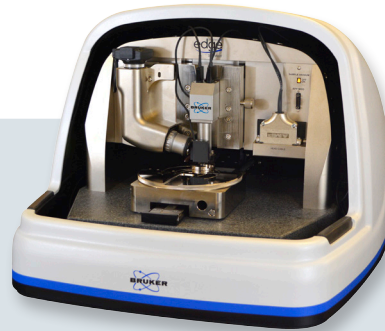
# ● Quantitative, Reliable, and Repeatable

## Expanding the Capabilities of our Industry-Leading AFMs

The TriboScope quickly interfaces to Bruker's Dimension Icon, Dimension Edge, and MultiMode 8 systems.



Dimension Icon



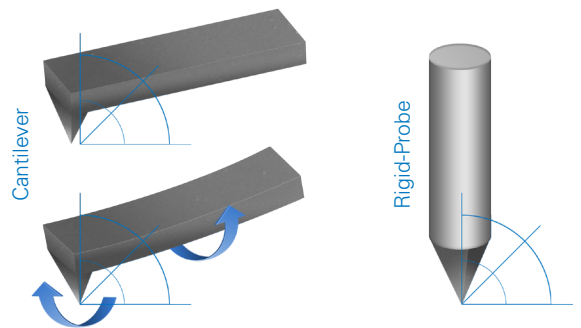
Dimension Edge



MultiMode 8

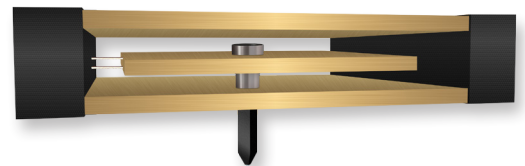
## The Rigid-Probe Advantage

Most AFMs utilize a compliant cantilever to conduct mechanical or tribological testing, posing significant challenges in separating a cantilever's flexural and rotational stiffness from the material's response to applied stress. The TriboScope utilizes a rigid test probe assembly, allowing direct control and measurement of applied force and displacement during the test.



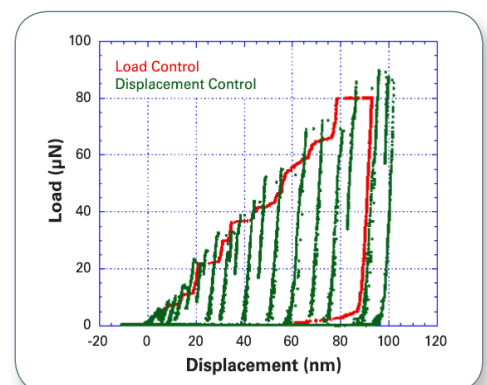
## Electrostatic Actuation

The TriboScope utilizes proprietary electrostatic force actuation and capacitive displacement sensing transducer technology to deliver industry-leading noise floors and low thermal drift for characterizing properties to the bottom of the nanoscale.



## Force and Displacement Feedback Control

The TriboScope operates under closed-loop force control or displacement control. Utilizing a 78 kHz feedback loop rate, the TriboScope can respond to fast material deformation transient events and faithfully reproduce the test function defined by the operator.





## TriboScope Features

- Quantitative, rigid-probe characterization removes the uncertainties and complexities intrinsically caused by cantilever-based nanoindentation and nanotribological testing techniques
- Industry-leading transducer technologies provide measurement of elastic modulus, hardness, creep, stress relaxation, fracture toughness, and viscoelastic properties over nanometer-to-micrometer length scales
- An intuitive mechanical interface streamlines integration with popular commercially available AFMs, including Bruker's Dimension Icon, Dimension Edge, and MultiMode 8 systems
- Proprietary capacitive transducer and Performech® control technologies provide superior control over the nanoindentation process and deliver industry-leading force and displacement noise floors
- In-situ SPM imaging provides nanometer-precision test placement accuracy and observation of post-test material deformation behavior
- Enables quantitative nanomechanical and nanotribological characterization of the broadest range of materials, from soft polymers to ultra-thin diamond thin films



### Standard Configuration

Testing Modes	Quasi-Static Nanoindentation, In-Situ SPM Imaging, ScanningWear
Normal Force	Maximum Force: 10 mN Noise Floor: 75 nN Resolution: 1 nN
Normal Displacement	Maximum Displacement: 5 $\mu\text{m}$ Noise Floor: <0.2 nm Resolution: 0.006 nm Drift Rate: <0.05 nm/sec

### Optional Configurations

#### nanoDMA III

Testing Modes	Dynamic Nanoindentation, Quasi-Static Nanoindentation, In-Situ SPM Imaging, ScanningWear
Dynamic Specifications	Frequency Range: 0.1 Hz - 300 Hz Maximum Dynamic Force Amplitude: 5 mN Maximum Dynamic Displacement Amplitude: 2.5 $\mu\text{m}$

#### NanoScratch

Testing Modes	NanoScratch, Quasi-Static Nanoindentation, In-Situ SPM Imaging, ScanningWear
Lateral Specifications	Maximum Displacement: 15 $\mu\text{m}$ Displacement Noise Floor: <2 nm Maximum Force: 2 mN Force Noise Floor: <3.5 $\mu\text{N}$

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