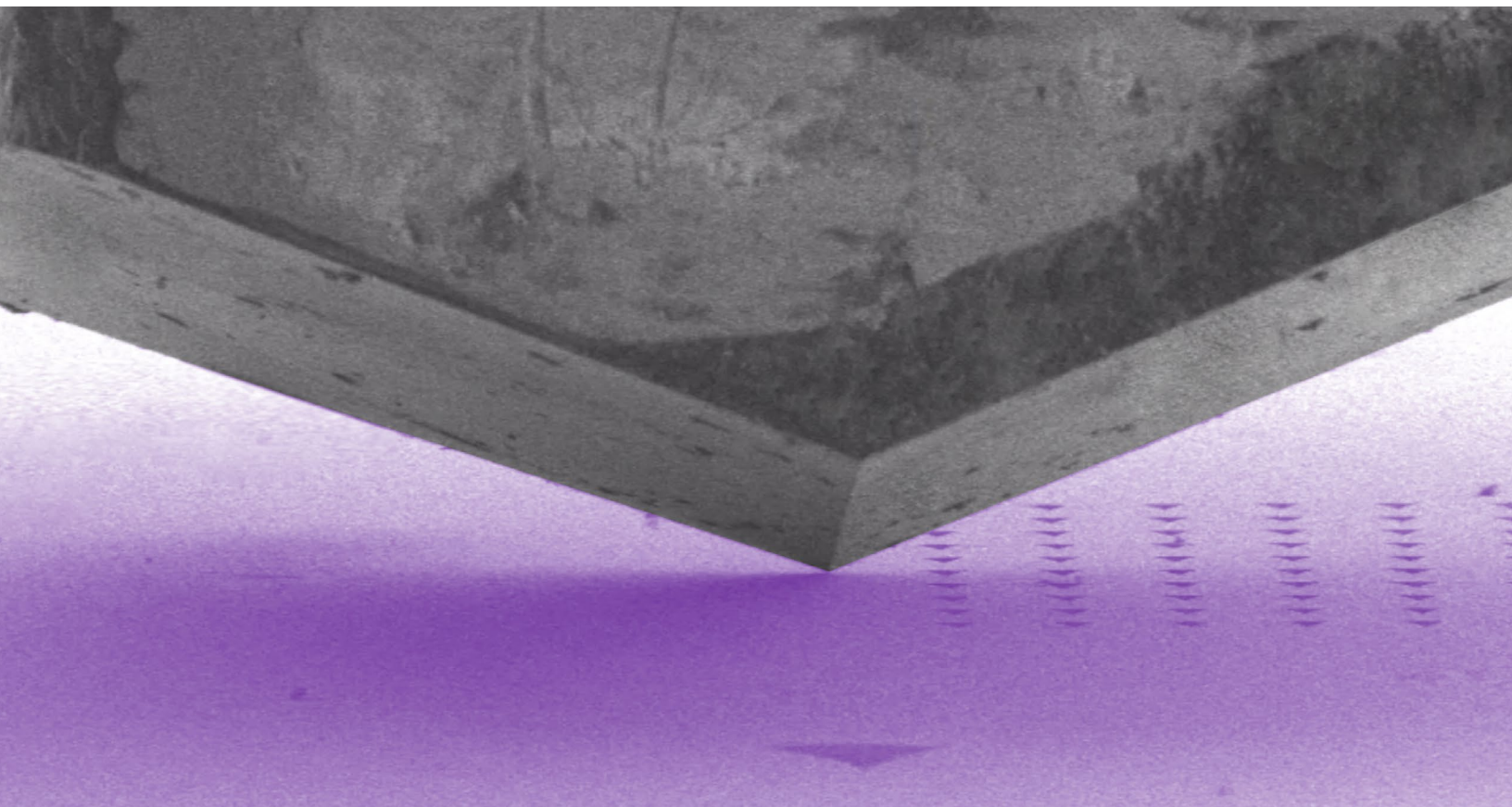


iNano®

Nanomechanical Tester



Features

- Full range of automated indentation testing, complete with statistical data analysis package
- Large suite of pre-programmed nanomechanical test methods for improved ease-of-use
- Proprietary online nanoindentation courses taught by nanoindenter experts, and mobile apps for live updates to test methods
- InForce 50 actuator with interchangeable tips for measurement of capacitance displacement and electromagnetic force actuation up to 50mN, ideal for thin films or soft materials
- Fast, accurate tip calibration for high measurement accuracy
- Integrated high-speed controller electronics for fast data acquisition
- Integrated microscope with digital zoom positions nanoindentation sites with high throughput

iNano®



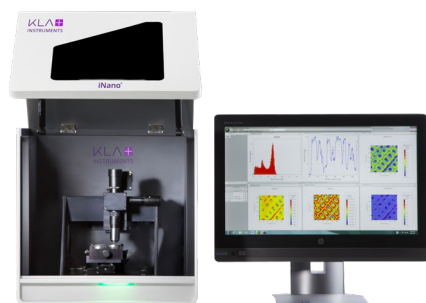
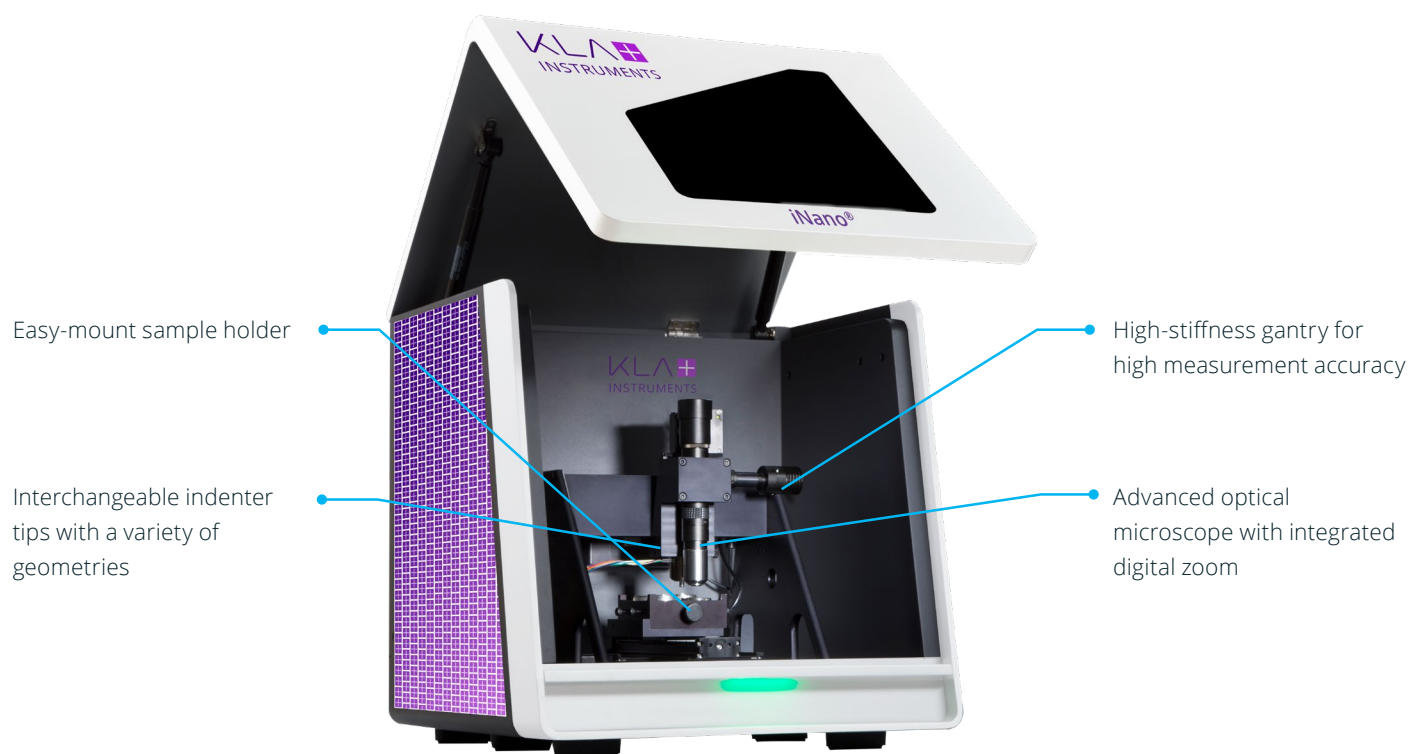
Flexible, easy-to-use mechanical testing for a wide range of applications and materials

The iNano® is a compact, user-friendly nanomechanical measurement system designed for hard coatings, thin films, and small volumes of materials. The system is built for accurate and repeatable nanoscale mechanical tests including indentation, hardness, scratch and universal nanoscale testing. With a large dynamic range of force and displacement, the iNano can exert up to 50mN of force to test thin films and soft materials. Modular options accommodate a variety of applications including material property maps and high-temperature testing.

Apart from its capability to advance research in universities, labs and institutes, the iNano can perform nanoindentation measurements for the following materials and industries:

- Manufacturing quality control
- Semiconductor wafers and packaging
- Polymer and plastics
- MEMS / nanoscale devices
- Ceramics and glass
- Metals and alloys
- Pharmaceuticals
- Coatings and paints
- Batteries and energy storage

Features and Options Overview



KLA Core Technology

The iNano system is powered by electromagnetic transducers featuring capacitive sensors to deliver precise measurements on a wide range of materials. The system is designed to provide high throughput and easy data analysis. The iNano comes with a wide variety of standard test protocols and can be easily programmed by the user for novel measurements. The iNano design produces calibrations that are stable for years, so that measurement data from multiple instruments across multiple sites remain consistent. The system has a small footprint to conserve lab space and conforms to ISO 14577 to ensure data integrity.

The iNano proprietary InView software suite includes RunTest with on-screen controls for simplified test setup, ReviewData for data analysis during or after testing, and InFocus for generating graphs and reports for presentations and documentation.

Continuous Stiffness Measurement (CSM)

- Measures stiffness and other material properties during the indentation cycle

The CSM option involves oscillating the probe during indentation to measure properties as a function of depth, force, time, or frequency. The option comes with a constant strain rate experiment that measures hardness and modulus as a function of depth or load, which is the most common test method used across academia and industry.

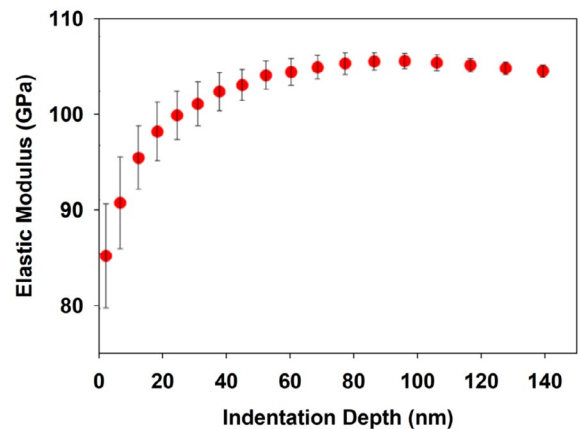
NanoBlitz 3D Rapid Mechanical Property Mapping

- Quickly and quantitatively maps surface mechanical properties
- Gives statistically significant results due to increased number of observations
- Measures rough surfaces and/or heterogeneous materials

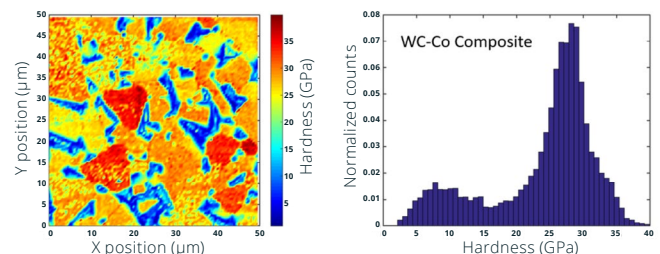
The NanoBlitz 3D option measures elastic modulus and hardness as a function of x-y position, generating thousands of data points in a short period of time. The quantitative data is combined with powerful visualization techniques to assess differences in microstructure and gradients in mechanical properties.

Internationally Standardized Nanoindentation Testing

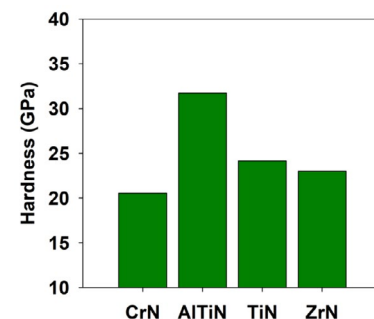
The iNano is compliant with internationally recognized mechanical testing ISO 14577 standards for nanoindentation.



Measurement of elastic modulus as a function of indentation depth using the CSM option



Hardness mapping and statistical histogram of hardness on WC-CO composite materials using the NanoBlitz 3D option

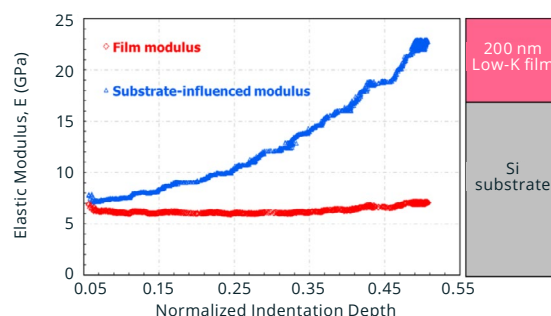


Hardness values of a series of standard samples, tested in compliance with ISO 14577 standards

AccuFilm™ Thin Film Method

- Allows for characterization of ultra-thin films by correcting for substrate influence on the measurement

The AccuFilm Thin Film Method option is a test method package with a specialized indenter tip for measuring substrate-independent material properties with the CSM module. AccuFilm uses the Hay-Crawford model to correct for substrate influence, for measuring hard films on soft substrates or soft films on hard substrates.

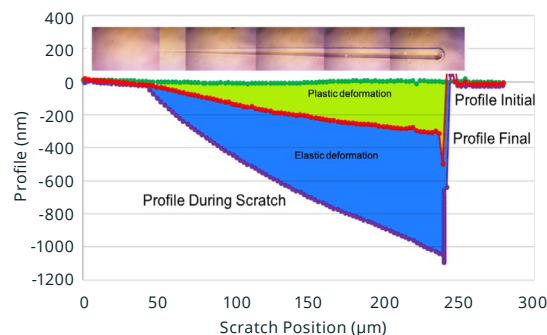


Substrate-influenced modulus and film-only modulus as a function of normalized indentation depth using AccuFilm thin film method

Scratch and Wear Test Method

- Applies a constant or ramped load to an indenter tip as it moves across the sample surface

Coatings and films are subjected to many processes that challenge the strength of the films and their adhesion to the substrate, such as chemical-mechanical polishing (CMP) and wire bonding. Scratch testing allows characterization of numerous materials such as thin films, brittle ceramics and polymers.

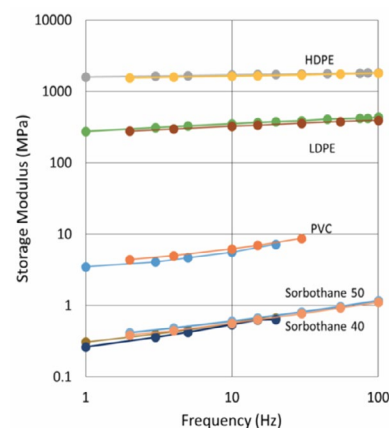


Quantitative analysis of scratch testing for film strength and substrate adhesion

ProbeDMA™ Local Dynamic Mechanical Analysis

- Enables dynamic mechanical analyses (DMA) on soft polymers and other materials with sample geometries and/or material volumes that are not suitable for standard DMA tests

The ProbeDMA option turns the nanoindenter into a localized Dynamic Mechanical Analysis instrument by enabling measurement of storage modulus, loss modulus, and loss factor as a function of frequency. ProbeDMA utilizes the CSM module and the precision of the iNano actuator to provide quantitative results that match traditional DMA testing. It is fully compatible with the 300°C sample heating option, described below.



Storage modulus of a series of standard polymer samples, tested using flat punch tip

300°C Sample Heating

The 300°C sample heating option allows the sample to be placed inside a chamber for uniform heating while simultaneously undergoing tests.



The iNano sample heating option is used to characterize mechanical properties at elevated temperatures

Additional iNano® Options

Remote Video Viewing	The Remote Video option includes a mounted webcam for convenient viewing of the sample before and during testing. Two viewing angles, the Sample Setup View and the In-Situ Test View, are available for observing the sample and the nanoindenter separately.
Biomaterials Method Pack	The Biomaterials Method Pack provides the ability to measure the complex modulus of biomaterials with shear moduli on the order of 1kPa. Utilizing the CSM module, the pack includes a flat-punch tip and a test method for evaluation of viscoelastic properties.
DataBurst Mode	DataBurst mode enables systems to record displacement data at rates > 1kHz for measuring high strain step loads, pop-in and other high-speed events.
InView Experiment Scripting	InView offers a powerful and intuitive experiment-scripting platform for designing that can be used for designing novel or complex experiments.
True Test I-V Measurements	The True Test I-V option allows the user to apply specific voltages to a sample and measure the current at the tip, to characterize local changes in electrical properties during nanomechanical measurements.
Active Vibration Isolation with Modular Rack	Adding active vibration isolation to the built-in passive vibration isolation of the iNano provides superior stability and precision for difficult nanomechanical measurements on ultra-thin films. The active vibration isolation system reduces vibration in all six degrees of freedom, with no tuning required.
NanoBlitz 4D Mechanical Property Tomography	To assess elastic modulus and hardness as a function of lateral position and depth, the NanoBlitz 4D option rapidly creates a user-defined array of constant strain rate indents using the CSM module. Because each indent is performed in about seven seconds, the system can generate a statistically significant amount of data, to accurately characterize complex microstructures and components.
Indenter tips and calibration samples	Interchangeable tips for all InForce actuators include Berkovich, cube corner, Vickers, and flat and sphere punches.

The Nanoindenter Family of Products

KLA offers a full range of ambient and in situ nanoindenter solutions, including the Nano Indenter® G200X, iMicro, NanoFlip, and InSEM® HT.



A Better Level of Understanding

The total customer experience delivered by the iNano is more than a list of specifications. For easy-to-use software and reliable hardware to industry-leading customer service and uptime, the iNano offers a powerful, straightforward, worry-free solution.

Applications Support

KLA application scientists are available to assist with test design and planning. With experience in both materials science and mechanics, our scientists have developed best practice testing techniques and have contributed to many of the key papers in the industry.

Customer Service

KLA nanoindenters are known for problem-free operation. If you do have a question or need help, our customer service personnel can log in to your equipment to resolve your issue within 24 hours. Most repairs do not require an onsite service visit. The tool is backed by local service and support around the world, for onsite service or installation.



KLA SUPPORT

Maintaining system productivity is an integral part of KLA's yield optimization solution. Efforts in this area include system maintenance, global supply chain management, cost reduction and obsolescence mitigation, system relocation, performance and productivity enhancements, and certified tool resale.

© 2020 KLA Corporation. All brands or product names may be trademarks of their respective companies.

KLA reserves the right to change the hardware and/or software specifications without notice.

KLA Corporation
One Technology Drive
Milpitas, CA 95035
www.kla.com
Printed in the USA
Rev 1_2020-5-13