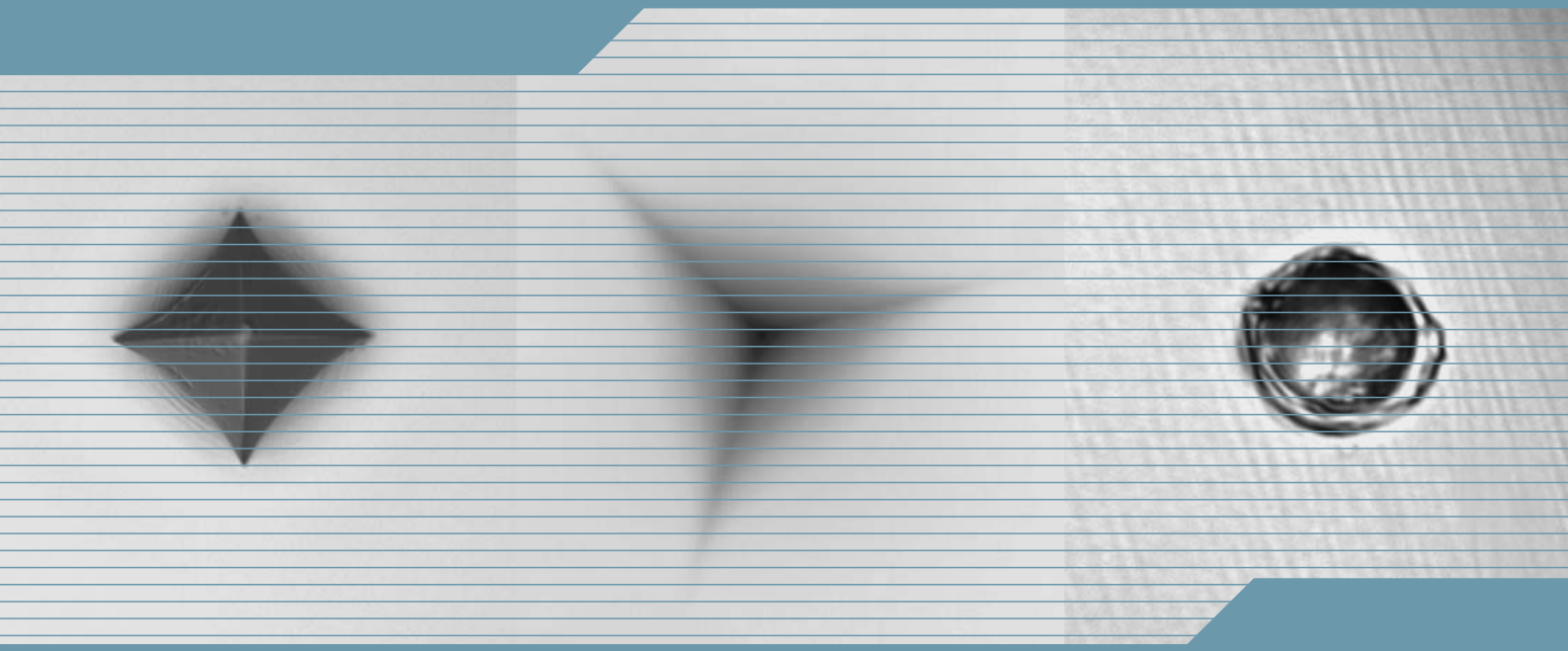


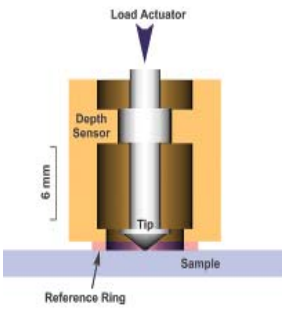
CSM INDENTATION TESTERS

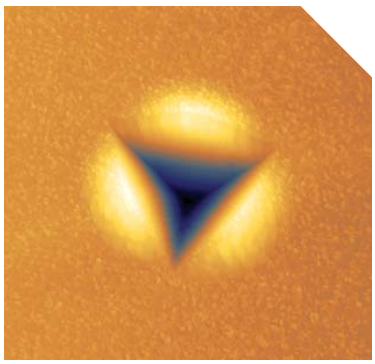
Ultra Nano, Nano and Micro

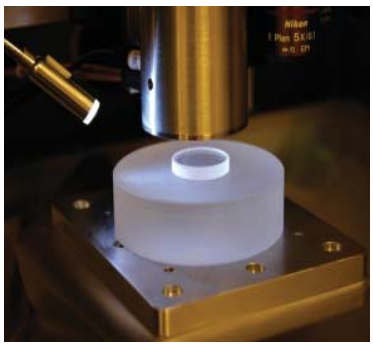
//// Hardness & Elastic Modulus
//// Nanoindentation down to a few nm
//// Temperature, Humidity and Vacuum options
//// Compliant to ISO & ASTM standards

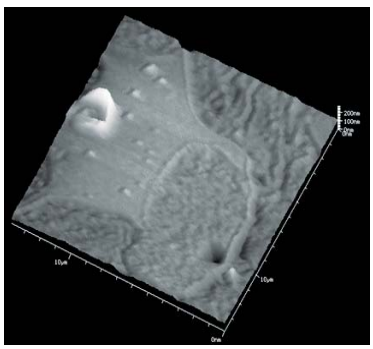
csm Instruments

CSM Indentation Testers

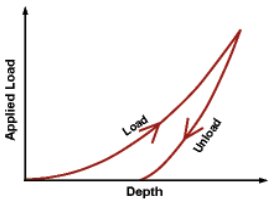








Introduction to the Indentation Testers



The CSM Indentation Testers are high precision instruments used for the determination of mechanical properties of thin films, coatings and substrates. Properties such as hardness and elastic modulus can be determined on almost any type of material: soft, hard, brittle or ductile.

The operating principle of the instrument is as follows: An indenter tip, normal to the sample surface, is driven into the sample by applying an increasing load up to some preset value. The load is then gradually decreased until partial or complete relaxation of the material occurs.

Features of the Indentation Testers

> Unique surface referencing technique
> Hardness & Young's modulus determination down to a few nm
> Automated multi-sample handling
> Berkovich, Vickers, Spherical, Cube corner, Knoop, ... indenter tip geometries
> Sinus Mode Analysis (DMA) for viscoelastic properties
> Handling of large samples (up to 300 mm size)
> Creep, fatigue and fracture toughness tests
> Mapping option for up to 1000 indents
> Very high throughput and reproducibility
> Automated optical microscopic inspection
> Combination with an optional AFM
> Precision engineered in Switzerland by CSM.

Unique surface referencing

The CSM Indentation Testers are the only commercially available instruments which use a surface referencing technique.

By performing a differential measurement between the sample surface and the indentation depth, the following unique advantages are obtained:

> High accuracy of depth measurement
> Rapid measurement cycle time
> Negligible thermal drift
> Protection of the measurement area against air currents and acoustic disturbances
> Protection of the measurement tip from mechanical damage.

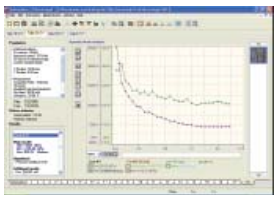
The surface referencing design also eliminates common sources of measurement errors to give:

> Negligible system frame compliance
> High sample mounting stability

Sinus mode analysis (DMA)

The Dynamic Mechanical Analysis (DMA) uses sine wave loading curves to obtain a more complete analysis of the mechanical properties of viscoelastic materials. The method allows for a continuous acquisition of Hardness, Elastic modulus, storage and loss modulus data as a function of indentation depth.

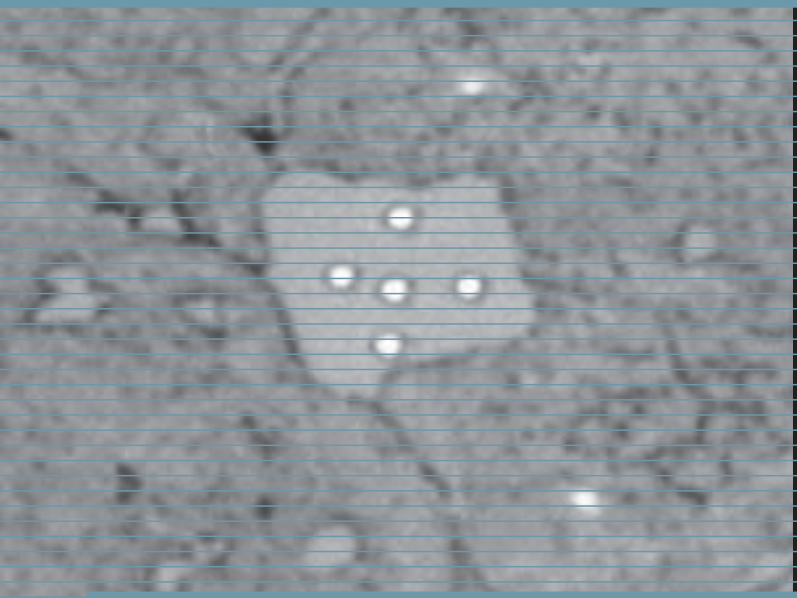
CMC™ (Continuous Multi Cycle)

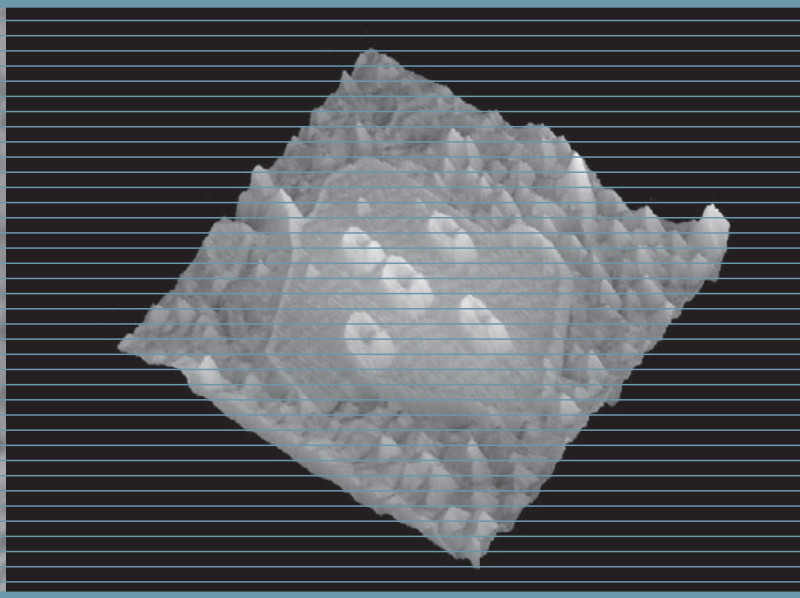


CSM Instruments has developed the CMC™ (Continuous Multi Cycle) method which allows the Indentation Hardness, Elastic modulus and Stiffness to be obtained as a function of depth.

NEW High resolution Ultra Nanoindenter

The CSM Ultra Nano Hardness Tester was developed for users requiring the highest resolution in depth and load. With an active top referencing system and three capacitive sensors for direct measurements of depth and load, the UNHT is the most sophisticated Nanoindenter on the market.

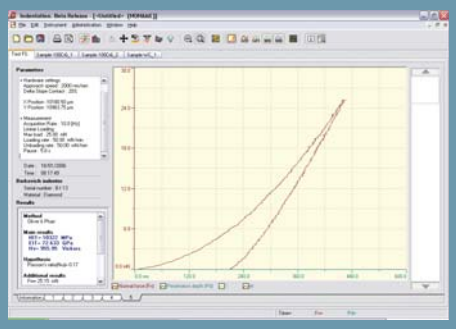


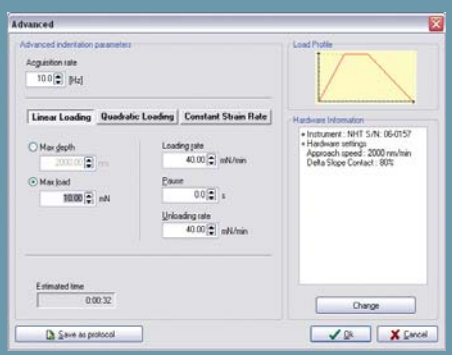


Complete software package

The CSM Indentation Software (Microsoft Windows 2000/XP) includes a complete set of features for setting up the indentation test and handling the data.

> Real time display of force against depth, with automatic calculation of hardness and elastic modulus
> Powerful indentation modes including Sinus (DMA), CMC™, large area mapping, ...
> Programmable system settings for every single indent in a multi indent experiment
> Fully customized user access rights management
> Superpositioning of data curves
> Multi language support
> Two external user channels available
> Automatic measurement report generator
> Powerful measurement statistics module
> Data export in ASCII format
> Easy video capture and measurement





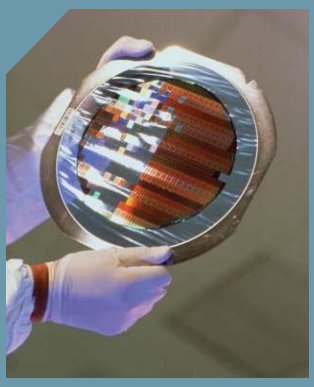
Options

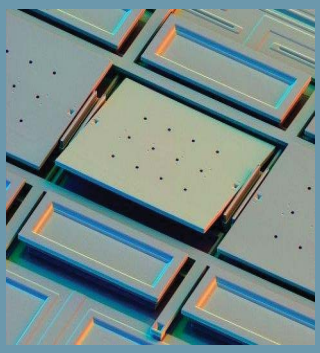
> Impact testing and Sinus (DMA)
> Vacuum, humidity and temperature controlled
> AFM & Conscan 3D imaging
> Environmental enclosure

General Applications

- Semiconductor Technology
  - > Passivation Layers
  - > Metallization
- Data Storage
  - > Protective coatings on magnetic disks
  - > Magnetic coatings on disk substrates
  - > Protective coatings on CD's
- Optical Components
  - > Eye glass lenses
  - > Optical scratch-resistant coatings
  - > Contact lenses
- Decorative coatings
  - > Evaporated metal coatings
- Wear Resistant Coatings
  - > TiN, TiC, DLC
  - > Cutting Tools
- Pharmacological
  - > Tablets and pills
  - > Implants
  - > Biological tissue
- Automotive
  - > Paints and polymers
  - > Varnishes and finishes
  - > Windows
  - > Brake pads
- General Engineering
  - > Rubber resistance
  - > Touch screens
  - > Lubricants and oil additives
  - > Sliding bearing
  - > Self-lubricating Systems

Do not hesitate to contact us if you need more information or a free demo!





CSM Indentation Tester Specifications

	Ultra Nano	Nano	Micro
Load Range	**0.025 - 100 mN**	**0.1 - 500 mN**	**0.03 - 30 N**
Load Resolution	0.001 µN	0.04 µN	0.3 mN
Maximum Depth	100 µm	200 µm	200 µm
Depth Resolution	0.001 nm	0.04 nm	0.3 nm
Sinus Mode Analysis (DMA)	200 Hz	20 Hz (optional)	-
Load rate	up to 10 N/min	up to 10 N/min	up to 300 N/min
XY Stage	120 x 20 mm 245 x 120 mm (for OPX$^+$)	120 x 20 mm 245 x 120 mm (for OPX$^+$)	120 x 20 mm 245 x 120 mm (for OPX$^+$)
XY Resolution	0.25 µm 0.10 µm (optional)	0.25 µm 0.10 µm (optional)	0.25 µm 0.10 µm (optional)
Video Microscope Magnification	200x, 4000x	200x, 4000x	200x, 2000x
Video Microscope Camera	Color 768 x 582*	Color 768 x 582*	Color 768 x 582*

Specifications may be subject to change, please contact us for updates

[*] High resolution is available as an option
[$^+$] Open Platform

CSM Instruments Inc
//// Advanced Mechanical Surface Testing

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