

CSM SCRATCH TESTERS

Nano, Micro and Macro range

- //// Adhesion and Scratch Resistance
- //// Conventional Hardness
- //// Compliant to ISO & ASTM standards

CSM Scratch Testers

Introduction to the Scratch Testers

The CSM Scratch Testers are ideal instruments for characterizing the surface mechanical properties of thin films and coatings, e.g. adhesion, fracture and deformation. They can be used for all kinds of industrial coatings from the plasma processed layers used in semiconductor and optical technology to the decorative and protective coatings used for consumer goods and automobile parts. The scratch tester's ability to characterize the film - substrate system and to quantify parameters such as friction force and adhesive strength, using a variety of complementary methods, makes it an invaluable tool for research, development and quality control.

The technique involves generating a controlled scratch with a diamond tip on the sample under test. The tip either of diamond or sharp metal, is drawn across the coated surface under constant, incremental or progressive load. At a certain critical load the coating will start to fail. The critical loads are very precisely detected by means of an acoustic sensor (MST & RST) attached to the load arm together with observations from a built-in optical microscope. The critical load data are used to quantify the adhesive properties of different film - substrate combinations. In addition to acoustic emission, the Scratch Testers measure the applied normal force, the tangential (friction) force and the penetration depth. These parameters, together with the acoustic emission, constitute a unique signature of the coating system under test.

Features of the Scratch Testers

- > Proven method to quantify adhesion of coatings
- > Acoustic Emission, Frictional Force, Penetration Depth and optical observation
- > Unique force feedback actuator
- > Wide range of different indenters (Spherical, Rockwell, Vickers, ...)
- > Very high throughput and reproducibility
- > Handling of large samples (up to 300 mm)
- > Works for both hard and soft materials
- > Wear testing in multipass mode
- > Automated optical microscope inspection
- > Automated multi sample handling
- > Precision engineered in Switzerland by CSM
- > Industrial platform for quality control
- > ISO and ASTM standardized

Active Force Feedback Loop Control

CSM Instruments Scratch Testers are the only commercially available system having a force sensor with active force feedback. Force feedback is now available on many instruments but the unique design of the CSM control unit allows an active force feedback which is controlled electronically and not corrected by the software. The unique design of the Nano Scratch measurement head includes force and depth sensors associated with a state-of-the-art piezoelectric sensor. These unique features provide fast response time (down to 5 milliseconds), greater accuracy and greater flexibility for all types of scratch measurement.

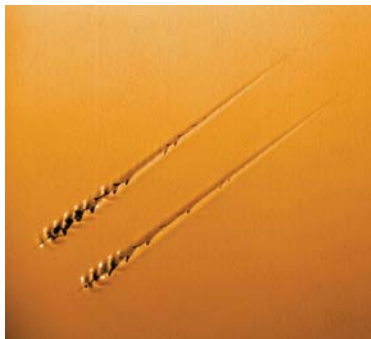
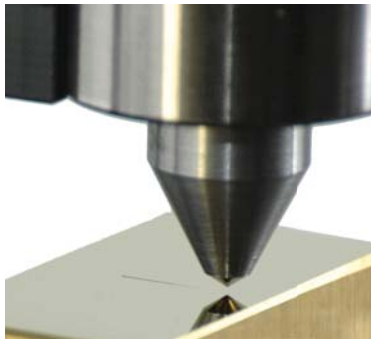
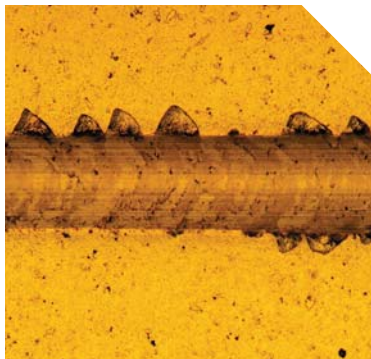
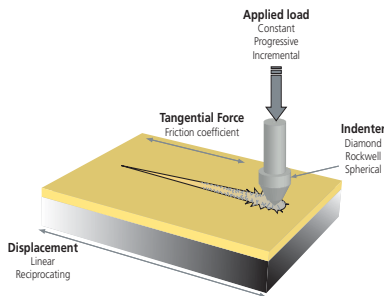
Accurate determination of early fracture events

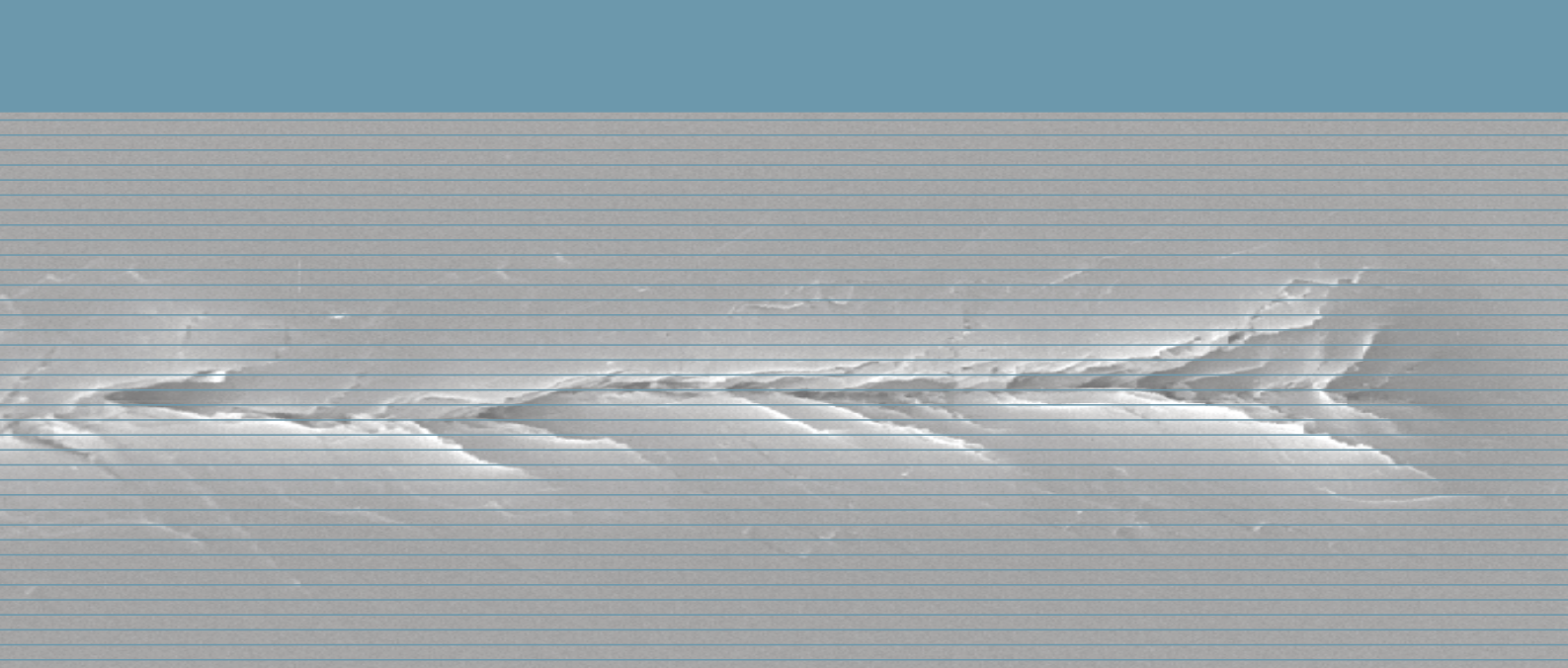
Studies of fracture in materials require accurate control of the applied normal scratch force. The fracture event can cause a sudden drop of the scratch indenter into the sample. On other existing scratch systems, this event causes a drop in the normal force which is not detected nor compensated immediately. This instantaneous drop in force stops fracture propagation and prevents the detection of the fracture event on a great number of materials. The CSM system is capable of detecting this force drop immediately (within 5 ms) and increasing the force to its original level. The CSM Scratch Tester is therefore the only system capable of accurately detecting early fracture events.

Video Microscope & dual screen PC

Scratch Testers are delivered with an integrated video microscope. Standard available objectives are x5, x20, x50 or x100 leading to a total magnification ranging from x200 to x4000.

Two video cameras are available: the standard model with a resolution of 768 x 582 or the optional high resolution 1280 x 1024 model using a progressive scan sensor with a very high sensitivity. In addition a LCD dual screen PC is delivered enabling a simultaneous and synchronised view of the scratch data and images.

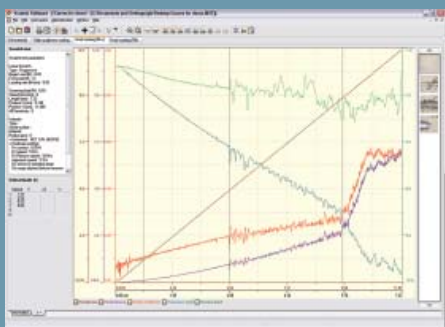




Complete software package

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

- > Real time display of normal force, friction force, friction coefficient, depth, acoustic emission
- > Powerful scratch modes including constant, progressive and incremental loads; matrix and visual scratch for automatic measurements and multicycles for wear studies
- > Easy video capture and measurements
- > System settings programmable for every single scratch in a multi-scratch experiment
- > Fully customized user access rights management
- > Logging of all operations executed on the instrument
- > Superpositioning of data curves
- > Powerful measurement report generator
- > Data export in ASCII format

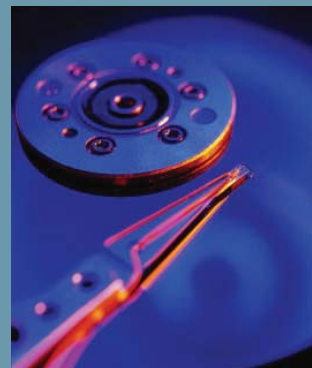


Options

- > Nano/Micro Hardness measurement modules
- > Open Platform for automatic handling of samples
- > Vacuum, humidity and temperature controlled
- > AFM and Conscan 3D imaging

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 Scratch Tester Specifications

	Nano	Micro	Macro (Revetest)
Normal Force Range	10 μN to 1 N	30 mN to 30 N	0.5 to 200 N
Load Resolution	0.15 μ N	0.3 mN	3 mN
Maximum Friction Force	1 N	30 N	200 N
Friction Resolution	0.3 mN	0.3 mN	3 mN
Maximum Scratch Length	120 mm	120 mm	70 mm
Scratch Speed	0.4 to 600 mm/min	0.4 to 600 mm/min	0.4 to 600 mm/min
Maximum Depth	2 mm	1 mm	1 mm
Depth Resolution	0.6 nm	0.3 nm	1.5 nm
XY Stage	120 x 20 mm 245 x 120 mm (for OPX*)	120 x 20 mm 245 x 120 mm (for OPX*)	70 mm x 20 mm
XY Resolution	0.25 μ m 0.1 μ m (optional)	0.25 μ m 0.1 μ m (optional)	0.25 μ m 0.1 μ m (optional)
Video Microscope Magnification	200x, 800x, 4000x	200x, 800x	200x, 800x
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

[*] Open Platform (OPX)

[+] High resolution is available as an option

CSM Instruments SA
 /// Advanced Mechanical Surface Testing

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