TI PREMIER SERIES

HYSITRON®

TI Premier DxSol

Nanoscale Mechanical Characterization at Elevated Temperatures

The **TI Premier Series** has been developed to provide quantitative nanomechanical characterization for dedicated applications. Built upon Hysitron's industry-leading and trusted technology, the TI Premier Series offers a variety of application-specific configurations to meet your rigorous testing needs. From essential nanomechanical and nanotribological characterization tools to advanced high temperature and powerful dynamic characterization techniques, the TI Premier is a solution for your current and future research requirements.

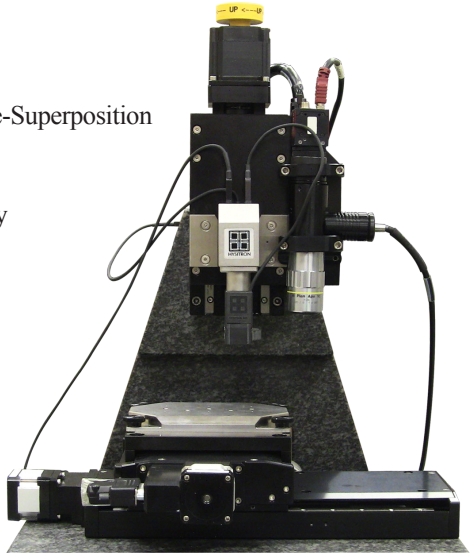
The variety of testing methods enabled by the TI Premier Series utilizing Hysitron's exclusive technology sets the standard for reliability in small scale mechanical characterization. All TI Premier Systems offer *in situ* SPM imaging and industry-leading, high-resolution capacitive transducer technology. Combined with high-precision staging, anti-vibration system, environmental enclosure, top-down color optics, flexible control software, and automated testing routines, the TI Premier Series streamlines the process to reliable nanomechanical and nanotribological results.

Highlights

- Quantitative characterization of nanoscale mechanical properties at temperatures in excess of 400 °C
- Ability to investigate nanomechanical properties under real processing and service conditions, eliminating the need for modeling approximations
- Drift-free measurements over the entire temperature range maximizes test accuracy and enables long duration creep studies
- Hysitron's nanoscale dynamic mechanical analysis (nanoDMA® III) with *CMX* routines and Reference Frequency algorithms provide depth profiling of mechanical properties and measurement of viscoelastic properties over a broad range of temperatures
- Powerful investigation of temperature-dependent fundamental properties of materials, including transition temperatures and activation energies
- *In situ* SPM imaging at elevated temperatures for surface topography imaging and nanometer accuracy test positioning
- Easily upgradable with Hysitron's suite of testing techniques

Applications

- Polymers
- Metals
- Alloys
- Time-Temperature-Superposition
- Creep
- Activation Energy



9625 WEST 76TH ST. MINNEAPOLIS, MN 55344 TEL: 1-952-835-6366 FAX: 1-952-835-6166 WWW.HYSITRON.COM

TI Premier DxSol

The **TI Premier DxSol** is a depth sensing indentation system optimized for nanomechanical characterization at elevated temperatures. The DxSol provides the ability to study the mechanical properties of materials as a function of temperature, frequency, and time. When material performance and reliability is important in extreme operational environments, the TI Premier DxSol is a critical tool for your material's research and development.

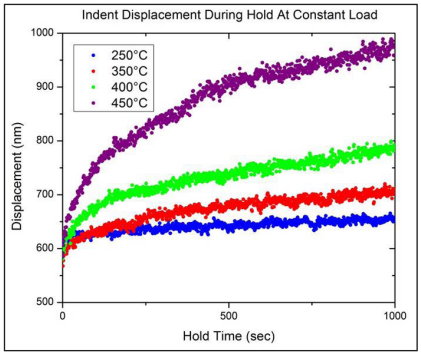
Hysitron's **xSol™ High Temperature System** was specifically designed for high resolution nanomechanical property measurements over a broad temperature range. The stage incorporates a multi-heating element micro-chamber for a uniform temperature to the outermost surface of the material. Passive indenter probe heating eliminates thermal gradients and ensures a uniform tip/sample temperature. An innovative thermal management design minimizes heat transfer to the instrument components for low thermal drift. The advanced design of the DxSol allows quantitative, accurate, and reliable nanomechanical measurements to be performed at 400 °C and beyond.

The TI Premier DxSol comes standard with Hysitron's exclusive *in situ* SPM imaging, providing the ability to obtain topographical information of the sample surface at elevated temperatures. SPM imaging delivers nanometer precision test placement accuracy and the ability to investigate surface topography changes as a function of temperature.

Hysitron's **nanoDMA® III** comes standard on every TI Premier DxSol system. nanoDMA III extends the capabilities of traditional nanomechanical testing by providing the ability to characterize time-dependent material properties and also perform long duration tests that are immune to drift at elevated temperatures. nanoDMA III's Reference Frequency algorithms on the DxSol provides the capability to perform nanoscale creep and time-temperature-superposition studies. The DxSol is an invaluable tool for investigating the relationships between mechanical properties, time, and temperature.

Creep Test on Polycrystalline Gold (250 °C - 450 °C)

Drift Free Creep Data at Elevated Temperatures



Specifications

Nanoindentation
- Normal Load Range: 70 nN to 10 mN (30 mN)
- Normal Displacement Range: 2 A to 5 µm

Dynamic Mechanical Analysis (nanoDMA® III)
- Frequency Range: 0.1 to 300 Hz
- Force Modulation
- Continuous Measurement of Mechanical Properties (*CMX*)
- Reference Frequency Technique
- Dynamic measurements based on lock-in technology allowing for truly Dynamic Mechanical Analysis at the nanoscale

Heating
- Temperatures reaching 400 °C and beyond

Integrated *In Situ* SPM Imaging
- Performed with the same probe as mechanical characterization
- Imaging capability over full temperature range
- Nanometer test positioning

Controller
- Digital

Optics
- Magnification: 10X
- Top-Down Optics

Upgrade Options

- **Modulus Mapping™** - Quantitative map of the storage/loss stiffness and moduli using the SPM scanning function
- **Scratch Testing** - Quantify scratch resistance, critical delamination forces, friction coefficients, and more with simultaneous normal and lateral force and displacement monitoring
- **Thermal Control**- Heating or heating/cooling stages can be added for investigation of mechanical properties at non-ambient temperatures
- **nanoECR®** - Conductive nanoindentation system capable of providing simultaneous *in situ* electrical and mechanical measurements for investigating material deformation and stress induced
- **Higher Loads** - Extend the characterization capabilities towards higher forces for indentation and scratch
- **Active Vibration Isolation** - Piezoelectric driven active vibration dampening for faster stabilization time and optimum results

HYSITRON®