XPM™ - Accelerated Property Mapping

Quantitative Ultra-High Speed Mechanical Property Mapping

500x Faster Nanoindentation

Hysitron's XPM sets a new industry standard in terms of nanomechanical testing throughput paired with measurement resolution and accuracy. With XPM, more data can be taken in a single afternoon than could be collected in an entire year using traditional nanoindentation methodologies. These exclusive performance capabilities are made possible by the coupling of three industry-leading Hysitron technologies: a high bandwidth electrostatically actuated transducer, fast control and data acquisition electronics, and top-down in-situ SPM imaging. These synchronized technologies can perform 6 measurements/second to achieve comprehensive quantitative nanomechanical property maps and property distribution statistics in a record amount of time.

Measure More in Less Time

Nanomechanical testing was specifically developed to measure highly localized mechanical properties. Arrays of individual measurements can be spatially arranged and plotted to generate maps of mechanical property gradients across a surface. Conservatively, a traditional nanoindentation measurement takes ~90 seconds and a 20x20 array would take 10 hours to complete. *Utilizing Hysitron's new XPM ultra-fast property mapping, this same data set can be compiled in a mere 1.1 minutes!*

XPM Features

- Ultra-high speed quantitative mechanical property measurements (6 per second)
- Rapid, high spatial resolution mapping of hardness and modulus with distribution statistics
- Produce large quantities of statistically significant data in a short period of time
- 500x faster than traditional nanomechanical testing
- Obtain a robust tip area function calibration within a minute
- Compatible with Hysitron's xSol® environmental control stage for rapid testing throughput under extreme environmental conditions

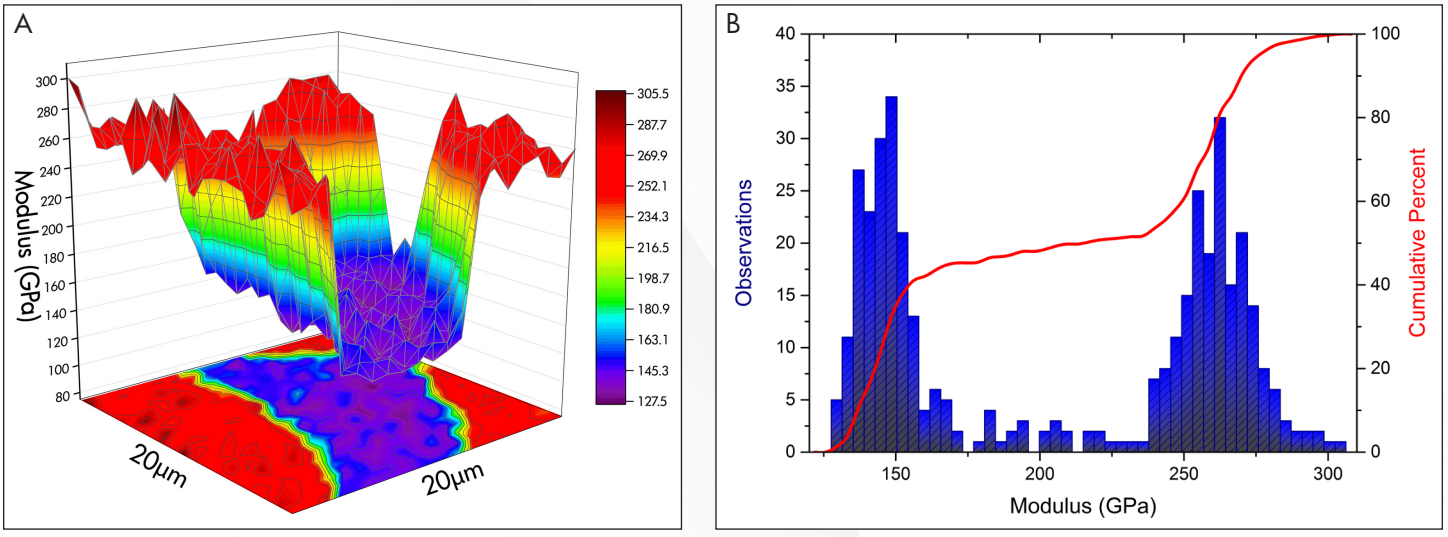

Figure 1: (A) Ceramic matrix composite modulus map - 400 measurements in 67 seconds. (B) Ceramic matrix composite modulus distribution statistics.

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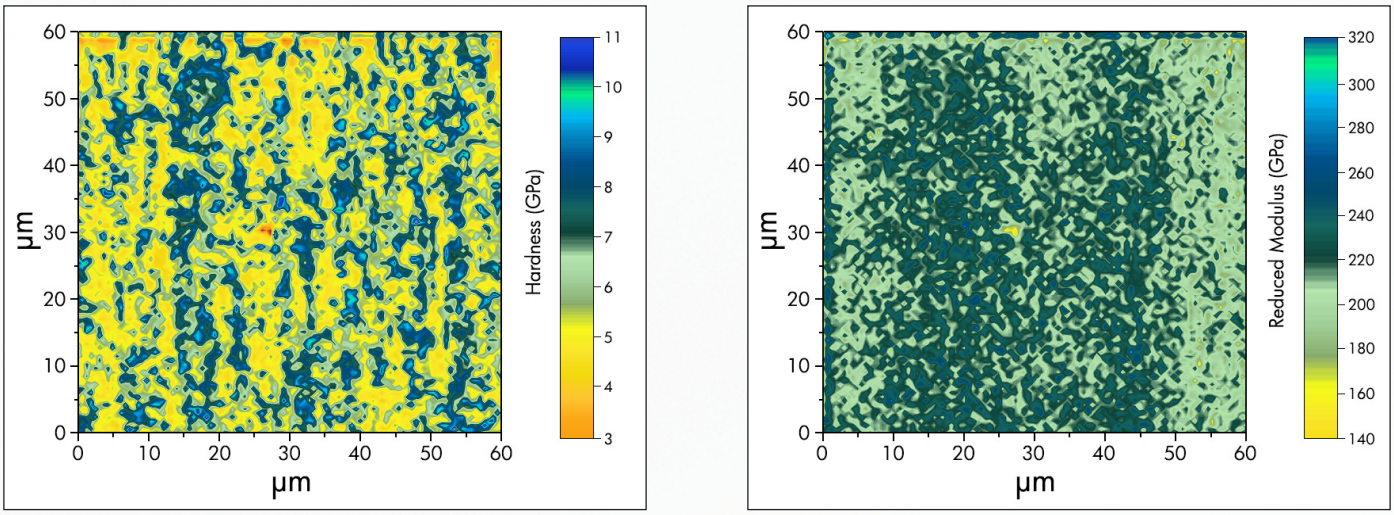

Figure 2: 10,000 point hardness (left) and modulus (right) maps on a DP 980 cold rolled steel alloy.

Easy Operation and Analysis

An intuitive XPM test function editor is built into Hysitron's TriboScan® control and data analysis software package. The operator simply defines the number of measurements to be performed, the spacing between measurements, and the indentation load function. XPM property maps can be accurately positioned on the sample using both optical and scanning probe microscopy techniques. After the XPM routine is complete, spatially resolved property maps and property distribution histograms are automatically generated.

Recalibrate Expectations

Unlike other nanomechanical test instruments, Hysitron's XPM rapidly delivers a complete picture of how localized mechanical properties are spatially distributed in inhomogeneous materials and also provides greater certainty in reporting property values on homogeneous materials. Even basic, yet time consuming, system calibrations such as the tip area function are ~500x faster! With XPM expect to spend more time understanding your materials and significantly less time gathering data.

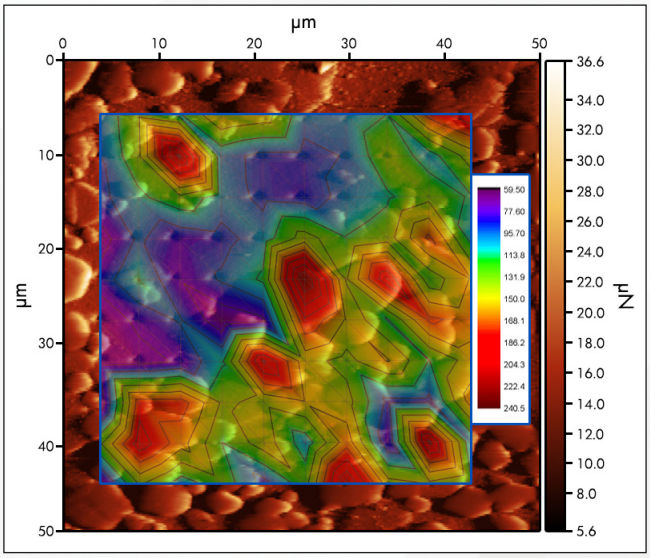

Figure 3: Cu-W alloy modulus map overlaid on an in-situ SPM image.

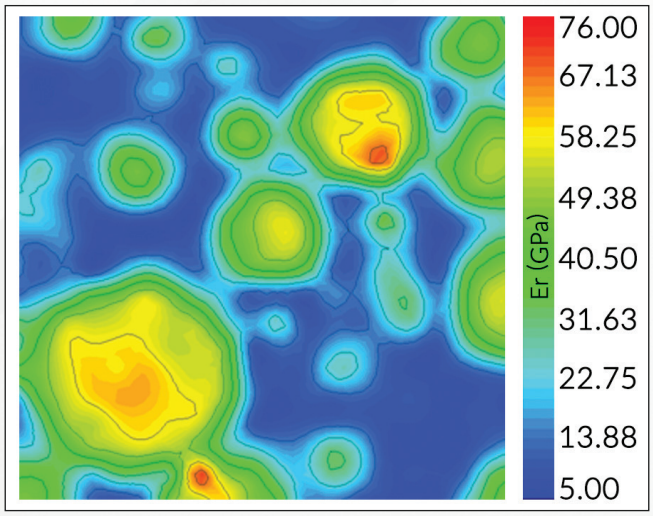

Figure 4: 100μm² modulus map of a particle filled polymer.