

Typical nanoindentation data

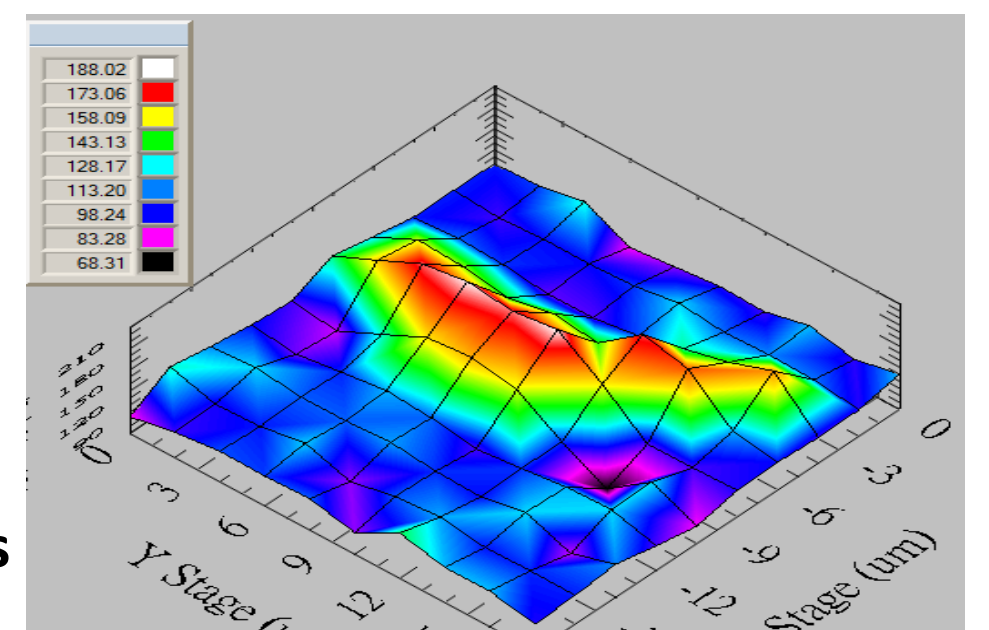
Nanoindentation

Measure

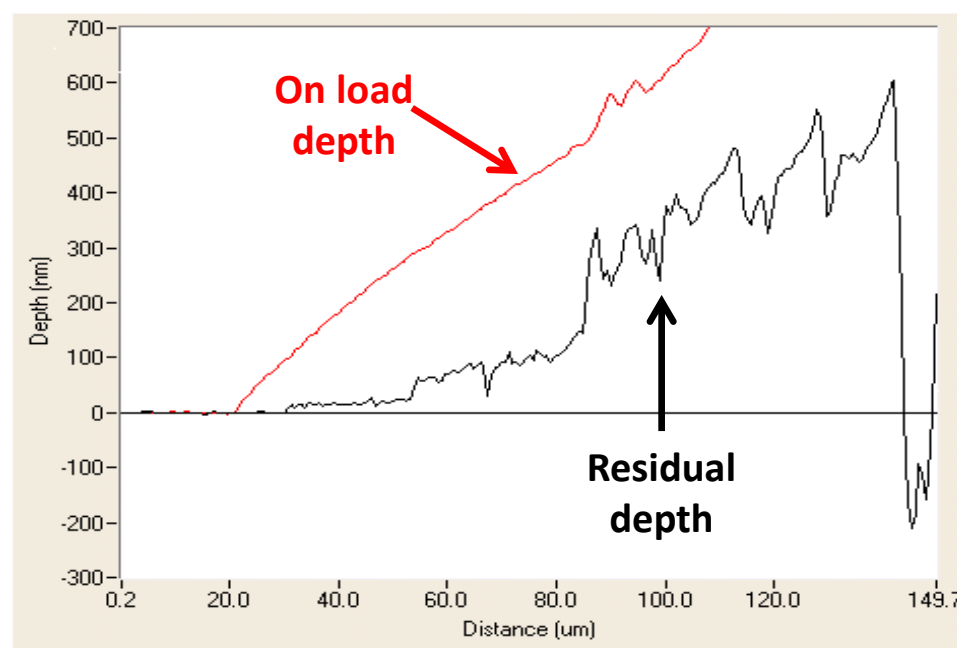
- Hardness
- Young's Modulus
- Creep
- Plastic and Elastic Energy

Advanced capability

- Mechanical property mapping
- Depth profiling
- Push out force experiments
- Compression/bending experiments



Modulus map of an inclusion in 7000 series Al alloy



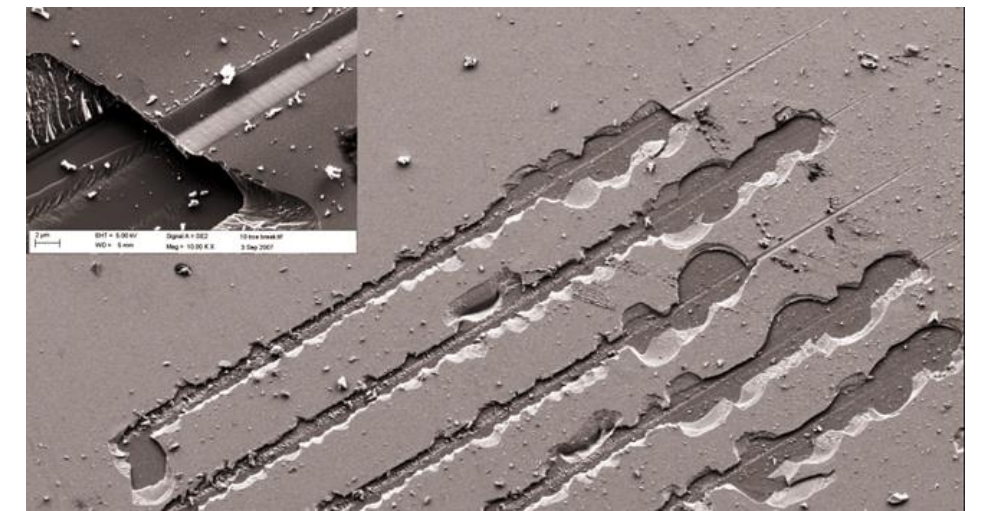
Nano-scratch and wear

Wear mechanisms

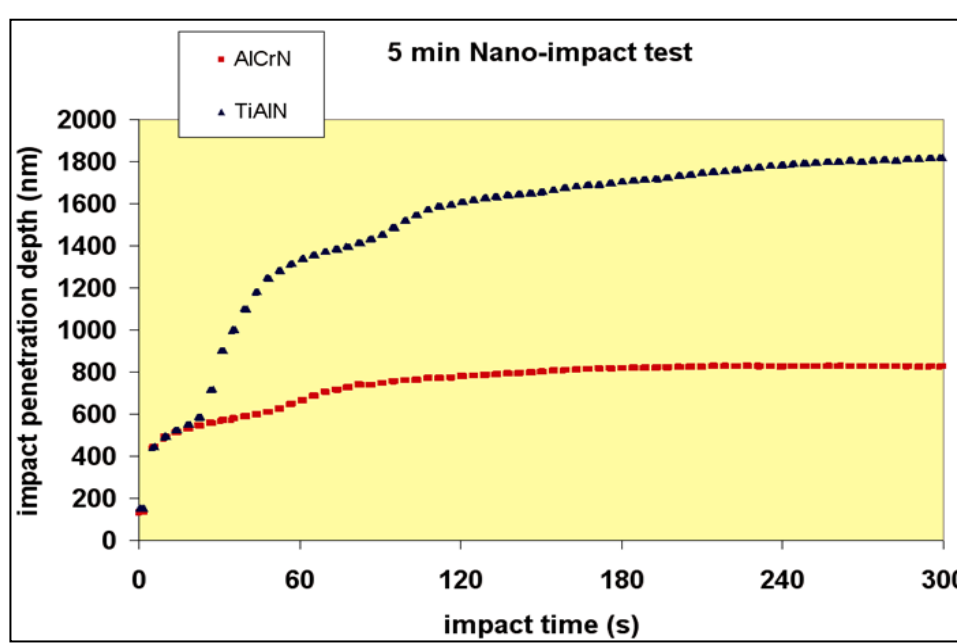
- Ramped loading
- Single or multi-pass scratching with constant or varying loads

Measure

- Adhesion quality
- Sliding Wear
- Surface Roughness
- Frictional properties of materials



TiN coating on silicon



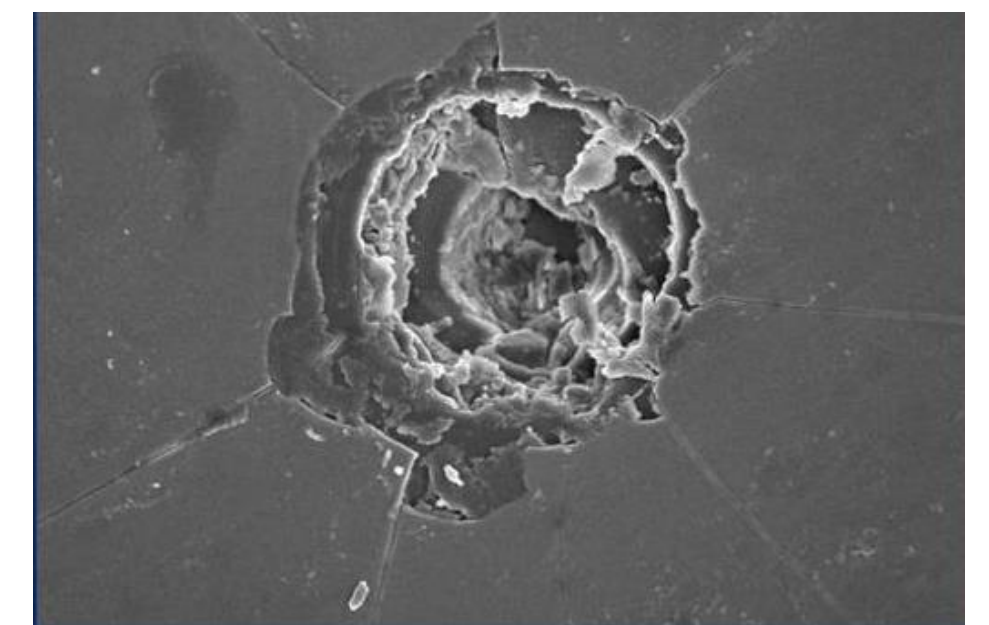
Repetitive nano-impact of Nitride coatings

Nano-impact and fatigue

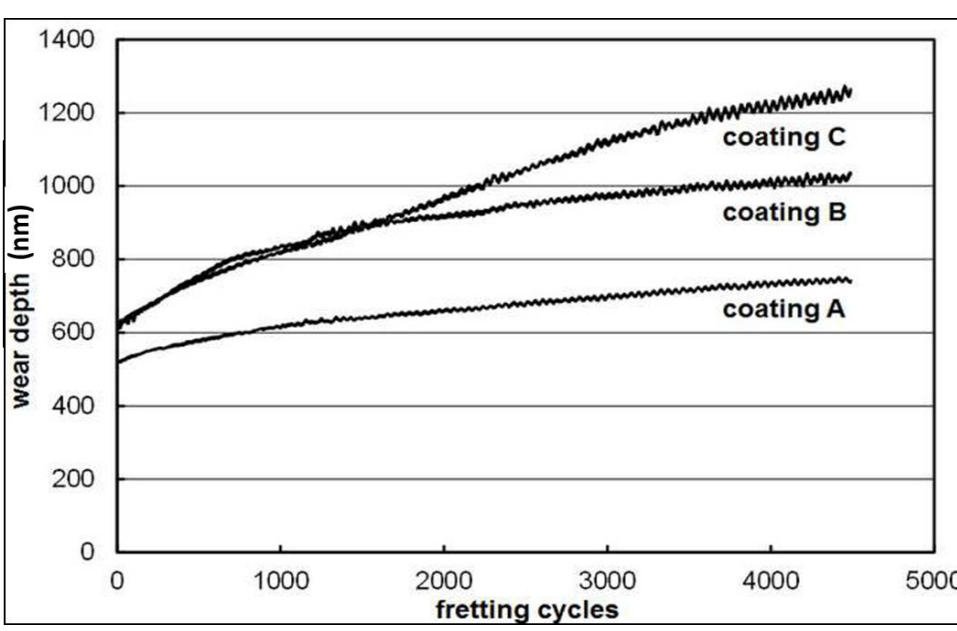
Examine strain rate sensitivity and fatigue at strain rates beyond the range of normal nanoindentation. Strain rates up to 10^3 s^{-1}

Single impacts to study energy damping behaviour

Repetitive impact experiments to examine high strain rate fatigue



Impact crater on a multilayer polymeric coating



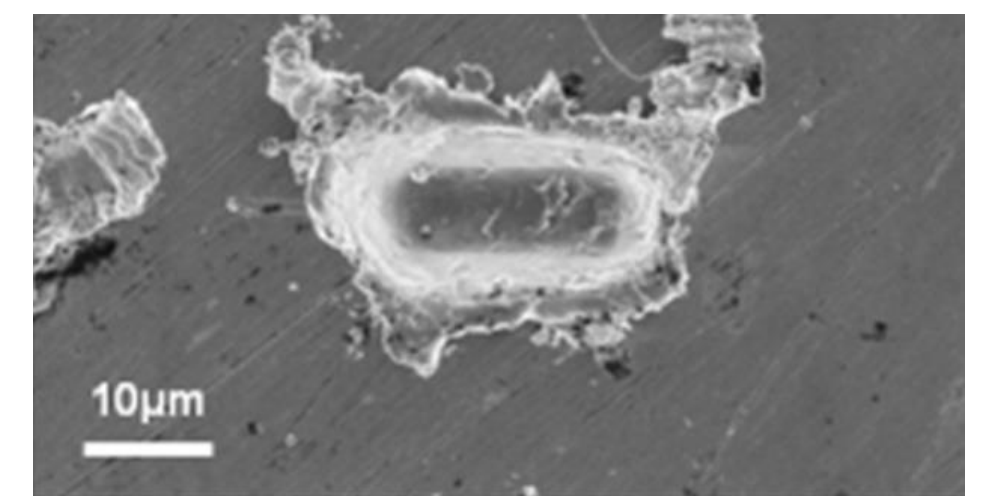
Fretting wear of DLC coatings

Nano-fretting

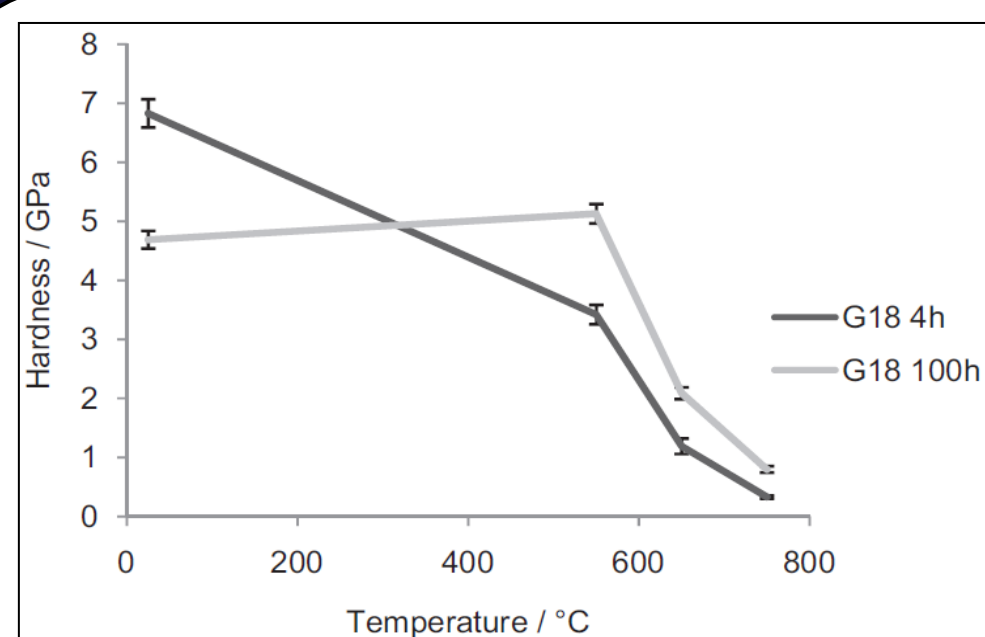
Low load, low amplitude bi-directional wear test

High cycle testing, up to one million cycles in one experiment

Ideal for studying the gradual wear and failure of surfaces in contact with constant or varying loads



Fretting scar on Ti6Al4V

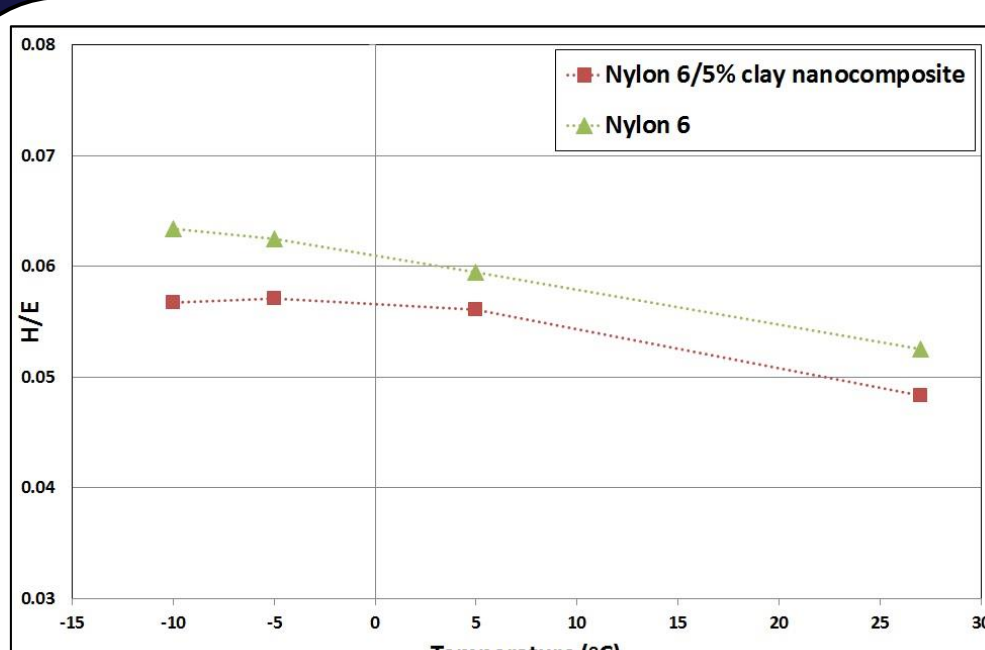
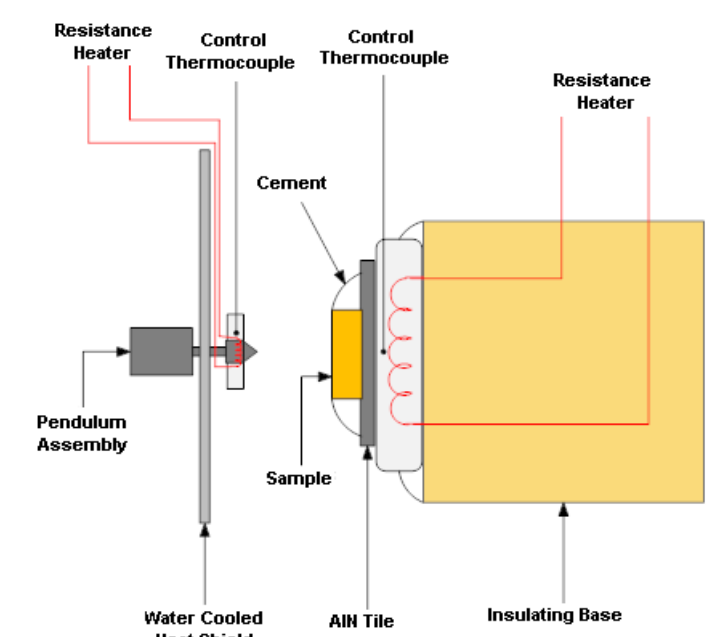


Hot hardness of glass-ceramic fuel cell seal material

High temperature testing

Material properties which are temperature dependent can be measured at elevated temperatures of up to 750°C .

A combination of tip heating, patented stage design and patented temperature control methodology ensures thermal stability for repeatable high temperature measurements.

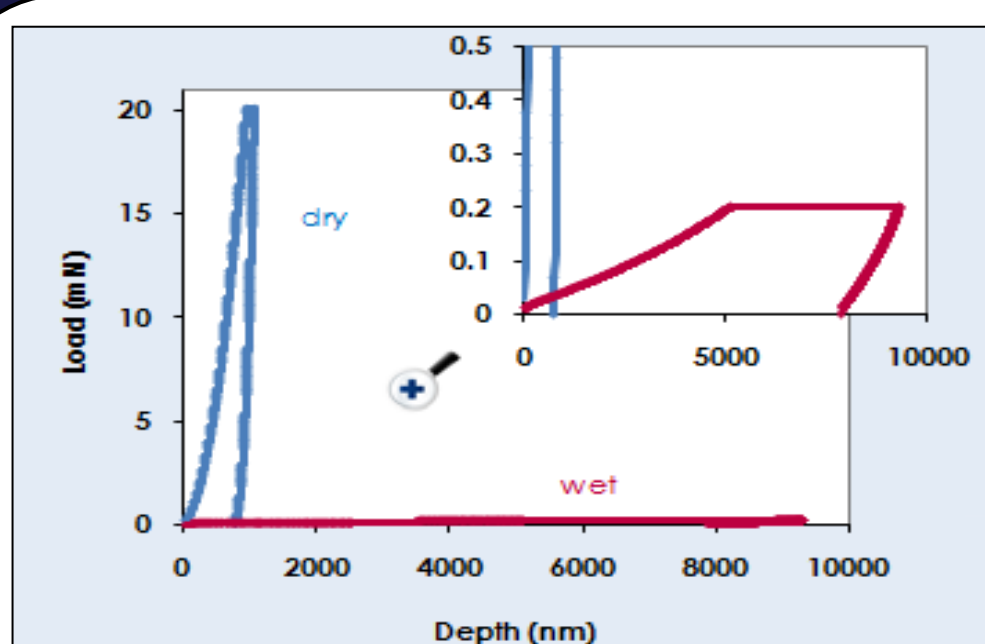
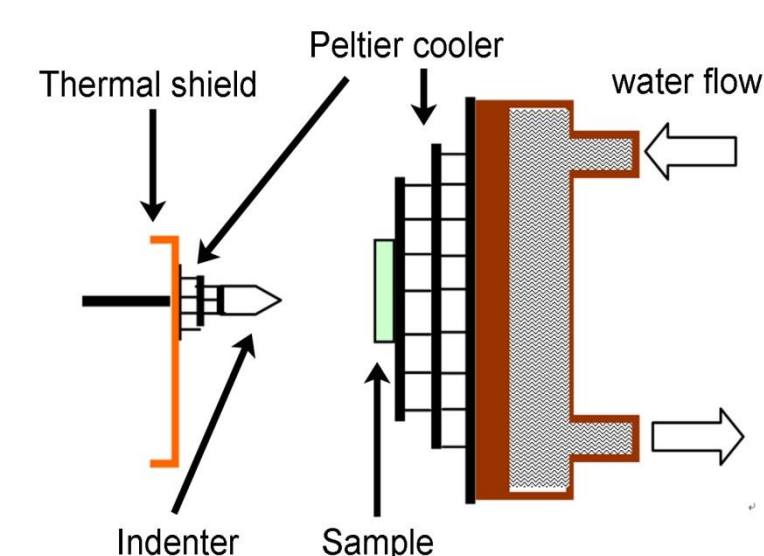


H/E vs. temperature for nylon/clay nanocomposite

Low temperature testing

The low temperature stage uses Peltier cooling of the indenter and stage to allow testing at temperatures down to -30°C

This capability is compatible with nanoindentation, scratch and impact techniques allowing assessment of a wide range of behaviour at sub-ambient temperatures

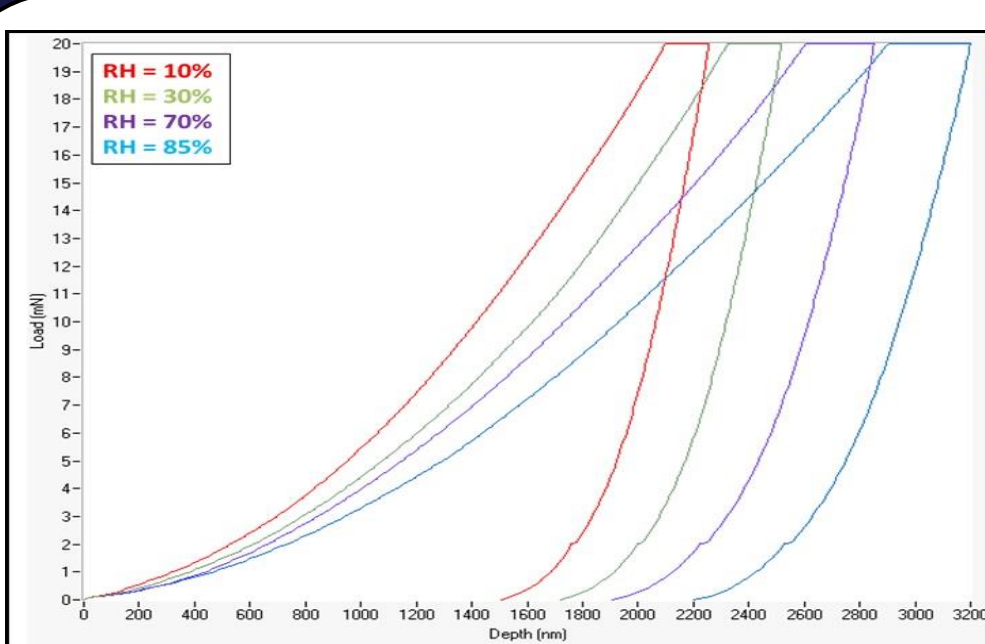
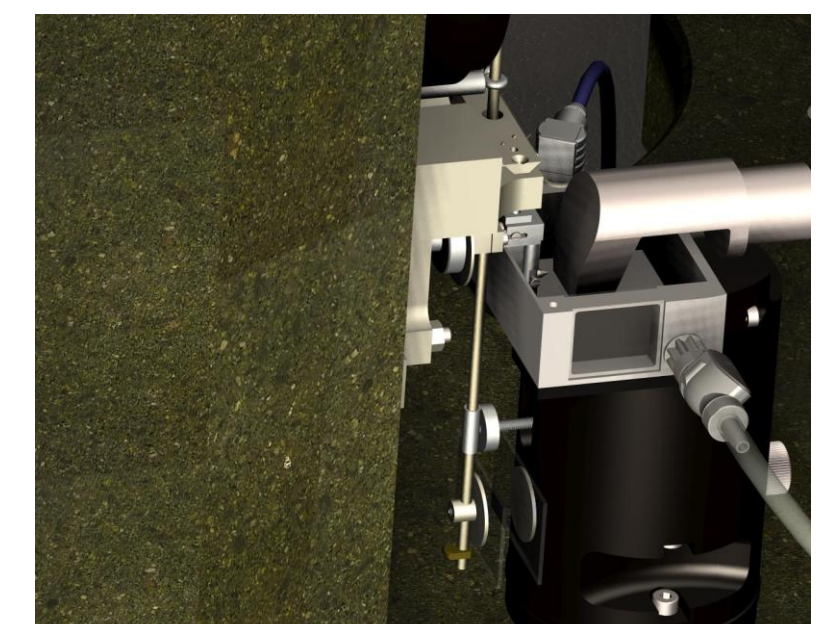


Wet vs. dry indentation on hydrogel samples

Liquid cell

Allows examination on material mechanical properties and wear behaviour in fully hydrated condition.

Additional capability can be added to the cell to allow testing at temperatures up to 40°C and with electrochemical monitoring



Effect of humidity on Nylon 6

Humidity control

Measurement region is isolated in order to control humidity between 10% and 85% relative humidity

Small enclosed volume ensures humidity can be changed rapidly and stabilises quickly at new levels.

