



NANO MECHANICAL TESTING LABORATORY

Figure 1. Nano-mechanical properties tester instrument.

This nano-indenter is used to characterize nano-mechanical properties such as hardness and elastic modulus of organic, inorganic, soft, or hard materials and thin-film coatings.

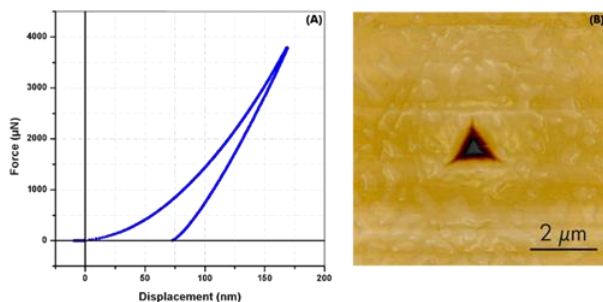


Figure 2. (left) Load-Unload curve of indentation process (right) print of nano-indentation on the surface.

INSTRUMENTS

The nano-mechanical tester in our lab has four modules. (i) Nano-indentation tester (ii) Micro-indentation and Micro-scratch tester (iii) Atomic Force Microscope and (iv) Optical microscope.

INDENTATION TESTER

The force is applied on the material with an indenter tip (berkovich, vickers) and the tip displacement is continuously measured to produce **force** versus **displacement** curve (fig 2)

This force vs. displacement curve serves as the 'mechanical fingerprint' of the material, from which quantitative nanoscale material properties can be determined.

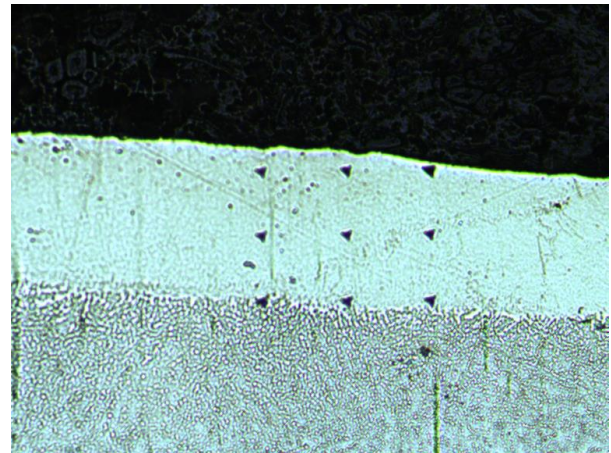


Figure 3. Indentation prints on the metal surface and coating.

Force range:

0.1-400 mN, berkovich indenter tip for nano indentation

MICRO SCRATCH TESTER

The scratch tester is used to determine the mechanical properties of thin films and coatings, such as fracture, deformation and adhesion. It is also used to characterise the friction and adhesion force of substrate and film structures. This technique relies on creating a controlled scratch in the material with a sharp tip. At the critical load value, the coating starts to break. The critical loading value is determined by the sound sensor and optical microscope attached to the loading arm.



Loading range: 30 mN- 25 N

Maximum friction force: 25 N

Scratch speed: 0.4 to 500 mm/min Maximum depth:1mm

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