A.P.E. Research
NANOTECHNOLOGY

TriA SPM – Scanning Probe Microscope

Tools for Microscopy and Nanotechnologies

TriA SPM
Scanning Probe Microscope

TriA–SPM is an innovative high resolution imaging and probing system. It is mainly dedicated to the studies of biomaterials (nucleic acids, peptides and proteins, cells and tissues, etc.) as well to thin films samples.

The direct observation of the sample using the integrated inverted light microscope widens the range of its applications from hard materials surfaces to biological sample.

TriA–SPM provides simultaneously double optical sample observation (upright and inverted) for common optical microscopy techniques along with SPM techniques for transparent and opaque samples, without sacrificing the SPM (AFM or SNOM) or optical performance.

The integrated inverted light microscope provided with TriA–SPM can accommodate different dedicated objectives and filters for a wide range of applications. With optional dedicated accessories it can support advanced working modes like fluorescence methods and confocal applications.

The optical setup is coupled with high definition video system with real time image capture capabilities, ensuring the sample and probe continuous monitor and documentation.

In **AFM Mode** beside the standard topography methods (contact, semi-contact, true non- contact, and lateral) scanning and optical tools can be adapted in order to expand the imaging function to include information about the electrical, vibrational, optical, and magnetic properties of studied nanostructures.

In SNOM Mode it allows the simultaneous acquisition of both the map of the surface topography and the near field optical signals. Up to 3 different near field optical signals can be simultaneously collected and analyzed. Both transmission and reflection paths have an integrated and independent high -performance photo detectors, ensuring robust and reliable operation for separate or simultaneous transmission and reflection measurements from the visible (VIS) to near infrared (NIR) range.

TriA-SPMsystem is an instrument that has an extremely **versatile modular structure**; therefore this Scanning Probe microscope is **easily customizable** and it can be adapted to various **needs** and for a **wide range of applications** from the physics of materials, to chemical analyzes, to biomedical applications.

TriA-SPM Microscope

A.P.E. Research **TriA-SPM system** is available in different configurations and with several accessories tools.

The standard TriA-SPM system includes the following

Main Components:

- **AFM** measure **head** (MB-100-A) with **Laser source**;
- **TriA-stage** with a **NanoScanning** (SN-100-P) system
- and **sample stages** (MB-100-B);
- **Upper Optical Vision System** (MB-100-O);
- **Inverted Optical Microscope** (MB-100-I);
- **Electronic modules** (EC-100-P);
- **Box** and **Anti-vibration system** (AT-100-G)**;**
- **Computer** with acquisition board and SPM Control **Software**.

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Double integrated Optical Vision system

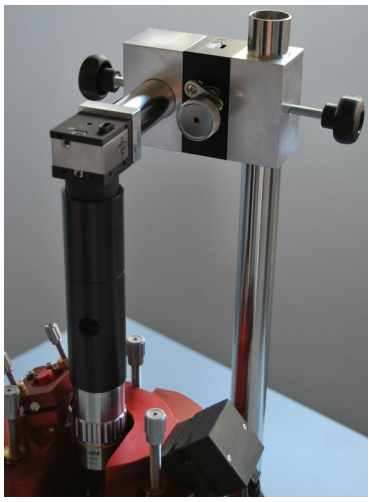
TriA-SPM is supplied with **two optical vision systems** for independent direct optical access from **above** and **below**:

- an **Upper Optical Vision system** for a magnified vision of tip and sample from the top, and
- an **Integrated Inverted Optical Microscope** with wide range of working Objectives and filters available

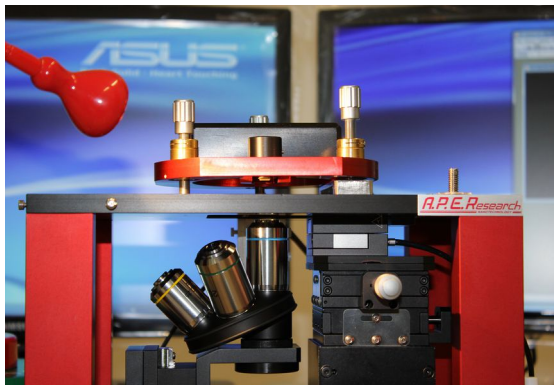
Each system includes a **Magapixel Colour Digital Camera** with Led illumination (cold light to avoid sample heating) and Images acquisition Software.

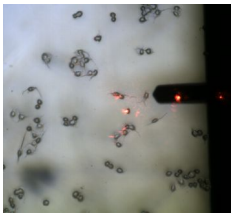
These cameras permit to directly view the sample, select the scan area, monitor the probe position and check the tip-sample approach.

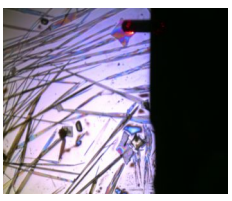
Upper Optical Vision system
(MB-100-O)

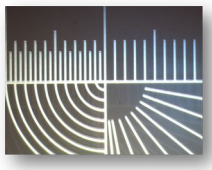


Integrated Inverted Optical Microscope
(MB-100-O)









Characteristics and technical specifications are subject to change without notice

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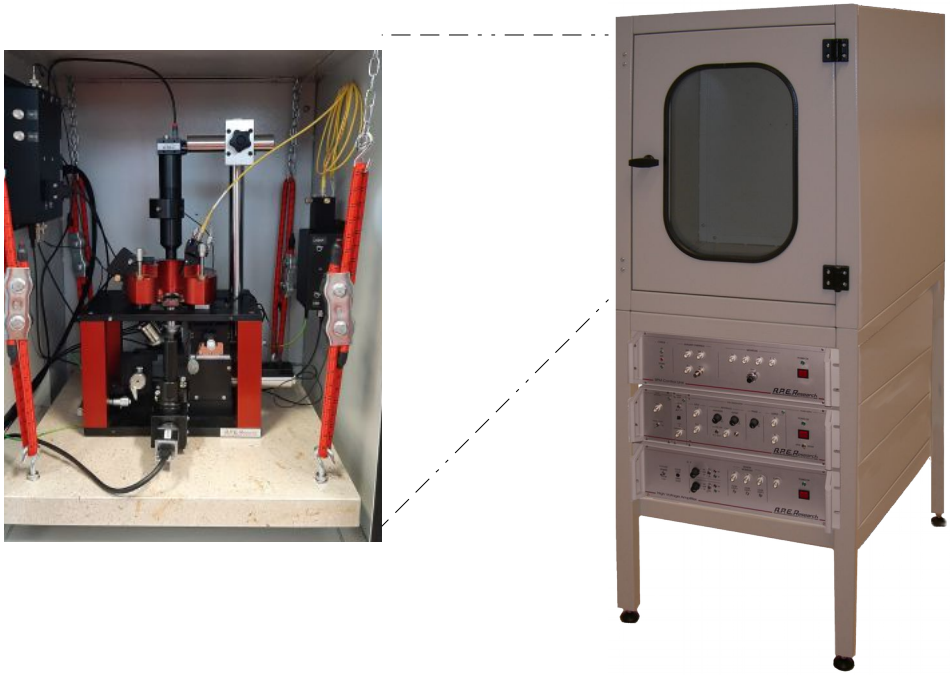
Anti-vibration system

The integrated Acoustic / Vibration Isolation Enclosure for TriA – SPM is providing acoustic isolation and increased vibration isolation

The tool (AT-100-G) comes with:

- Metallic Table suited for Acoustic Box.
- Acoustic Isolation Box with door and inspection window.
- Pasive damping system
- Dimensions: 60-cm wide by 60-cm deep by 75-cm high.
- Max load: 150Kg



SPM Control Software for data acquisition and imaging (SW-100A)

and Software for data analysis (SW-100B)

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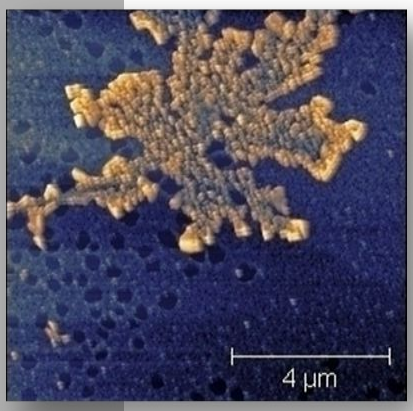

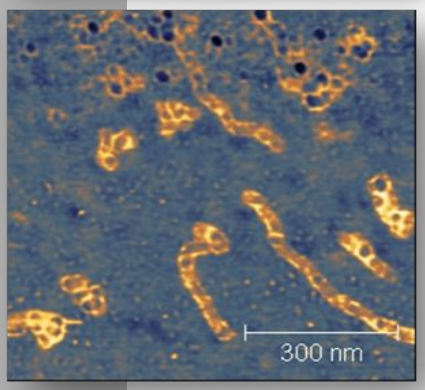

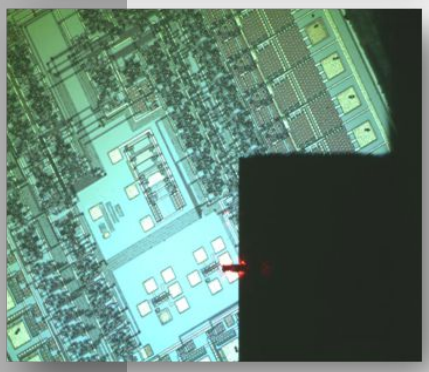

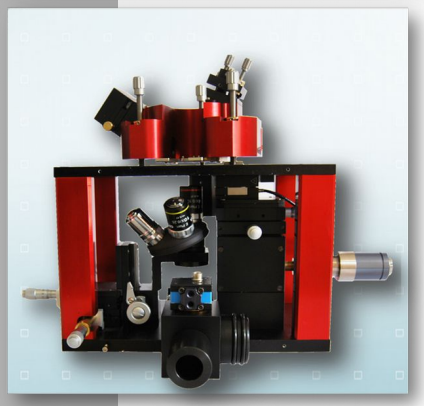

Key features:

- **Ease of Use**
- **High Versatility**
- **Easily interchangeable Samples**
- **Automatic tip sample approach**
- **Integrated Double optical system.**
- **Integrated acoustic and vibration damping system**
- **Working modes**:
  - **AFM Mode:** supports major SPM scanning techniques* but not restricted to the following : *Contact AFM mode, Non-contact mode, Semi-contact mode, Phase Imaging, Lateral Force Microscopy, Force Curves Analysis, Electric properties, Magnetic Force Microscopy, etc.*
  - **SNOM Mode:** *Topography, Reflection, Back-Reflection, Transmission*

TriA SPM Scanning system:

Scanning stage with absolute positioning system and strain gauge sensors.

Scanner technical data:**

X-Y scan size:

100 x 100µm (high voltage mode);

10 x 10 µm (low voltage mode)

Resolution - high voltage mode:

Closed loop: 0,4 nm,

Open loop: 0.2 nm

Closed loop linearity: 0.1%.

Z scan size:

10 µm (high voltage mode)

1 µm (low voltage mode)

Resolution:

0.1 nm (high voltage mode),

0.01 nm (low voltage mode).

Sample size: can accommodate samples with different geometries and sizes up to 30 mm diameter.

SPM Control System (EC-100-P) is composed by a digitally controlled analog feedback that combines the flexibility of computer controlled parameters with the high resolution and low noise of an analogue implementation. This detection scheme provides sub-nanometric vertical resolution in the images and all collected signals are distortions free.

The electronics supports STM, AFM and SNOM heads, performs different kinds of spectroscopy and can acquire several user-defined auxiliary channels.

Acquisition software (SW-100-A)

Software runs under Windows and is composed of a multi- window application to control the instrument and do the data acquisition. The software controls all the parameters of the instrument.

Accessories: In order to provide different working modes A.P.E. Research have developed different dedicated tools (e.g. MFM Tool, EFM Tool, CAFM Tool, Liquid Cell, KFM Tool, Phase imaging, etc.).

* Some of the SPM techniques are requiring additional specific tools/accessories.

** Other ranges are available on demand. Please contact your local distributor for specific configuration.

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