



LIFE SCIENCE IN NANO SCALE



INTRODUCTION

Biological Atomic Force Microscope (Bio-AFM) is one of the most important tools for studying samples in biology.

Bio-AFM provides an appropriate platform for merging atomic force microscope and optical microscope in biological research projects.

The ability of Bio-AFM to capture images in various environments along with different operation modes allows scientists to study the structure and properties of living cells and other biological samples such as DNA and RNA, proteins, viruses, bacteria, tissues, etc. The microscope uses physical scanning for nano imaging and sample preparation is relatively simple and does not require **freezing, metal coating, vacuum, or dye injection**.

APPLICATIONS

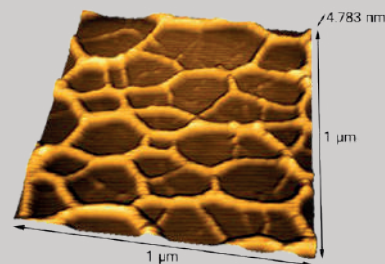
- Imaging **biological samples** with high resolution in buffer solution.
- Topographical imaging down to angstrom scale resolution from **live organisms**.
- Investigation of intermolecular forces (**force spectroscopy**) in biological structures.
- Nano-scale study of **mechanical properties** of biological Samples.
- Investigation of the **Ligand-Receptor** binding.
- The **Antibody-Antigen** interactions studies.
- Study of the **unfolding of proteins**.
- **Cutting out different sections** of chromosome for genetic analysis by applying directed force.
- The possibility of performing **Chemical Lithography**.



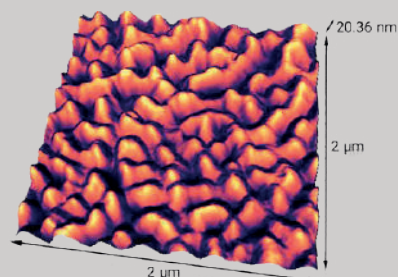
KEY FEATURES

- Simultaneous use of an inverted microscope and a digital microscope from above during scanning.
- Easing optical adjustments by changing the laser optical path.
- A modern and easy way of tip fixation with a vacuum pen.
- Accurate fixing of tip position by using Chip Alignment template.
- Optimum and easy application due to head weight reduction.
- Fast, automatic, and safe approach at any distance of tip and sample.
- Single LAN cable connection of the device to the computer.
- Improvement of the user-friendly interface for the system software.
- Ability to view and save optical images in addition to nano-scanned images.

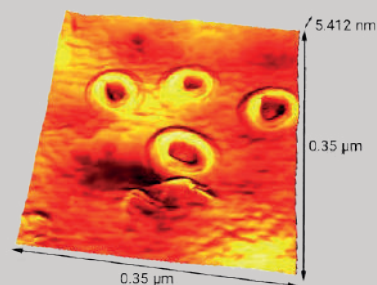
SAMPLE PICTURES



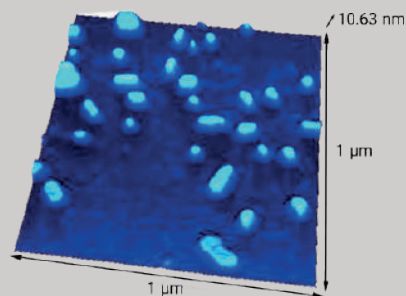
DNA



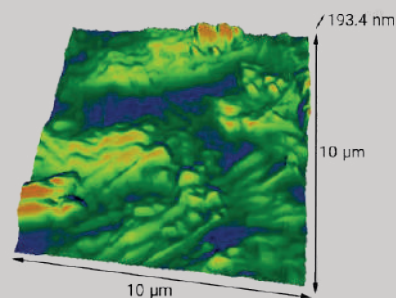
Bee's eye



Tau proteins after injection



Flu Vaccine



Rabbit Cartilage

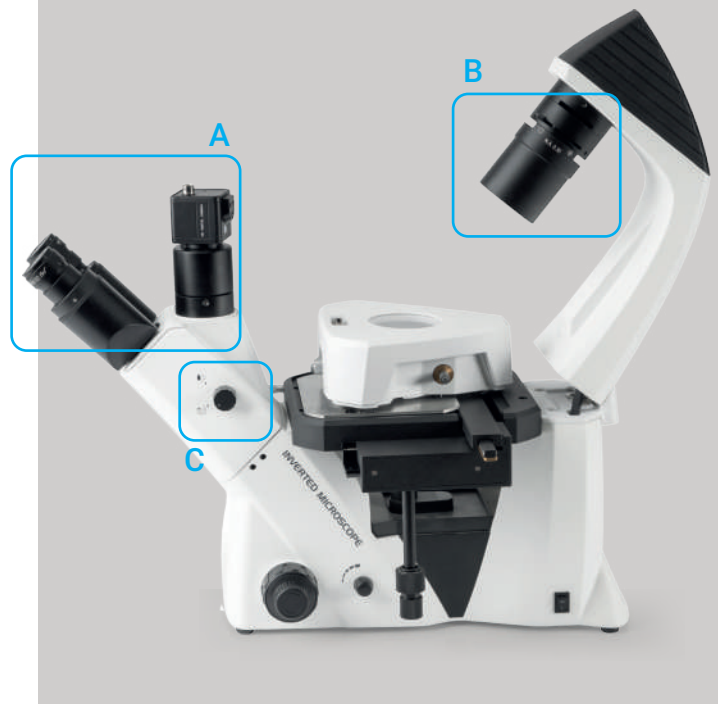
AFM and INVERTED MICROSCOPE INTEGRATION

A: Biological samples are viewed from underneath by an inverted optical microscope. The Bio-AFM model can be coupled with desired types of inverted microscopes according to the client's needs.

B: Exposure from above and the possibility of adding a condenser and optical filters with different color spectrums to view all kinds of biological samples such as cells, viruses, etc.

C: The possibility of viewing the inverted image as CCD output or through ocular lenses according to the user's choice.

■ The possibility of being equipped with an inverted fluorescent microscope.

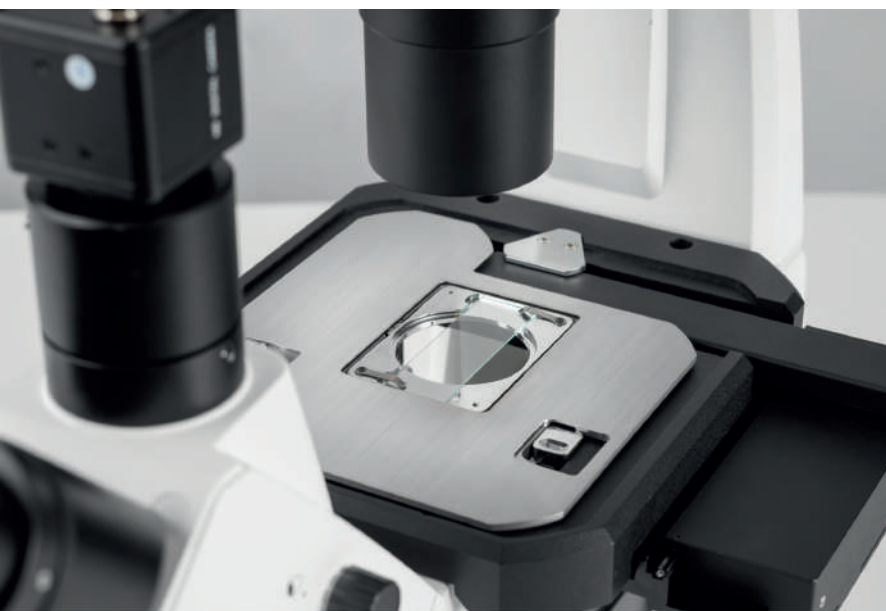
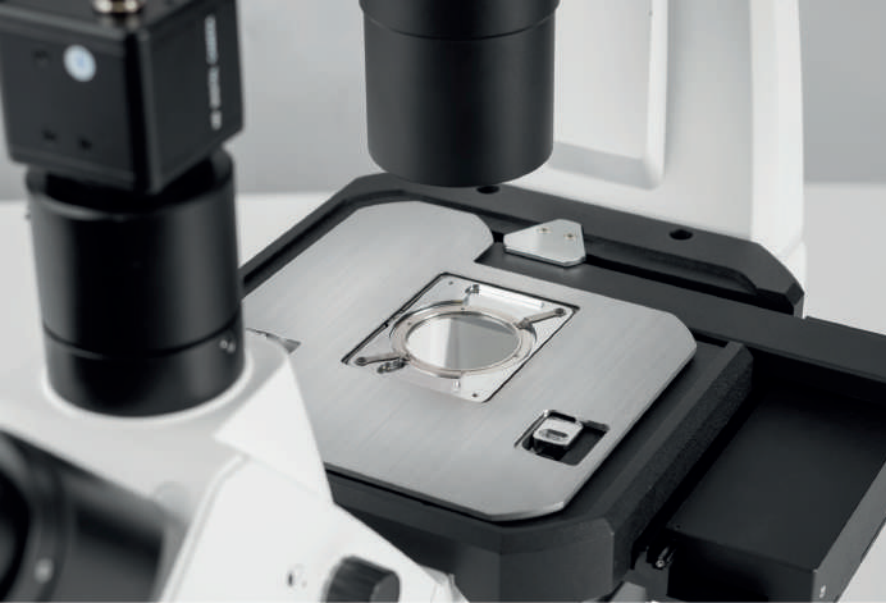


OBJECTIVE LENSES & COARSE/FINE ADJUSTMENTS

A: Bio-AFM is equipped with objective lenses for inverted displaying samples with high resolution and magnification at scales of 4, 10, 20, and 40 X.

Easy replacement of objective lenses with user demanded magnifications.

B: Accurately performing focusing operation in order to obtain high-resolution images by using coarse and fine adjustments.



■ SAMPLE HOLDER

- Equipped with a large **liquid cell** for imaging **biological buffer matrices**, **physiological conditions**, and other solvents.
- The **minimum effect of the liquid environment** on the quality and clarity of the images due to using the world's latest standards and methodologies.
- The liquid cell is made of material resistant to **chemical effects**, **thermal changes**, and **environmental pH**.
- Capability of **simple and quick slide replacement** for imaging the surfaces of different samples in air.
- **Newly designed scanner** to reduce noise level.
- Increasing the scanning range to **50 μm** and the possibility of customizing to **100 μm** range.

■ DIGITAL OPTICAL MICROSCOPE

- The possibility to observe the **opaque sample** from the top during scanning using an advanced **digital optical microscope**.
- **No need for a head** in the use of a digital microscope for various optical analysis.
- Determination of the **precise location in the scan step**, accurate and fast imaging thanks to the smart design of optical parts.



TECHNICAL SPECIFICATIONS

<p>Scanner XY Scanner 50 µm maximum XY scan range (The possibility to customize to 100 µm) 1 nm XY resolution Z Scanner 3 µm Maximum Z movement range 0.1 nm Z resolution</p>	<p>Electronics Plug and Play control box ADC and DAC Channels 4 Channel ADC 24bit 4 Channel DAC 24bit Signal processing 40 MHz Frequency zynq processor Integrated functions 100 MB/sec Via LAN</p>
<p>Stage XY Stage Mechanical Stage 12 mm Travel range Head Stage Mechanical XY stage: Positioning cantilever in the center of the objective lens</p>	<p>Software Data acquisition Real-time 100 MB/sec Microsoft Windows compatible Integrated optical view windows for sample and cantilever vision Monitoring all system signals with a high-rated oscilloscope Auto saving captured images in the software gallery Scanning zoom-selected area on captured images Automatic fast approach of the cantilever to the sample surface (Auto Fast Approach) Image processing Independent software for image processing, data analysis, and presentation The capability of exporting different data of images Built-in with all Microsoft OS</p>
<p>Sample Mount 75 x 26 mm microscope slide mounting Customized 50 mm culture dish Slide and culture dish holder spring -10 V to +10 V Bias voltage range to the sample</p>	<p>Dedicated all in one (AIO) Computer 21" Display Monitor: 1920 *1080 Resolution The latest generation of processors 8 GB RAM</p>
<p>Inverted Microscope See Table of Inverted Microscope Items</p>	<p>Options Top View Optical Microscope 8-Megapixel resolution, color 60X to 600X Optical zoom Integrated lighting Include microscope dimmer XY Scanner Possibility to customize the XY scan range to 100 µm Tip changing kit Vacuum pen</p>
<p>AFM Unit Plug and Play Dimension 580 mm × 370 mm × 600 mm Net Weight 20 Kg</p>	<p style="text-align: center;">Functional Kits</p>
<p>Head High precision adjustment micrometer Optic designed for both dry and liquid environments 670 nm Laser frequency 5 mW Maximum laser diode power High-grade quadruple photo-diode Dithering mechanism Optimized optical path design Spring lever tip holder mechanism Chip alignment mount for accurate tip mounting Head Z actuators 3 independent Z positioning actuator for Leveling ability 15 mm Travel range 40 nm Movement steps Automatic engagement of the cantilever to the sample surface (Auto Fast Approach)</p>	<p>Fly Kit</p> <ul style="list-style-type: none"> ● Magnetic Force Microscopy (MFM) ● Electric Force Microscopy (EFM) ● Phase imaging
<p>Accessories Sample mounting kit The sample substrate Various types of cantilevers Tweezers and magnet box head-holder unit</p>	<p>Pro Contact Kit</p> <ul style="list-style-type: none"> ● Lateral Force Microscopy (LFM) ● Force Spectroscopy ● Mechanical Nano-Lithography
<p>Standard Modes</p> <ul style="list-style-type: none"> ● Contact Mode (Static, DC) ● Non-Contact Mode (Dynamic, AC) ● Tapping Mode (Semi-Contact, Intermittent-Contact) 	<p>Experts Kit</p> <ul style="list-style-type: none"> ● Chemical Nano-Lithography ● Force Modulation Microscopy (FMM) ● Conductive AFM (C-AFM) ● Kelvin Probe Force Microscopy (KPFM) ● Piezo response Force Microscopy (PFM)
<p>Any requirement for specific applications or modifications can be customized.</p>	

INVERTED MICROSCOPE ITEMS

Head	Seidentopf Trinocular Head Inclined 45°, Interpupillary Distance 48~76mm, Light Split Switch E100:P0 / E20:P80	
Eyepiece	WF10x/22mm, Dia.30mm, High Eyepoint, Diopter Adjustable	
Nosepiece	Quintuple	
LWD Infinity Plan Objectives	LPL 4 × / 0.11	W.D. = 12.1 mm
	LPLAN 10 × / 0.25	W.D. = 8.3 mm
	LPLAN 20 × / 0.40	W.D. = 7.2 mm
	LPLAN 40 × / 0.60	W.D. = 3.4 mm
LWD Infinity Plan Fluorescent Objectives	L Plan FL 10 x / 0.25	W.D.= 10.3 mm
	L Plan FL 20 x / 0.45	W.D.= 5.8 mm
	L Plan FL 40 x / 0.65	W.D.= 5.1 mm
LWD Infinity Plan Phase Contrast Fluorescent Objectives Newly Update 2021	L Plan FL PHP 20x / 0.45	W.D.= 5.8 mm
	L Plan FL PHP 40x / 0.65	W.D.= 5.1 mm
Phase Contrast	Centering Telescope 11x	
Annular Spot	4x	
	20x / 40x	
	10x	
Working Stage	Mechanical Stage Size 210 x 241mm, Round Slide Size Φ110mm	
Condenser	Long Working Distance, Quickly Detachable, N.A.0.3, Working Distance 72 mm (With Condenser), 195 mm (Without Condenser).	
Transmit Illumination	Koehler Illumination Halogen 6V/30 W, Input Voltage 100 V ~ 240 V	
Filter	Blue, Dia.34 mm	
Reflect Illumination	Green, Dia.34 mm	
Inverted Fluorescent	Optional	

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