



ATOMIC FORCE MICROSCOPE

Inability of optical microscopes in imaging sizes smaller than wavelength of visible light resulted in invention of nanoscopes in the last decades. AFM is the top in the list due to its low price and multi-applications.

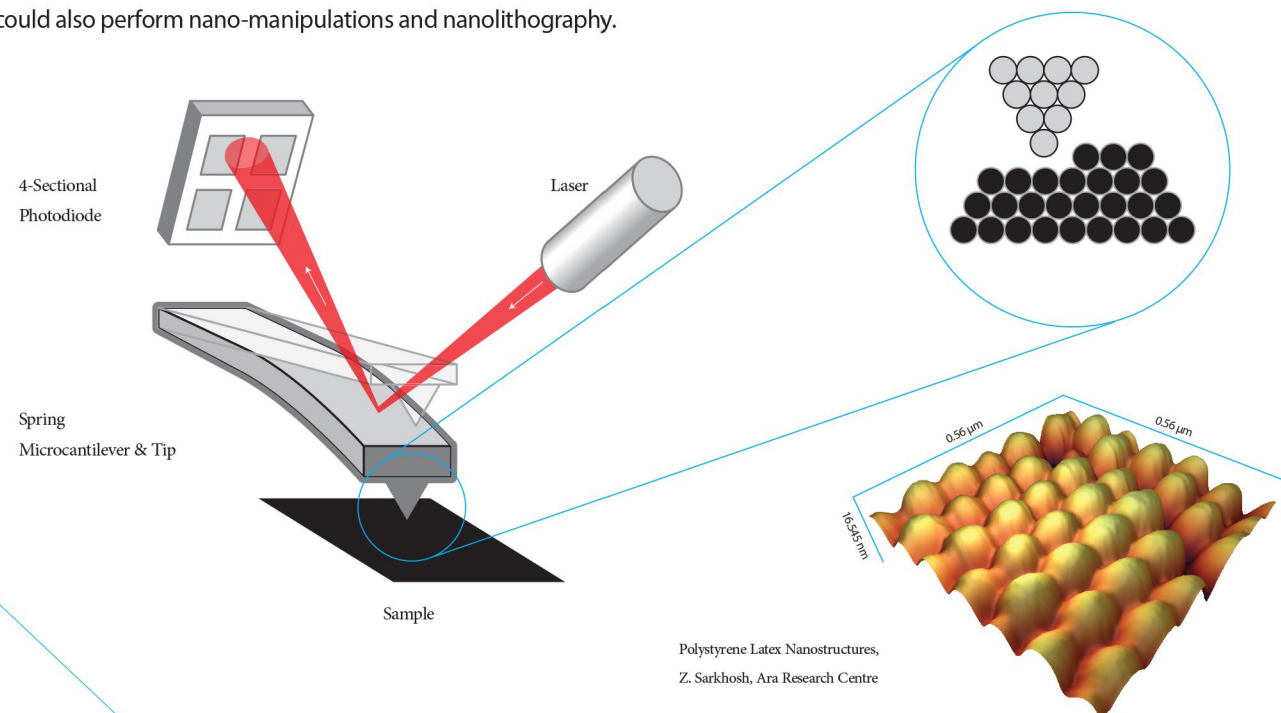
#### The basic principle of AFM

A spring micron size cantilever has a conical tip at its free end. The conical tip with a very sharp end, usually less than 10 nanometres, scans the sample surface from a very close nanometric distance.

As the tip moves over the surface the Van Der Waals forces between atoms on the sharp end of the tip and atoms on the surface of the sample varies, resulting vertical displacements of the cantilever.

Vertical movements of the cantilever are sensed by an optical method. The reflected laser beam from the cantilever backside hits a quadruple photodiode. The output signals of the photodiodes are related to the vertical movements of the cantilever which in turn represents the surface topography of the sample.

Nowadays AFM is the main tool in Nano research works. Apart from 3-dimensional nanoimaging, AFM is capable of determining various properties of the sample in nano scale. AFM could also perform nano-manipulations and nanolithography.



Our valuable experience in equipping over 80 universities and research centres to AFMs and our view to extend our market to all continents directed us to a new design on the technology edge.

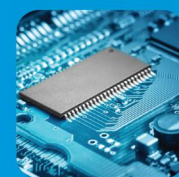
- » Elegant and innovative appearance, modest volume.
- » Extremely user friendly; eliminating strains on users.
- » Nano imaging in least possible time duration.
- » Robustness



The above features, plus using the latest technologies in manufacturing ARA AFM, has produced an splendid apparatus for nano researchers. Ara Research, with 20 years of experience in producing nano technology equipment, today is setting forth the sophisticated functioning modes of AFM in an spectacular product.



Quality control of high-tech products



Solar cells, semiconductors and integrated circuits

Surface engineering material science



Ceramics and coatings

Polymers and chemical products



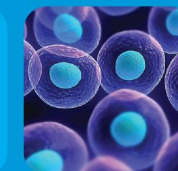
Nano-scale mechanical and electrical properties



Pathology and medicine synthesis medical science



Biotechnology research



## ATOMIC FORCE MICROSCOPE

- » **Simplified procedure for nano-imaging**  
Simplifications in operation together with reducing the required time for nano-imaging has made ARA AFM extremely user friendly.
- » **Developed tip fixing procedure**  
You can calmly fix the tip in AFM-head in the shortest possible time.
- » **High magnification OM**  
The initial imaging for choosing the scan point is performed using a powerful OM fixed on the machine.
- » **Adopted with all computer types**  
PCs, laptops, all-in-one or any other computer types can be used with ARA AFM.
- » **New generation of the controller**  
Employing the latest advanced electronics in ARA AFM has improved the controller functioning.
- » **LAN feature**  
One single network cable does all data transfer between computer and the machine.
- » **Fast Approach**  
Saving time during approach by using fast approach technique is a marvellous feature of ARA AFM.
- » **Fantastic design, compact**  
ARA AFM occupies least possible space in your laboratory and its nice looking view attracts the users.



Precise  
PERFORMANCE



Fast Approach  
TECHNOLOGY



LAN INTERFACE  
PLUG & PLAY



**ARA RESEARCH Co.**  
Advanced Technology Consultants, Research and Applications



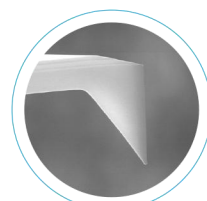
#### Direct online communication

Network possibility provides simultaneous connection of technical specialist and the user to ARA AFM. This feature speeds up user's problem solving and troubleshooting. Further, one may operate ARA AFM from any station in network and no need to be present in the lab.



#### Developed software

Highly-magnified tip and sample view, obtaining & auto-saving nano images and signals monitoring are unique features of the latest version of ARA AFM software.



#### Straight and easy tip-fixation

Thanks to the new head design, providing the easiest way of fixing the tip without usual user's stress. Picking and putting of the tip is performed with the least possible risk of breakage.



#### Time saving in approach

Swift commence of scanning is due to sophisticated fast approach technique implemented in ARA AFM.

### SPECIFICATIONS

#### Scanner

##### XY Scanner

30,40 ,50  $\mu\text{m}$  XY scan range

1 nm XY resolution

##### Z Scanner

4  $\mu\text{m}$  Maximum Z scan range

0.1 nm Z resolution

#### Electronics

##### 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

#### Stage

##### XY Stage

Motorized software-controlled

15 mm Travel range

40 nm Movement steps

##### Z Stage

15 mm Travel range

40 nm Movement steps

Automatic engage of the cantilever to the sample surface (Auto Fast Approach)

#### 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 software gallery

Scanning zoom-selected area on captured images

Automatic fast approach of cantilever to the sample surface (Auto Fast Approach)

##### Image processing

Independent software for image processing, data analysis and presentation

Capability of exporting different data of images

Built-in with all Microsoft OS

#### Sample Mount

20 mm Maximum sample diameter

10 mm Maximum sample thickness

Includes light magnetic sample holder

-10V to +10V Bias voltage range to the sample

#### Top View Optical Microscope

8-Megapixel resolution, color

60X to 600X Optical zoom

Integrated lighting

Include microscope dimmer

#### Dedicated Computer Configuration

21.5" Display Monitor

Core i5-7200U CPU

8GB DDR4 RAM

2GB GeForce Graphic, 1920\*1080 Resolution

#### Head

High precision adjustment micrometer

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

#### AFM Unit

Plug and Play

##### Dimension

300 mm  $\times$  400 mm  $\times$  300 mm

##### Net Weight

20 Kg

#### Options/Accessories

Standard test samples, sample mounting kit, sample substrate

Various types of cantilevers

Tip changing kit including vacuum pen, tweezers, magnet box, head holder unit

#### Functional Modes

**Standard Kit:** Contact, Non-Contact, Tapping, Phase image, Lateral Force Microscopy (LFM)

**Fly Kit:** Magnetic Force Microscopy (MFM), Electric Force Microscopy (EFM)

**Pro Contact Kit:** Chemical and Mechanical Nano-Lithography, Force Spectroscopy

**Expert Kit:** Kelvin Probe Force Microscopy (KPFM), Conductive AFM (C-AFM), Piezoresponse Force Microscopy (PFM), Frequency Modulation (FM), Force Modulation Microscopy (FMM)

- Any requirement for specific applications or modification can be customized



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