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AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY



VINAYAKA MISSION'S  
RESEARCH FOUNDATION  
(Deemed to be University under section 3 of the UGC Act 1956)



**CENTRE FOR NANOTECHNOLOGY RESEARCH  
DEPARTMENT OF HUMANITIES AND SCIENCE**

**SPECIFICATIONS: ATOMIC FORCE MICROSCOPE (Park XE7 AFM)**

Park XE7 Atomic force microscope AFM is a surface mechanical property measuring tool designed to be used for measuring surface features of dimensions between 10 nanometer and 100 micrometer. It provides valuable information about three - dimensional topography as well as physical properties of sample surfaces.



*Park XE7 AFM set-up*

The basic principle of the atomic force microscopy technique is to measure the forces or interaction between the probing AFM tip and the sample surface. The technique is also used to characterize electrical, magnetic, morphological and mechanical surface properties in real space on atomic scale.

AFM modes available are: 1) True contact mode, 2) Non-contact mode, 3) Tapping mode

**Specifications:**

XY Scanner

Single-module flexure XY scanner with closed-loop control

Scan range: 100  $\mu\text{m}$  x 100  $\mu\text{m}$   
50  $\mu\text{m}$  x 50  $\mu\text{m}$   
10  $\mu\text{m}$  x 10  $\mu\text{m}$

Z Scanner range

Guided high-force Z scanner Scan range : 12  $\mu\text{m}$   
15  $\mu\text{m}$

Manual Stage

XY travel range : 13 x 13 mm; Z travel range 29.5mm  
Focus travel range : 70 mm

Typical AFM resolution: X-Y: 1 nm; Z: 0.1nm;

Detection: sub-Å deflection, pN forces

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**SPECIFICATIONS: ULTRA VIOLET (UV – Vis) SPECTROMETER**

**UV-Visible spectrophotometer (UV-Vis 2600, Shimadzu make)** is an analytical tool used to measure the optical properties of the samples in the UV-visible range of the electromagnetic radiation. It is the most widely used spectrometer for studying liquid medium, gas and solids including semiconductors, films, glass and absorbing materials. Importantly, the UV-Visible spectrometer determines how much light of a given wave length or frequency passes through a sample and how much is absorbed.

The frequency or wavelength at which the light is absorbed or emitted depends on the nature of the electronic transition energy levels present.



*Shimadzu UV-Visible spectrophotometer*

The optional facility of ISR-2600 plus integrating sphere attached with the main unit enables to measure absorbance or emission spectral features in a wider wavelength range 220 - 1400 nm. As a result, UV-Vis 2600 can accommodate measurements of solar cell anti-reflective films and polycrystalline silicon wafers.

Specifications	
Wavelength Range	185 to 900 nm or 220 to 1400 nm (when the ISR-2600 plus Integrating sphere attachment is used)
Optical System	Double beam, Single mono-chromator
Resolution	0.1 nm
Wavelength Accuracy	+/-0.1 nm (656.1 nm D2), +/-0.3 nm (all range)
Scanning Speed	4000 to 0.5 nm/min
Spectral Band-width	0.1, 0.2, 0.5, 1, 2 or 5 nm
Light Source	50 W Halogen lamp, Deuterium lamp

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**SPECIFICATIONS: FAST FOURIER INFRARED SPECTROMETER (FTIR)**

**(Model: IR affinity with single reflection ATR)**

Shimadzu make Fourier transform Infra-red (FTIR) spectrometer (model: IR affinity IS) coupled with attenuated total reflection (ATR) is a sophisticated compact instrument designed to be used for a wide range of structural analysis. ATR is a sampling technique used in conjunction with infrared spectroscopy which enables samples to be examined directly in solid state or in liquid state without further preparation. The surface emitted IR spectrum recorded from the bond natural vibration frequencies provides knowledge about the presence of various functional groups and chemical bonds present in the sample. The spectrometer offers high signal to noise ratio (30,000: 1) or higher. Despite its compact design, it offers full functionality for all FTIR techniques, including transmission and diffuse reflection.

**Specifications:**

Interferometer : Michelson interferometer (30° incident angle) equipped with Dynamic Alignment system

Sealed interferometer with auto dryer

Beam splitter: Germanium-coated KBr

Light source: High-energy ceramic light source

Detector: DLATGS detector equipped with temperature control

Wave number range: It operates in full mid-IR range from 7800 cm<sup>-1</sup> to 350 cm<sup>-1</sup>.

Resolution : 0.5, 1, 2, 4, 8, 16 cm<sup>-1</sup> Dimensions : 514 (W) x 606 (D) x 273 (H) mm Weight : 35 kg

**LAB INCHARGE**

**HOD**