उपकरण सुविधाएं

Instrument Facilities




सीएसआईआर–इमटैक, सैक्टर 39ए, चण्डीगढ़

CSIR - IMTECH, Sector 39-A, Chandigarh

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
CSIR·INDIA

Dr. Anil Koul, Ph.D.
Director,
CSIR-IMTECH

Director's Message

Established in 1984, the Institute of Microbial Technology (IMTECH) is one among the chain of 37 national laboratories, 6 units and 39 outreach centers of the Council of Scientific & Industrial Research (CSIR). The Institute is set up to be a fore-runner in the niche domain of microbial biotechnology. The Institute's primary asset is a team of more than 400 scientific, technical, and support staff with a majority of them having several years of training in world renowned laboratories.

CSIR-IMTECH houses a variety of major sophisticated instruments which are operated and maintained by dedicated and qualified group of scientists and technical staff. These high end instruments are used for various types of studies for research and experimentation, creating a vibrant inter-disciplinary atmosphere among its students and scientists. Efforts are made by the institute to offer all these instruments to scientific community across India for their use and exploring new dimensions of research in various niche areas.

IMTECH has Major Instrument Facility (MIF) which provides sophisticated analytical capabilities to internal users (IMTECH/CSIR Labs) as well as external users from various academic/research institutes and industry. The objective of the MIF is to facilitate scientists/researchers working in various educational institutes/universities, research institutions and industry to carry out measurements on sophisticated analytical instruments not available in their own institutions. We are keen to let our Instrumentation Facility to be used by other researchers/students and have a policy to support all national labs/universities and industry as per specific rules.

डॉ. अनिल कॉल, पी.एच.डी.
निदेशक,
सीएसआईआर-इमटैक

निदेशक की कलम से

वैज्ञानिक एवं औद्योगिक अनुसंधान परिषद् की 37 राष्ट्रीय प्रयोगशालाओं, 6 इकाइयों और 39 आउटरीच केन्द्रों की श्रृंखला में से एक सूक्ष्मजीव प्रौद्योगिकी संस्थान की स्थापना 1984 में हुई थी। सूक्ष्मजीव जैव प्रौद्योगिकी के क्षेत्र में एक अग्रणी संस्थान के रूप में उभरने की संकल्पना के साथ इसकी स्थापना की गई थी। संस्थान की प्रमुख सम्पत्ति इसका उच्च प्रेरित 400 से अधिक वैज्ञानिक, तकनीकी एवं सहयोगी स्टाफ है जिनमें से अधिकतर विश्वप्रसिद्ध प्रयोगशालाओं से अनेक वर्षों का प्रशिक्षण प्राप्त हैं।

सीएसआईआर-इमटैक में अनेक प्रकार के बडे अत्यधुनिक उपकरण हैं जिनका प्रचालन एवं रखरखाव समर्पित एवं योग्यताप्राप्त वैज्ञानिकों एवं तकनीकी स्टाफ के समूह द्वारा किया जाता है। उच्च स्तर के इन उपकरणों का प्रयोग विभिन्न प्रकार के अध्ययनों से संबंधित अनुसंधान एवं प्रयोगों के लिए लिए किया जाता है जिससे विद्यार्थियों एवं वैज्ञानिकों में परस्पर सम्बद्ध विषयों का जीवंत वातावरण बनता है। संस्थान द्वारा प्रयास किए जाते हैं कि प्रयोग एवं विभिन्न प्रमुख शोध क्षेत्रों अनुसंधान के नए पक्षों का पता लगाने के उद्देश्य से देश के वैज्ञानिक समुदाय को इन उपकरणों की सुविधा उपलब्ध करवाई जा सके।

संस्थान की मेजर इन्स्ट्रूमेंट फेसिलिटी (एमआईएफ) आन्तरिक प्रयोक्ताओं (इमटैक/सीएसआईआर प्रयोगशालाओं) के साथ-साथ विभिन्न शिक्षा/अनुसंधान संस्थानों व उद्योगों को अत्यधुनिक विश्लेषणात्मक उपकरण सुविधाएं प्रदान करती है। एमआईएफ का उद्देश्य विभिन्न शिक्षा संस्थानों/विश्वद्यिालयों, अनुसंधान संस्थानों व उद्योगों में काम कर रहे वैज्ञानिकों/अनुसंधानकर्ताओं को उन अत्यधुनिक विश्लेषणात्मक उपकरणों पपर मापन कार्य में सहयोग करना है जो उनके अपने संस्थानों में उपलब्ध नहीं हैं। हम चाहते हैं कि हमारी उपकरण विन्यास सुविधा का अन्य शोधकर्ताओं/विद्यार्थियों द्वारा लाभ उठाया जाए और समस्त राष्ट्रीय प्रयोगशालाओं, विश्वविद्यालयों एवं निजी कम्पनियों द्वारा नियमानुसार इनके प्रयोग की एक नीति भी है।

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वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
CSIR·INDIA

Small Angle X-ray Scattering

The SAXSpace small- and wide-angle X-ray scattering (SWAXS) system is used for characterizing your nanostructured materials and samples. It determines the size, size distribution and shape sample domains and is especially suited for analyzing isotropic, colloidal and biological samples (Bio-SAXS). SAXSpace an ideal tool for investigating nanostructures in many different materials, including nanoparticles, proteins, foods, pharmaceuticals, polymers and surfactants.

Make: Anton Paar
Model: SAXSpace

FEATURES AND SPECIFICATIONS

X-ray source:

- 2.2 kW Sealed tube (line collimation) operating at 40 kV and 50 mA

X-ray wavelength:

- 1.5418 Å

Sample environment

- Temperature range: 5 °C to 80 °C
- Atmosphere: Vacuum

X-ray optics

- Multilayer optics
- Advanced Kratky-based line and point collimator

Sample holders

- Quartz capillary for liquids
- sample holder for solids

Matrix Assisted Laser Desorption Ionization (MALDI-TOF)

Matrix-assisted laser desorption ionization (MALDI) mass spectrometry TOF/TOF 5800 system provides the fastest and most confident path to identification and relative quantitation of proteins. The system's excellent speed and sensitivity make it the ideal platform for biomarker discovery, MALDI mass spectrometry imaging, and protein identification

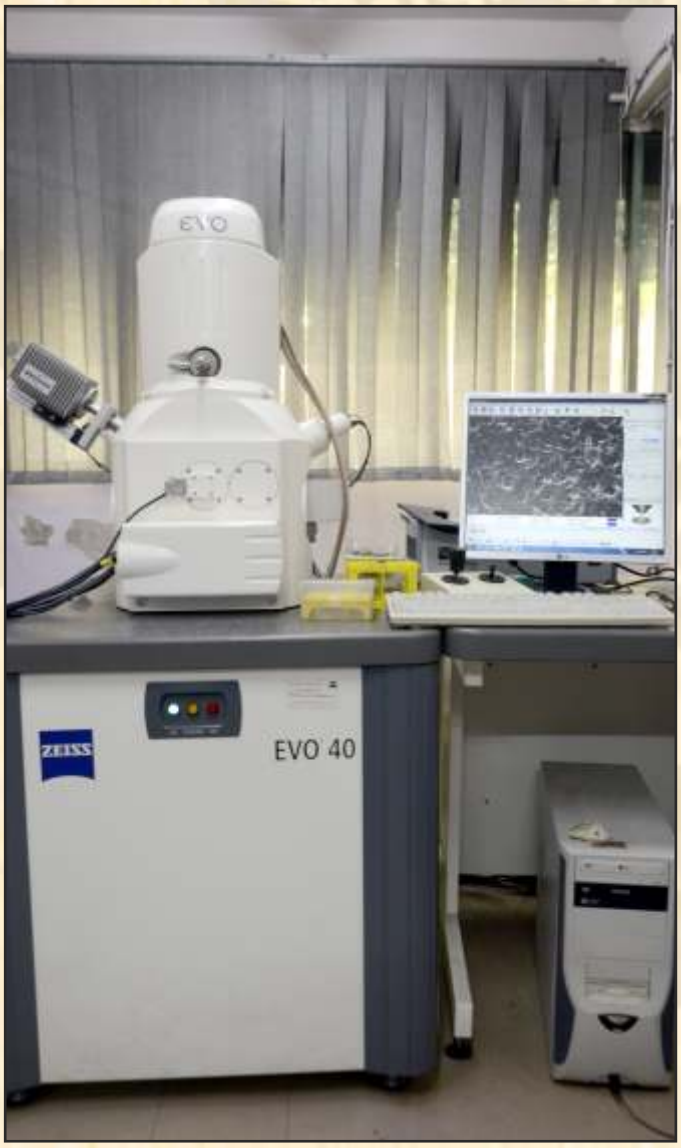
Make: AB Sciex
Model: 5800

FEATURES AND SPECIFICATIONS

- Unique OptiBeam On-axis Laser irradiation increases sensitivity in both MS and MS/MS modes by 10-fold over systems without an on-axis laser
- Maximum up-time and throughput by continuously heating of the source mirror and user-programmable source mirror cleaning
- Improved resolution with new reflectron mirror design and 1000 MHz digitizer
- Protein Identification by searching MS/MS Spectra using MS/MS ions search or searching by Peptide mass fingerprinting (PMF)
- Post translation modification
- Quantitative and qualitative analysis

Scanning Electron Microscope (SEM)

The EVO®40 microscope is ideal for pharmaceutical and biotech research offering superb imaging of small specimens. The chamber design provides excellent access to the specimen for cryo and other specialist techniques. Its key features are: VPSE detector for secondary imaging in XVP® and BeamSleeve™ accurate analysis of non-conducting samples.



Make: ZEISS
Model: EVO 40XVP

FEATURES AND SPECIFICATIONS

Resolution

- 3.0 nm @ 30 kV (SE and W)
- 4.5 nm @ 30 kV (BSD - XVP® mode)

Magnification

- 7 to 1,000,000x
- Acceleration Voltage 0.2 to 30 kV

Field of View

- 6 mm at the Analytical Working Distance (AWD)

Image Processing Resolution:

- Up to 3072 x 2304 pixel Signal acquisition by integrating and averaging

Transmission Electron Microscope (TEM)

The JEM-2100 electron microscope provides solutions for a wide range of problems in the fields of materials, nano electronics, and biological sciences.

Make: Jeol
Model: JEM – 2100CR

FEATURES AND SPECIFICATIONS

Resolution

- Point Resolution: 0.3 nm or better
- Lattice Resolution: 0.14 nm or better
- EHT : 200 KV selectable at 80-100-120-160-200KV

Filament :

- Pre-centred single crystal Lab 6 High stability.
- Automatic airlock and gun lift capability.

Imaging System :

- Magnification Ranges : Total range 50x – 1,000,000x
- Plate Camera : 6.5 cm x 9 cm plate size
- 2K x 2K Post Column digital Camera

Nuclear Magnetic Resonance Spectroscopy (NMR)

Nuclear magnetic resonance (NMR) is a physical phenomenon in which nuclei in a magnetic field absorb and re-emit electromagnetic radiation. This energy is at a specific resonance frequency which depends on the strength of the magnetic field and the magnetic properties of the isotope of the atoms. Sophisticated multinuclear FT NMR Spectrometer model ECX-300 (JEOL) is the latest acquisition in the Centre. The instrument is equipped with a cryomagnet of field strength 7.0 T. The instrument is accompanied by Delta NMR data processing software and features complete spectrometer control for sophisticated multipurpose applications. Other highlights being, gradient shimming, auto shimming auto tuning and homo-hetronuclear de-coupling with 0.005Hz offset result. A sensitive 5 mm multinuclear BBO probe allow to study a large number of NMR sensitive nuclei such as 19F, 31P.

Make: Jeol
Model: ECX-300

FEATURES AND SPECIFICATIONS

Frequency:

- 1H frequency is 300Mhz, while for 13C the frequency is 100 MHz.

Temperature range:

- -50°C to +150°C

Experiment:

- 1D 1H and 13C NMR Spectrum.
- Solvent suppression experiment.
- 2D COSY and HETCOR Experiments
- DEPT-135, DEPT-90, DEPT-45 and QUAT experiments

Thermo-Gravimetric Analysis (TGA)

Thermogravimetric Analysis is a technique in which the mass of a substance is monitored as a function of temperature or time as the sample specimen is subjected to a controlled temperature program in a controlled atmosphere. TGA measures a sample's weight as it is heated or cooled in a furnace. A TGA consists of a sample pan that is supported by a precision balance. That pan resides in a furnace and is heated or cooled during the experiment. The mass of the sample is monitored during the experiment. A sample purge gas controls the sample environment. This gas may be inert or a reactive gas that flows over the sample and exits through an exhaust.

Make: METTLER TOLEDO
Model: TGA/DSC-I

FEATURES AND SPECIFICATIONS

Balance Capacity

- ~ 200 mg with 1 μgm resolution without range switching.

Baseline/blank reproducibility

- < +/- 10ug for the full temperature range.

Temperature Range

- RT to 1100°C with accuracy of +/- 0.25°C

Heating / cooling rate

- 250 K/Min. / -20K/min

Crucible

- Al2O3- 70 μl, Pt- 70

Gas Chromatography - Mass Spectrometry (GC-MS/MS)

Gas chromatography–mass spectrometry (GC-MS) is a method that combines the features of gas chromatography and mass spectrometry to identify different substances within a test sample. Applications of GC-MS include drug detection, fire investigation, environmental analysis, explosives investigation, and identification of unknown samples.

Make: Varian
Model: 450 GC, 320 MS

FEATURES AND SPECIFICATIONS

Temperature range:
- Ambient to 325 ^{o}C

Temperature-programmed ramps:
- 25 temperature ramps per method

Maximum temperature ramp rate:
- 120 ^{o}C/min for all voltages

Temperature range:
- 50 ^{o}C to 450 ^{o}C isothermal 1079 PTV Injector

Maximum temperature ramp rate:
- 200 ^{o}C min

Injectors:
- CP-1177 Split/Splitless or 1079 PTV (Programmable Temperature Vaporizing)

Experimental Modes:
- Scanning Modes: Scan modes: Q1MS, Q3MS, Precursor (Parent), Product (Daughter), Neutral Loss, Selected Ion Monitoring (SIM), Selected Reaction Monitoring (SRM), Full Scan
- Ionization modes: Electron Ionization (EI) or positive/ negative Chemical Ionization (CI)

Gas Chromatography (GC)

A gas chromatograph (GC) is an analytical instrument that measures the content of various components in a sample. The analysis performed by a gas chromatograph is called gas chromatography.

Make: Shimadzu
MODEL: GC-2010

FEATURES AND SPECIFICATIONS

Sample Injection Method:

- Liquid Sample Injection via special Micro syringe

Sample Volume:

- 0.1 – 8.0 ml (Using 10 ml Syringe)
- 0.5 – 40 ml (Using 50 ml Syringe)
- 2.5 – 200 ml (Using 250 ml Syringe)

Types of sample injection mode:

- a. Traditional
- b. Solvent Flush
- c. Solvent flush with second solvent

Injection Volume linearity:

- ±0.5%

Fourier-Transform Infrared Spectroscopy (FT-IR)

The Bruker Vertex 70 is used to obtain an infrared spectrum of absorption, emission, photoconductivity or Raman scattering of a solid, liquid or gas.

Make: Bruker
Model: Vertex-70

FEATURES AND SPECIFICATIONS

Spectral range:
4000 to 350 cm^{-1}

Beam splitter option:
KBr (Broadband): 10000 to 380 cm^{-1}

Spectral resolution:
Better than 0.4 cm^{-1}

Wavenumber accuracy:
Better than 0.01 cm^{-1}

Photometric accuracy:
Better than 0.1%T

Aperture ratio:
f/205, nominal bean diameter 40mm (1.37")

Rapid scan:
15 spectra/ sec @ 1 cm^{-1}

Differential Scanning Calorimetry (DSC)

DSC is a differential scanning calorimeter for studying samples in solution. It can be used to measure the intramolecular stability of a broad spectrum of biomolecules, including proteins, nucleic acids, lipids, and detergent micellar systems. DSC provides fast, accurate transition midpoint (Tm) determination. In addition, a thermodynamic profile can be generated, providing insight into the factors that affect conformation and stability. Typical applications include determination of protein stability and folding, antibody domain structure determination, characterization of membranes and lipids, and the measurement of ultra-tight molecular interactions.

Make: Malvern
Model: VP-DSC

FEATURES AND SPECIFICATIONS

Operating temperature range:

- 2 to 130°C

Response time:

- 7 s

Cell volume:

- 500 µl

Cell material:

- Tantalum
- Self-contained pressurization system (0-45 psi)

System ability:

- measure very tight binding constants (up to 10-20 M-1)

Dynamic Light Scattering (DLS)

Dynamic Light Scattering (also referred to as Photon Correlation Spectroscopy or Quasi-Elastic Light Scattering) is a technique used for the measurement of the size, electrophoretic mobility of proteins, zeta potential of colloids and nanoparticles, and optionally the measurement of protein mobility and micro rheology of protein and polymer solutions. The high performance of the Zeta sizer Nano ZS also enables the measurement of the molecular weight and second virial coefficient, A2, of macromolecules and kD, the DLS interaction parameter.

Make: Malvern
Model: Nano ZS

FEATURES AND SPECIFICATIONS

Temperature control range:
- 0ºC - 90ºC +/-0.1

Light source:
- He-Ne laser 633nm, Max 5mW.

Experimental Mode:
- 1. Size measurement

Measurement range:
- 0.3nm – 10.0 microns (diameter).
- 2. Zeta potential

Measurement range:
- 3.8nm – 100 microns (diameter)

Measurement principle:
- Electrophoretic Light Scattering
- 3. Molecular weight determination

Measurement range:
- 980Da – 20M Da

Measurement principle:
- Static Light Scattering using Debye plot

Atomic Force Spectroscope (AFS)

Force spectroscopy is a single molecule technique that allows the real-time study of molecular interactions on the nanoscale. Originating from the broad field of Atomic Force Microscopy, force spectroscopy provides the sensitivity necessary to characterize biomolecular interactions such as the unfolding forces of single proteins or forces of a single chemical bond. For the very first time, the automation of force spectroscopy makes it fast enough to deliver high quality data in short time-frames. A large variety of accessories makes the system highly flexible.

Make: JPK Instruments
Model: ForceRobot 300

FEATURES AND SPECIFICATIONS

- Protein (un)folding and receptor-ligand interactions
- Analysis of adhesion forces of single macromolecules for surface chemistry and polymer science
- Elastic response or melting of DNA
- Single molecule mechanical properties, e.g. muscle proteins, synthetic biopolymers, carbohydrates or spider silk protein
- Localization of binding of small molecules on proteins (e.g. inhibitors on membrane proteins)
- Quantification of kinetics, affinity and energy landscapes of biological interactions
- Colloidal probe and Nanoindentation experiments
- Analysis of adhesion forces of single macromolecules for surface chemistry and polymer science


accuron

Isothermal Titration Calorimetry (Auto ITC)

The isothermal titration calorimetry (ITC) instrument allows direct and label-free measurement of binding affinity, and thermodynamic parameters. Heat released or absorbed during biomolecular binding events is measured directly, giving information about binding affinity (Kd), stoichiometry (n), enthalpy (ΔH), and entropy (ΔS) in a single experiment. This data reveal the forces that drive complex formation, providing deeper insights into structure-function relationships and the mechanisms of binding. In drug discovery, the information can be used together with structural data to guide drug design and to resolve the mechanism of drug action.

Make: Malvern
Model: MicroCal Auto-iTC200

FEATURES AND SPECIFICATIONS

- All binding parameters (affinity, stoichiometry, enthalpy and entropy) in a single experiment.
- Quick to first result with minimal assay development, no labelling, no immobilization and no molecular weight limitations.
- Sensitivity to investigate any biomolecular interaction using as little as 10 µg of protein.
- Exceptional data quality for sub-millimolar to picomolar affinity constants.
- Directly measures millimolar to nanomolar binding constants (10-2 to 10-9 M)
- Measures nanomolar to picomolar disassociation constants using competitive binding techniques (10-9 to 10-12 M)

Analytical Ultracentrifuge (AUC)

Analytical ultracentrifugation is a versatile and powerful technique for in-solution characterizing of macromolecules such as proteins, oligomers, aggregates, particles, colloids, etc. without the requirement for sample modification or the association with solid support media. This unique column-free separating technique measures the relative change in the distribution of molecular weights, providing an efficient way to measure heterogeneity, stoichiometry and self-associating systems. And, because the measurements are based on the first principles of thermodynamics and hydrodynamics, no standards or calibrations are required. Coupled with contemporary data analysis methods, AUC rigorously determines sample purity, characterizes assembly and disassembly mechanisms of biomolecular complexes, determines subunit stoichiometry, detects and characterizes macromolecular conformational changes, and measures equilibrium constants and thermodynamic parameters for self- and hetero-associating systems.

Make: Beckman Coulter
Model: ProteomeLab XL-A/XL-I

FEATURES AND SPECIFICATIONS

Detection Systems

- UV/Vis detection system that provides sensitivity for low-concentration work and selectivity for optimizing detection based on the sample's maximum absorbance.
- Rayleigh Interference Optics provides the capability to measure the change in refractive index resulting from changes in sample concentration.

Rotor

- An-50 Ti 8-Place Rotor
- r max: 7.3 cm
- r min: 5.8 cm

Maximum Speed:

- 50,000 rpm

Maximum RCF at r max (g):

- 201,600 x g

Rotor Material:

- Titanium

Surface Plasmon Resonance (SPR)

Biacore system exploits surface plasmon resonance as the detection principle to monitor the interaction between bimolecular real time without labeling. It provides binding kinetics, affinity, specificity and concentration without any needs for labels. The Biacore 3000 system enables the comprehensive characterization of the biomolecular interactions, like Quantitative kinetic analysis (rate constants), Quantitative determination of affinity constants, Concentration determination, Determination of binding specificity and Thermodynamic measurements.

Make: GE Healthcare
Model: Biacore 3000

FEATURES AND SPECIFICATIONS

1. Concentration measurement

- (For analysis times $<$15 minutes, precision $\leq$5% CV dose)

High molecular weight analytes (104 -106 g/mole)

- a. Direct assay typically 10-5 - 10-9 M
- b. Sandwich assay typically 10-3 - 10-11 M

Low molecule weight analytes ($<$5000 g/mole)

- Inhibition assay typically 10-3 - 10-9 M

2. Affinity measurements at equilibrium

- KA typically 104 - 1011 M-1

3. Kinetic measurements

- High molecular weight analytes (104 -106 g/mole)
- Ka: typically 103 - 107 M-1 s-1 and kd : typically 10-1 - 5 $\times$ 10-6 s-1

Phospho-imager

Bimolecular Imager (FLA 9000) is a versatile laser scanner for biomolecular imaging applications including sensitive and quantitative measurements of radio isotopic labels by storage phosphor, chemi-fluorescent Western blots, and multiplex fluorescence as well as digitization of colorimetric stains.

Make: GE Healthcare
Model: FLA 9000

FEATURES AND SPECIFICATIONS

Detection modes:

- Fluorescence, Phosphorimaging, Digitization and Chemiluminescence

Excitation wavelengths:

- 473 nm (blue LD laser), 532 nm (green SHG laser), 635 nm (red LD laser)

Radioisotopes:

- 3H, 11C, 14C, 125I, 18F, 32P, 33P, 35S, 99mTc, and other sources of ionizing radiation

Scanning area:

- 40 × 46 cm

Pixel sizes:

- 10, 25, 50, 100um

Capillary Electrophoresis

It is an analytical technique that separates ions based on their electophoretic mobility with the use of an applied voltage. The electrophoretic mobility is dependent upon the charge of the molecule, the viscosity and the atom's radius. Capillary electrophoresis (CE) is used to separate ionic species by their charge and frictional forces and hydrodynamic radius. Capillary Electrophoresis (CE) technology is employed in a series of related separation techniques that use narrow-bore fused-silica capillaries to separate a complex array of large and small molecules.

Make: BECKMAN COULTER
Model: P/Ace MDQ

FEATURES AND SPECIFICATIONS

Sample Introduction:
- Pressure, Vacuum, Electro kinetic

Voltage Range:
- 1-30 kV

Current Range:
- 3 - 300μA

Pressure Range:
- -5 to 100 psig

Sample temperature:
- 5°C to 60°C

Modes of Operation:
- Constant/Gradient Voltage
- Constant/Gradient Current
- Constant/Gradient Power
- Variable pressure

Confocal Microscope

Confocal laser scanning microscopy (CLSM or LSCM) is a technique for obtaining high-resolution optical images with depth selectivity. The key feature of confocal microscopy is its ability to acquire in-focus images from selected depths, a process known as optical sectioning. Images are acquired point-by-point and reconstructed with a computer, allowing three-dimensional reconstructions of topologically complex objects.

Make: Nikon
Model: AI(R)

FEATURES AND SPECIFICATIONS

Laser:

- 405 nm, 440/445 nm, 488 nm, 561/594 nm, 638/640 nm,
- Ar laser (457 nm, 488 nm, 514 nm), HeNe laser (543 nm)

Wavelength

- 400-750 nm

Detector

- 4 PMT

Filter cube

- 6 filter cubes

DNA Sequencer

High throughput, automated DNA sequencing services are currently provided by the use of the state of the art Applied Biosystems 3130xL Genetic Analyzer. This capillary based instrument has the capability to run up to 16 samples in one run with read lengths of greater that 1,000 bases (PHRED Q20 scores > 800) within 2 hours.

Make: Applied Biosystems
Model: 3130xl Genetic Analyzer

FEATURES AND SPECIFICATIONS

- DNA sequencing of plasmids and PCR products (using BDT v3.1)
- Auto-loading of samples performed from two micro-titer plates: 96 well format
- Arrays with sixteen capillaries in two different lengths: 36 and 50 cm
- Argon laser with primary excitations at 488 and 515 nm
- Detection of up to 5 dyes for sequencing and fragment analysis
- CCD detection technology and spectrograph for color separation
- Simultaneous dual-side illumination detection system to maximize signal uniformity and sensitivity

Macromolecular Crystallography Unit

X-ray crystallography is the technique predominantly used to determine the three dimensional structure of biological macromolecules including proteins, RNA, DNA, or other macromolecular complexes at atomic resolution. The technique basically relies on the phenomenon of the X-ray diffraction. The X-ray diffraction is caused by the interaction of the electromagnetic X-ray waves with the atoms present in the crystals especially the electrons. The wavelength of X-rays used (~0.8 to 1.5 Å) in the experiments allow us to resolve high resolution atomic structures of the macromolecules.

Make: Rigaku
Model: Micro-007

FEATURES AND SPECIFICATIONS

X-ray Generator:

- Maximum power: 1.2 kW
- Voltage: 20 – 40 kV
- Current: 10 – 30 mA
- Available target: Cu Kα-1.5418Å

Image plate detector:

- Plate Diameter: 345 mm
- Usable detector area: 93.480 mm^2

Flow Cytometry Facility

Flow cytometry is a laser based, biophysical technology employed in cell counting, cell sorting, biomarker detection and protein engineering, by suspending cells in a stream of fluid and passing them through an electronic detection apparatus. A flow cytometer allows simultaneous multiple parametric analysis of the physical and chemical characteristics of up to thousands of particles per second.

Fluorescence Activated Cell sorter
Make: BD
Model: ARIA III
Fluorescence Activated Flow cytometer
Make: BD
Model: Verse & Accuri

FEATURES AND SPECIFICATIONS

BD FACS ARIA III (SORTER & ANALYSER)

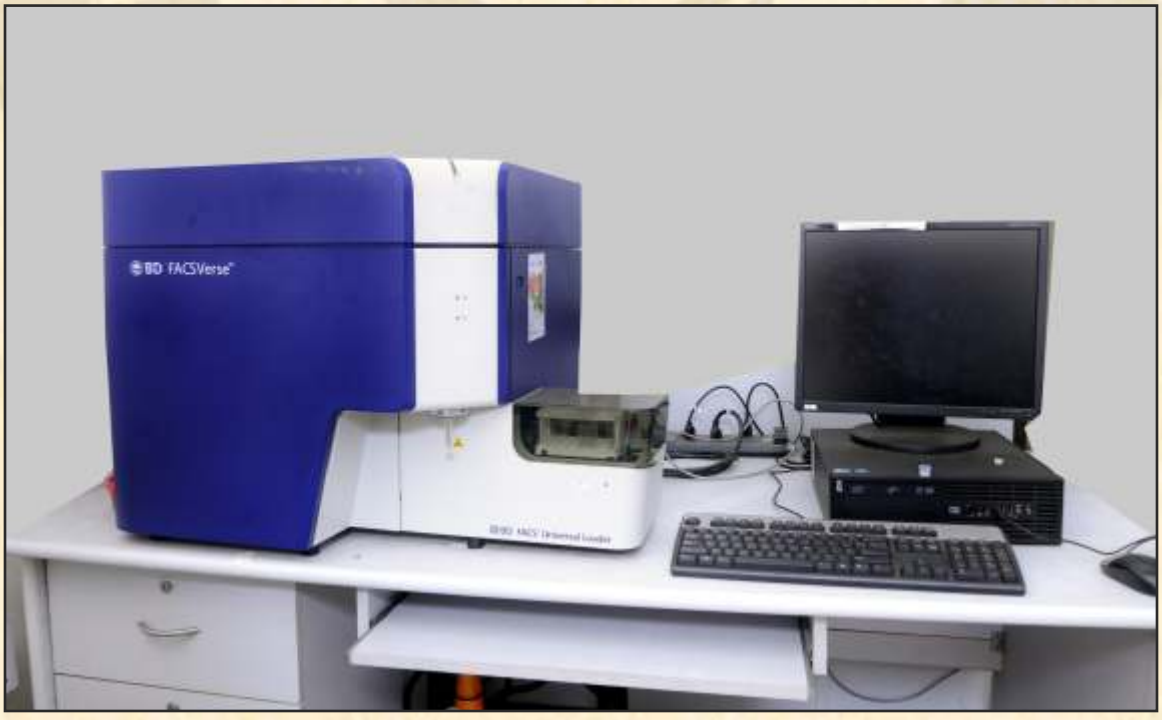
- Equipped with 4 lasers (405, 488,633 and 561nm)
- Fluorescence Detectors: 10 PMTs in 3-4-2-2 configuration
- Two wavelengths detected from the 488 nm laser –FITC & PerCP-Cy5.5
- Five wavelengths detected from the 561 nm laser –PE, PE-Cy5, PE-Cy7 & PE-Texas red
- Two wavelengths detected from the 633 nm laser-APC & APC-Cy7
- Two wavelengths detected from the 405 nm laser-DAPI & Am Cyan

BD FACS VERSE (ANALYSER)

- Equipped with a Blue (488nm) and a Red (633nm) lasers, two light scatter detectors (FSC and SSC), and six fluorescence detectors (FITC, PE, PerCP-Cy5.5, PE-Cy7, APC & APC-Cy7)

ACCURI C6 (ANALYSER)

- Equipped with a Blue (488nm) and a Red (633nm) lasers, two light scatter detectors (FSC and SSC), and four fluorescence detectors (FITC, PE, PERCP &APC)
- A sheath-focused core enables event rates of up to 10,000 events per second and a sample concentration of over 5 x 106 cells per ml.



Atomic Force Microscope

The Atomic Force Microscope (AFM) is a powerful instrument for nano-meter scale science and technology. Applications in the biosciences include: DNA and RNA analysis; Protein-nucleic acid complexes; Chromosomes; Cellular membranes; Proteins and peptides; Molecular crystals; Polymers and biomaterials; Ligand-receptor binding, Biomolecular force mapping. By using phase imaging technique one can distinguish the different components of the cell membranes.

Make: Veeco
Model: XE100

FEATURES AND SPECIFICATIONS

- Cantilever
- Tip-sample distance: 3 nm (typical)
- Cantilever oscillation frequency: 1 - 600 kHz
- Cantilever oscillation amplitude: 1 - 2 nm (typical)

Camera:

- On-axis color CCD with motorized zoom

Field of view:

- 1.24mm x 0.25mm

Resolution:

- Less than 2μm with standard 10x objective [0.75μm with 50μm]

Sample Size:

- 15 mm diameter; 5 mm thick

High Performance Liquid Chromatography (HPLC)

High-performance liquid chromatography (HPLC) is widely used in diverse fields such as pharmaceuticals, and biochemistry to chemistry, the environment, and food products. Our HPLC systems are equipped with UV-visible, fluorescence and photo diode array (PDA), detectors. The system has a multitude of set-ups and combination and is capable of delivering both isocratic and gradient solvent elution with various flow rates. A wide range of separations are performed on the instrument, encompassing both normal and reverse phase conditions; with a wide variety of column chemistries utilised for purification, quantitative analysis, fractionation, and separation.

Make: Shimadzu
Model: Prominence

FEATURES AND SPECIFICATIONS

- The LC-20AD offers the fast solvent delivery with pulse-free solvent delivery.
- The CTO-20A is a forced-air circulation-type column oven with temperature control from 10°C below room temperature to 85°C.
- The CTO-20A can incorporate up to two flow-line selection valves, a manual injector, and a gradient mixer.
- The SPD-20AV with its deuterium lamp and tungsten lamp can measure two wavelengths simultaneously.

Peptide Synthesizer

The PS3™ has 3 serial reaction vessels and allows up to 45 couplings without user intervention or reloading. The efficient packaging method for protected amino acids and activator simplifies procedures and reduces the number of mechanical components required.

Make: Protein Technologies
Model: PS3

FEATURES AND SPECIFICATIONS

Synthesis Scale:

- 0.005 - 1.50 mmol (at 2x excess, up to 1.0 g of resin per RV)

Reagents/Solvents:

- Amino acids & activators, Pre-packaged vials (0.4 mmol and 1.0 mmol)

Synthesis:

- Peptides can be synthesized from dimers to ~ 60mers using Fmoc Chemistry (All natural amino acid and also using d-amino acids).
- Cyclic peptide can be synthesized using N-C cyclization and also S-S disulphide bridging maximum upto two disulphide bonds.
- Dye labeling (FITC, Congored, Cy5, Pyrene, and TAMRA) can also be carried out.
- Two Dedicated HPLC (Thermo-Dionex, Waters HPLC) for purification of peptides.


UltiMate 3000


RESTRICTED AREA

Liquid Chromatography - Mass Spectrometry (LC-MS/MS)

Agilent 6550 iFunnel Q-TOF along with Agilent 1290 Infinity Binary LC has excellent speed and sensitivity for qualitative and quantitative analysis. The Agilent 6550 iFunnel Q-TOF LC/MS system delivers the lowest detection levels of any high resolution LC/MS instrument. It has low femtogram-level sensitivity with high resolution and accurate mass. It's the ideal choice for pharmaceutical, metabolite ID, discovery proteomics, metabolomics, food safety, forensics, toxicology, and environmental screening applications.

Make: Agilent
Model: 6550 iFunnel Q-TOF along with 1290 Infinity Binary LC

FEATURES AND SPECIFICATIONS

- 40k mass resolution
- Sub ppm mass accuracy from m/z 20-10,000
- Femtogram-level sensitivity
- Scanning of up to 50 spectra per second
- Protein Identification by searching MS/MS Spectra using MS/MS ions search or searching by Peptide mass fingerprinting (PMF)
- Post translation modification
- Quantitative and qualitative analysis

Circular Dichroism (CD)

Circular Dichroism (CD) relies on the differential absorption of left and right circularly polarised radiation by chromophores which either possess intrinsic chirality or are placed in chiral environments. Proteins possess a number of chromophores which can give rise to CD signals. In the far UV region (240-180 nm), which corresponds to peptide bond absorption, the CD spectrum can be analysed to give the content of regular secondary structural features such as α-helix and β-sheet. The CD spectrum in the near UV region (320-260 nm) reflects the environments of the aromatic amino acid side chains and thus gives information about the tertiary structure of the protein. Other non-protein chromophores such as flavin and haem moieties can give rise to CD signals which depend on the precise environment of the chromophore concerned.

Make: Jasco
Model: J-815

FEATURES AND SPECIFICATIONS

- Estimation of protein secondary structure content.
- Detection of conformational changes brought about by changes in pH, salt, and added cosolvents (simple alcohols, tri-fluoroethanol, and so on).
- Monitoring protein denaturation brought about by changes in temperature or by the addition of chemical denaturants (urea, guanidine hydrochloride).
- Monitoring protein–ligand, protein–peptide, and protein–protein interactions.
- Studying protein self-association through CD studies as a function of concentration. Studying (in favorable cases) the kinetics of ligand binding (particularly slow dissociation processes), protein denaturation, and protein refolding.

Automated Crystallization Facility

The facility is equipped with high-throughput automated nanolitre dispensing robot for setting up crystallization trials for both soluble and membrane proteins. The robot is equipped with humidity control feature. LCP syringe is available for setting up LCP plates. The crystallization experiments are monitored using automated crystal imaging system with 1000 plate storage capacity. Initial hits are further optimized to produce diffraction quality crystals. Both visible and UV imaging facilities are available.

Make: Formulatrix
Model: NT-8, R1-1000

FEATURES AND SPECIFICATIONS

- LCP dispensing available for screening membrane proteins.
- The largest and most versatile system with 1000 plate storage and scheduled imaging capabilities.
- Equipped with both UV and Visible imaging microscopes.
- Helps in monitoring crystallization experiments with ease with minimal manual intervention.


FORMULATRIX

Lyophillizer

The main principle involved in freeze drying is a phenomenon called sublimation, where water passes directly from solid state (ice) to the vapour state without passing through the liquid state. Sublimation of water can take place at pressures and temperatures below triple point, i.e., 4.579 mm of Hg and 0.0099 °C. The material to be dried is first frozen and then subjected under high vacuum to heat (by conduction or radiation or by both) so that frozen liquid sublimes leaving only solid, dried components of the original liquid. The concentration gradient of water vapour between the drying front and condenser is the driving force for removal of water during lyophilisation.

Make: VirTis
Model: Benchtop K

FEATURES AND SPECIFICATIONS

- Pharmaceutical companies often use freeze drying to increase the shelf life of products, such as vaccines and other injectables. By removing the water from the material and sealing the material in a vial, the material can be easily stored, shipped and later reconstituted to its original form for injection.
- Freeze drying is used to preserve food and make it very light weight. The process has been popularized in the form of freeze dried ice-creams, an example of astronaut's food.
- In chemical synthesis, products are often freeze dried to make them more stable, or easier to dissolve in water for subsequent use. In bio-separations, freeze drying can be used also as a late purification procedure, because it can effectively remove solvents. It is capable of concentrating substances with low molecular weights that are too small to be removed by a filtration membrane.
- It is used for drying of heat sensitive compounds/products (compounds which degrade at higher temperature).

UV Visible Spectroscopy

It is based on Beer Lambert law which states that the absorbance of a solution is directly propositional to the concentration of the absorbing species in the solution and the path length. Thus, for a fixed path length, UV/Visible spectroscopy can be used to determine the concentration of the absorber in a solution. The Woodward-Fieser rules, for instance, are a set of empirical observations used to predict λmax, the wavelength of the most intense UV/visible absorption. The nature of the solvent, the pH of the solution, temperature, high electrolyte concentration, and the presence of interfering substances can influence the absorption spectrum. Experimental variation such as the slit width (effective bandwidth) of the spectrophotometer will also alter the spectrum.

Make: Agilent Technologies
Model: Cary 60 UV-Vis

FEATURES AND SPECIFICATIONS

- UV absorption spectroscopy is one of the best methods for determination of impurities in organic molecules. Additional peaks can be observed due to impurities in the sample and it can be compared with that of standard raw material.
- UV absorption spectroscopy can be used for the quantitative determination of compounds that absorb UV radiation.
- Identification of compounds is done by comparing the absorption spectrum with the spectra of known compounds.
- The PKa value of various compounds can be determined spectrophotometrically from the graph plotted between absorbance and wavelength at different pH values.
- Kinetics of reactions can also be studied using UV spectroscopy. The UV radiation is passed through the reaction cell and the absorbance changes can be observed.
- Many drugs are either in the form of raw material or in the form of formulation can be assayed.
- Dissolution study can be done.
- Biological assay can be done.

Probe Sonicator

Sonication is the act of applying sound energy to agitate particles in a sample for various purposes. Ultra-sonic frequencies are usually used to bring about reduction in particle size of developed formulation in nano range.

Make: Sonics
Model: VCX 750

FEATURES AND SPECIFICATIONS

- Sonication can be used for the production of nano-particles such as nano-emulsions, nano-crystals, liposomes, micelle formulations etc.
- It can be used for cell disruption and release cellular contents.
- Sonication is commonly used in nanotechnology for evenly dispersing nano-particles in liquids and to break-up aggregates of micron-sized colloidal particles.

Fume Hood

A Fume Hood (sometimes called a Fume Cupboard or Fume Closet) is a type of local ventilation device that is designed to limit exposure to hazardous or toxic fumes, vapours or dusts.

Make: Thermo Scientific
Model: 1300 Series A2

FEATURES AND SPECIFICATIONS

- Protecting the user from inhaling toxic gases.
- Protecting the product or experiment from neighboring environment.
- Protect in the environment (recirculating fume hoods and any other type when fitted with appropriate filters in the exhaust air-stream).
- It also functions for explosion protection, spill contamination, and other functions.

UV Visible Plate Reader

Microplate reader is a high quality monochromator based UV/Visible spectrophotometer. It follows Beer- Lambert's law. According to this law, the medium concentration of any liquid is directly related to the waves absorbed in the liquid when waves are passed through it. Absorbance, also known as Optical Density (OD), is defined as the logarithmic ratio between the intensity of light hitting a sample and the intensity of that very light transmitted through the sample. While a specific wavelength of light selected by a filter illuminates a sample, part of this light gets absorbed. The non- absorbed light passes through the sample and is collected by a detector located opposite the light source, on the other side of the microplates well. Luminescence is the result of a chemical or biochemical reaction. Luminescence detection is simpler optically than fluorescence detection because luminescence does not require a light source for excitation or optics for selecting discrete excitation wavelengths. A typical luminescence optical system consists of a light – tight reading chamber and a PTM detector.

Make: BioTek
Model: Synergy Hybrid Reader

FEATURES AND SPECIFICATIONS

- Absorbance has been used for the quantification of the nucleic acids and proteins as well as in popular colorimetric reaction such as ELISA tests
- It is used in spectral scanning, endpoint and kinetic measurement to measure absorbance in the UV/Visible region using appropriate plate or cuvettes.
- It is used in protein and cell growth assays
- Protein – protein interactions
- Reporter assays
- Molecular interactions study
- To know enzyme activity
- To do immunoassays


Thermo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