

NANOTECH RESEARCH INNOVATION AND INCUBATION CENTRE (NRIIC)

PSG INSTITUTE OF ADVANCED STUDIES

Avinashi road, Coimbatore

COIMBATORE-641004

www.psgias.ac.in

Nanotechnology- Characterization, Synthesis, Development and Testing

The Centre has a dedicated team of qualified and experienced researchers and technical staff with specialization in chemistry, physics, biotechnology, engineering, metallurgy, polymer science and textiles.

The infrastructure includes a clean room (Class 1000/10000) with multi source PVD integrated with glove box, Plasma enhanced CVD with reactive ion etching, Nano imprint lithography, Rapid thermal annealing equipment, Wet benches, Spin coater, yellow room etc.. Characterization equipment includes High Resolution TEM, E-SEM, Multi mode scanning probe microscope, TG-DSC, Microscopes, FTIR, Profilometer, UV Spectro photometer, etc., that support Nanotechnology domain in terms of Material development, Synthesis, and testing and characterization.



High resolution Transmission Electron Microscope (HRTEM)

The JEOL JEM 2100 HRTEM provides one of the best-in-class solutions to problems in diverse fields ranging from material science to biology. The microscope enables to view lattice resolution of 0.14 nm and point to point resolution of 0.19 nm. It has an operating voltage range from 80KV to 200KV based on sample requirement. The HRTEM facility has a full range of Gatan sample preparation equipments for TEM specimen preparation.

Environmental Scanning Electron Microscopy (SEM)

Scanning electron microscope (SEM) is a non-destructive technique that uses an electron beam to analyze surface details down to nano-scale. PSG IAS has EVO 18 model with low vacuum facility and ALTO 1000 cryo attachment for biological, hydroscopic and sensitive samples.

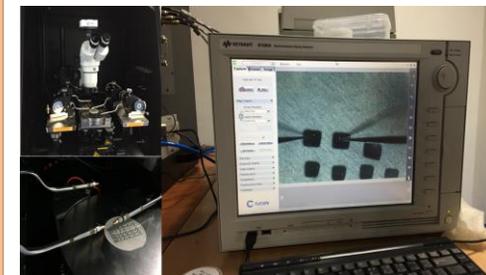


AFM / SPM

The Multimode scanning probe microscope is capable of performing multimode operations especially for analyzing surface characteristics with high precision and resolution. It is possible to carry out experiments in air, vacuum as well as in liquids in controlled environment. New generation electronics provide operations even in higher frequency modes.

CV-IV analyser with probe station

Keysight B1500A parametric analyzer with Cascade EPS150 Triax EDU probe station for device characterization with capability of Current-voltage (IV) measurement of spot, sweep, sampling and pulse measurement in the range of 0.1 fA - 1 A / 0.5 μ V - 200 V, AC capacitance in multi frequency from 1 kHz to 5 MHz .





ZEM3 M10 Seebeck and electrical resistivity measurement system:

This system is capable of carrying out simultaneous measurements of Seebeck coefficient and electrical resistivity of thermoelectric materials with high reproducibility. It can measure a wide range of samples including semiconductors, oxides and metals at a temperature range between 50 deg C to 1000 deg C

Multisource PVD system

The PVD system, installed in class 10,000 clean room, is capable of depositing wide variety of materials starting from metals, organics, oxides to composites thin films. It supports co-evaporation and co-sputtering ability to cater the need of all the processes involved in building state of art devices. Uses RF and DC/pulsed magnetron sputtering with 3" target. It is a multi-source system with RADAK (2 nos.) - Alumina crucible upto 1250 deg C and thermal (2 nos.) with bloat and filament type



ICP-CVD System

Inductively Coupled Plasma-Chemical Vapor Deposition system combines the advantages of a high density plasma ICP source with PECVD allowing for the extension of deposition technology to significantly lower temperatures resulting in higher density films.



Ultra Centrifuge

Beckman Coulter's Optima XPN-100 Ultracentrifuge is a high performance centrifuge optimized for spinning at speeds approaching 100,000 rpm or 802,000 x g. It features an imbalance detector that will prevent dangerous operations, a diffusion pump in series with a mechanical vacuum pump to increase spin efficiency, and interchangeable rotors and accessories to customize specific sample requirements. Its main purpose is to separate components of a sample through the use of relative centrifugal force. It has a wide range of applications ranging from separating blood to measuring conformational changes in proteins, nanoparticles and biomolecule.

Confocal Micro Raman Spectrometer:

This is an integrated confocal micro-Raman system with high resolution nano-imaging capability including a confocal microscope, transfer and filtering optics, an achromatic spectrograph equipped with gratings, multichannel detector, lasers, computer controlled xyz stage with a supporting software. The system is capable of measuring the Raman spectra of glassy, crystalline, polymer and liquid/biological samples. The system optics is compatible with the use of NIR, Visible & Ultraviolet lasers with focal length greater than 200 mm, spectral resolution less than 0.5 cm^{-1} . Spectrometer Range: 200 nm – 2200nm



XRD- Multi-purpose, Intelligent Automated Diffractometer system

This system is capable of largest variety of measurements without any manual intervention. It has the unique ability to measure all sample types - from powders to thin films, from nanomaterials to solid objects - on a single instrument. It covers the largest set of X-ray diffraction, scattering and imaging applications in one single instrument.



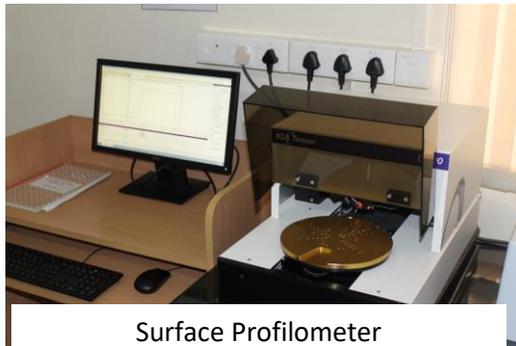
Bar coater



Dip coating unit



Box coater



Surface Profilometer



Ultrasonic Spray Pyrolysis unit



Rheometer



Electro-spinning unit



Sputtering (DC/RF)



3D Bio printer



Spin coater



Major Equipments

- High Resolution Transmission Electron Microscope (HRTEM)
 - Energy Dispersive spectroscopy(EDS)
 - Multimode Scanning Probe Microscope
 - Raman spectrometer
 - XRD
 - E-SEM
 - CV/IV analyzer with probe station
 - Optical Polarizing Microscope
 - T90+ UV/Vis spectrophotometer
 - UV/Vis spectrophotometer
 - DSC/TG analyzer
 - Spectro-fluorometer
 - Seebeck measurement system
 - Multisource PVD system and Parylene coater
 - Sputtering unit (DC)
 - Rheometer
 - Ultra Centrifuge
 - Spin coating unit
 - EC workstation
 - Environmental Chamber
 - Sputtering unit (DC)
 - Solar simulator
 - Box coater
 - Spin coater
 - Screen Printer
 - Fuel cell test station
 - Microwave synthesizer
 - Tubular Furnace
 - 3D printer
 - Hardness tester
 - Ultrasonic bath
 - Haemocytometer
 - Spray pyrolysis unit
 - Pit type melting furnace (1300°C)
 - Ball mill
-and much more.....

Major labs:

- Nano characterization
- Nano sensor
- Nano Bio-technology
- Functional, Innovative and Smart Textiles (FIST)
- Nano Chemistry
- Solar lab
- Tissue engineering
- Flexible electronics
- Thermoelectric materials
- Hybrid electronics
- Electrochemical sensors and Energy materials lab

Contact details

Dr. KK Venkataraman
kkv@psgias.ac.in
+91 9500950311

Dr. Bindu Salim
bbs@psgias.ac.in
+91 9790039955

www.psgias.ac.in