SATHI Foundation IIT Kharagpur

Fostering research-based innovation for Atmanirbhar Bharat

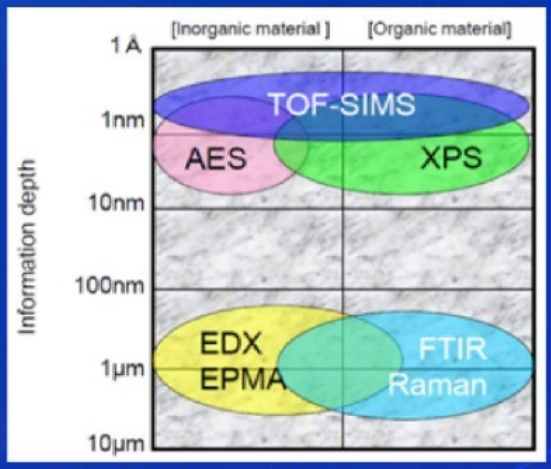
Scientific and Engineering Services in Advanced Materials

Time-of-Flight SIMS (PHI nanoToF III)

ToF-SIMS (PHI nanoTOF III) installed at the SATHI Foundation IIT Kharagpur Facility

Time-of-flight secondary ion mass spectrometry (TOF-SIMS) is a key analytical technique for detecting, identifying, and imaging the distribution of both elements and molecules on the surface of materials. TOF-SIMS is the only mass spectrometry imaging technique that provides less than 50 nm spatial resolution with full mass range detection.

Due to the limitations of TOF-SIMS in mass accuracy and mass resolution, high mass peaks often go unidentified in traditional TOF-SIMS experiments. PHI's revolutionary Parallel Imaging MS/MS eliminates this limitation with its Integrated Parallel Imaging MS/MS for fragmentation and analysis in a separate TOF analyzer providing unambiguous peak identification and parallel tandem MS imaging capability.



ToF-SIMS is a surface sensitive analysis technique

Main Features

- High spatial resolution of < 500nm in high mass resolution mode and < 50nm in high spatial resolution mode
- High precision analysis with TRIFT based spectrometer
- Automated Sample Transport System and Parking Position
- Unique ion beam technology
- Argon ion Gun for complete Turnkey Charge Neutralization
- Integrated bakeout facilities
- 30kV LMIG with Bi, Au, or Ga emitter & HR2 imaging
- In situ optical viewing
- 5 axis sample stage with in vacuum parking

Advantages of ToF-SIMS

- Can analyze any kind of samples, insulator, powder, fiber, etc.
- Can detect all elements – H, He, Li, etc.
- Can detect isotopes 2H, 18O, 13C, etc.
- High trace sensitivity
- Gives detailed molecular information
- Information depth < 1-2 nm
- High spatial resolution < 50 nm
- Parallel detection of all masses
- 2D & 3D Imaging without Labeling

Applications

1) **Ion mass spectra** (surface sensitivity and chemical selectivity.)
2) **Depth profiling** (of both inorganic and organic materials)
3) **Ion images** (for studying the localization of chemicals on a surface)

Industrial applications of ToF-SIMS include quality control and failure analysis, fundamental material research. ToF-SIMS is being used in various fields viz. Ceramics, Battery, Medicine, Resin adhesion, Polymer, Fiber, Defect on display, BGA, Cu/PI electric circuit, Via hole, Geology, Oil & Gas, Nanoparticles and Catalysis research.

About SATHI Foundation IIT Kharagpur

Department of Science & Technology (DST), Government of India (GoI) has set up a Sophisticated Analytical and Technical Help Institute (SATHI) center at IIT Kharagpur (IIT KGP) to offer services such as Characterization, Testing, Fabrication, Scientific analysis / interpretation, generation of data & knowledge dissemination etc. to various external users including start-ups, MSMEs, large scale industry and academia.

SATHI IIT KGP center will be housing facilities for rapid prototyping, and smart fabrication, in addition to analysis and testing. It will also provide an opportunity for consultancy, training and various levels of collaboration with the stakeholders in the process.

The key theme of the SATHI center at IIT Kharagpur, which will be managed by SATHI Foundation at IIT Kharagpur (a section 8 company) is Advanced Materials.

More details about the Center are available on the website *http://www.sathi.iitkgp.ac.in*

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