

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

Sophisticated Analytical Instrument Facility (SAIF)

Focused Ion Beam - Scanning Electron Microscope (FIB-SEM)

NOTE

PART A : To be filled if user requires FIB Milling, patterning / TEM sample preparation / 3D Slice & View

PART B : To be filled if user requires SEM imaging & EDS Analysis

PART A

Request Form for **FIB Analysis** for internal IITB users

(Details required for FIB Milling, patterning / TEM sample preparation / 3D Slice & View)

Applicant Details

User belongs to: IIT Bombay University National Lab Industry

User Name:

Institute/University/Organisation:

Email ID: Mobile No.:

Name of Guide/PI:

Guide/PI Email ID: Guide/PI Mobile No.:

Address of Institute/Organization:

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Sample information:

Number of samples	
Sample code	
Sample Composition & Sample dimensions (The sample size should	

<p>be less than 10 mm x 10 mm x 4mm and base of the sample should be flat for mounting on sample holder)</p> <p>** Sample Height/ Thickness should not exceed 4mm)</p>	
<p>Analysis Required (Tick the relevant analysis required)</p>	<p>FIB Milling / TEM sample preparation / 3D Slice & View</p> <p>If FIB Milling / 3D Slice & View is ticked then, What feature size (estimated) are you looking to mill / image?</p> <p>_____</p> <p>_____</p> <p>If TEM sample preparation is ticked then, What are the dimensions required for TEM lamella?</p> <p>_____</p> <p>_____</p> <p>Any additional information</p> <p>_____</p> <p>_____</p>
<p>Sample type (you can select multiple options)</p>	<p>Powder (Not for Milling) / Solid / Solid but porous / Magnetic (Highly magnetic samples not possible) / Thin film / Other (Please specify)</p> <p>_____</p> <p>_____</p>
<p>Detailed description of the sample. (Briefly describe the method used to prepare or fabricate your sample before bring it for FIB related preparation)</p>	
<p>Nature of the sample</p>	<p>Non-Conducting / Conducting / Semi-Conductor</p> <hr/> <p>Magnetic /Non Magnetic</p> <p>Is it electron beam sensitive? Yes/No → (Explain if Yes)</p> <p>_____</p> <hr/> <p>Is it volatile? Yes/No →</p> <hr/> <p>Is it flammable? Yes/No →</p> <hr/> <p>Is the material loosely bound under vacuum condition? (Yes/No) (Explain if</p>

	<p>Yes) _____</p> <p>If YES</p> <ol style="list-style-type: none"> 1. Has sticky tape test been done by the user in case of solid / thin film on substrate? (Yes/No) (Explain if No) _____ 2. Has compressed gas blow test been done by the user in case powder on carbon tape? (Yes/No) (Explain if No) _____
<p>Please explain your reason behind preferring FIB (Milling / Cross section imaging / TEM lamella preparation) over other characterisation tools for sample preparation (Maximum 50 words)</p>	
<p>Have you prepared lamella using FIB earlier? If Yes, please provide details of preparation method and sample dimensions <i>If No, then</i> in case of TEM Lamella preparation, Request user to attach a ppt (please prepare a PPT describing your sample detail. Make a diagram describing the details requires for lamella preparation.)</p>	
<p>Is site specific sample preparation mandatory? If so, mention the specific area in the sample. (Publication related to this work would help):</p>	
<p>Note:</p> <ul style="list-style-type: none"> • Please share results that may be helpful for sample preparation and analysis • Samples for FIB related preparations should be well-polished / Uniform • The sample size should be less than 10 mm x 10 mm x 4 mm (height) in case of bulk samples and base of the sample should be flat for mounting on sample holder 	

PART B

Request Form for **SEM-EDS Analysis** for internal IITB users (Details required for SEM imaging & EDS Analysis)

Applicant Details

User belongs to: IIT Bombay University National Lab Industry

User name:

Institute/University/Organisation:

Email ID: Mobile No.:

Name of Guide/PI:

Guide/PI Email ID:Guide/PI Mobile No.:

Address of Institute/Organization:

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.....

Sample information:


Number of samples	
Sample code	
Sample type	Biological / Composite Material / Thin Film / Crystalline Solid / Metal/Polymer/Ceramic/Composite/ Other (Please specify): *biological samples should be submitted after primary fixation
Detailed description of the sample (Refer Annexure I before filling)	
Sample form	Powder/Pellet/Suspension/On glass substrate/Film/Others.....
If sample is Pellet, thin film (Refer Annexure II before filling)	Mention sample dimensions.....
If sample is powder, Dispersion required (Refer Annexure II before filling)	Yes/No If Yes, Medium for dispersion.....
Nature of the sample	Non-Conducting / Conducting / Semi-Conductor
Sample is	Magnetic /Non Magnetic

Type of Analysis & Details of the Analysis required (Kindly tick):

SEM Image	Mode	Secondary Electron Image / Back Scattered Electron Image
	Analysis requirement	Surface Imaging / Cross Section Imaging / Surface + Cross Section imaging (*For powder and suspension samples only surface imaging is possible*)
	Sample to be mounted	Planar/Cross Section/ Powder directly loaded on sample holder/ Drop cast for liquid or suspension samples
	Expected Morphology	Brief description about shape
	Expected Particle Size	
EDS	Analysis requirement	Point EDS /area EDS/EDS mapping/ line scan
	List of expected elements (for EDS)
STEM Imaging		Please mention the sample thickness (Should be < 100nm)

Material safety data:

If you are submitting more than one sample which are different in nature/composition, submit separate MSDS

Sample Properties	Carcinogenic (level) <input type="checkbox"/> Toxic <input type="checkbox"/> Radioactive <input type="checkbox"/> Corrosive <input type="checkbox"/> Explosive <input type="checkbox"/> Flammable <input type="checkbox"/> Other(specify) : _____
Moisture	Present <input type="checkbox"/> Absent <input type="checkbox"/> NA <input type="checkbox"/>
Volatile organic compound	Present <input type="checkbox"/> Absent <input type="checkbox"/> NA <input type="checkbox"/>
Stability of sample	Stable under RTP <input type="checkbox"/> Hygroscopic <input type="checkbox"/> Sublimes <input type="checkbox"/> Reactive in: Air <input type="checkbox"/> Light <input type="checkbox"/> Heat <input type="checkbox"/> Vacuum <input type="checkbox"/> Moisture <input type="checkbox"/> May decompose when exposed to electron beam <input type="checkbox"/>
Mention the storage and handling conditions if anything specific	
Whether incompatible with any material-	Yes <input type="checkbox"/> No <input type="checkbox"/> (Specify the materials):
Health hazards	Yes <input type="checkbox"/> No <input type="checkbox"/> (irritant to skin/irritant to eyes/harmful to skin/ toxic if inhaled/toxic if ingested)
First aid measures	Eye/Skin/Inhalation/ Ingestion/Others (specify):
Disposal Method of sample	
Please fill appropriate numbers in the NFPA diamond: (*reference image attached below)	
Additional information if any	

*Along with this form MSDS should be submitted if available.

Note: All Samples will be discarded after 15 days of analysis. If you wish to collect the samples then you are required to make arrangement for the same. SAIF office will not dispatch the same to users under any circumstances

Declaration

I confirm that the samples submitted for analysis are for research purpose only and the above furnished details are correct and true to the best of my knowledge. I understand that I will be held responsible for any damages arising from incorrect information provided by me against material safety data.

I agree to acknowledge DST and SAIF/CSIF, IIT Bombay for providing (Instrument name) analytical facility for my research work, in my publications. I also agree to send the publication reference (Journal name/volume number/names of the authors/date of issue of the publication etc) to office.saif@iitb.ac.in

I declare that the “Content of this report is meant for our information only and we will not use the content of this report for advertisement, evidence, litigation or quote as certificate to third party” I accept that all the issued reports/results (Soft/hard) will not carry any Signature or Seal and Stamp of SAIF/CSIF IIT Bombay.

Signature of the User

Signature of the In-Charge/HOD/PI
with College/P.I. Guide seal / stamp

Date:

Place:

* Reference image for filling NFPA diamond:



Annexure I, II is for your reference (kindly do not print)

Annexure I

For filling detailed description of the sample: kindly refer to the below sub categories and examples.

If your sample details do not match with the below list, please give the correct sample type and sample description.

Sample type	Description
Biological	Cells (Give type), Tooth, Gels, Scaffolds, Bone, Biofilm, Tissue, Leaf/plant extracts, Insect/Insect parts, Lipids/Liposome's, Proteins, Blood cells, Bacteria (Give type), Sludge, Fibrin gel,
Polymer	Resin, Alginate, Polystyrene, Polypropylene, PDMS, PVC, Polymeric microspheres, Fibers, Thermoplastic polyurethanes, Polymeric scaffold
Metal	Alloy, Chips, Micro tools, Fractography
Geological	Soil, Flyash, Sand, Activated carbon, Brick, Cement
Nanomaterials	CNT, Nano particles (Give type) , Ferrite
Thin film	Specify the material:_____, Substrate: Glass/ Copper/Conducting material/Silicon wafer
Ceramic or Composite material	Detailed description of the sample/composite material

EXAMPLES:

Sample type	Description
Biological	Shrimp waste extract
Biological and Nanomaterials	Au/Ag nano particles prepared from plant extract
Biological	Cells, blood cells or animal cells or E.coli/ Staph. aureus
Polymer	polystyrene nanoparticles
Thin film	Material: ZnO/TiO ₂ /CZTS substrate: glass
Nanomaterials	Gold nano particles or CNT or
Composite material	CNT in polymer, CNT/ carbon and graphene

****For Powder sample: Mentioning sample type and sample description is mandatory.**

Annexure II

Sample preparation instructions for SEM Imaging / EDS analysis:

- **Sample dimensions** should be less than 10 mm x 10 mm x 4 mm (height) in case of bulk samples for obtaining high resolution images.
- **Medium for Dispersion** Ethanol /Methanol / Water /Iso-propyl alcohol are available. Any other medium should be provided by the user. Dispersion will be done by ultrasonication.
- Kindly **mark the edge** of the sample to be observed for **Cross section**.
- Base of the sample should be flat for mounting on sample holder.
- Biological samples will be accepted only after user has done primarily fixation with suitable fixative.
- Samples should be in dry form. Hydrated samples must be dried properly before sending.
- Sample preparation if any should be done at user end (cutting the sample for CS, freeze fracturing, sample fixation for biological samples, staining of samples, oven drying should be done by the user)
- The samples should withstand high vacuum (~ 10⁻⁵ Pa). **Wet samples cannot be done.**
- For any further query, kindly contact on Email: fibsem@iitb.ac.in, Contact: 022-2159-6861

Sample preparation instructions for FIB related analysis

- Sample dimensions should be less than 10 mm x 10 mm x 4 mm (height) in case of bulk samples and base of the sample should be flat for mounting on sample holder.
- Please share results that may be helpful for sample preparation and analysis
- Samples for FIB related preparations should be well-polished / Uniform
- The samples should withstand high vacuum (~ 10⁻⁵ Pa). **Wet samples cannot be done.**
- For any further query, kindly contact on Email: fibsem@iitb.ac.in, Contact: 022-2159-6861

COMMON IMPORTANT NOTE:

1. Users would need to do online registration for their sample analysis. Before proceeding further, please review [How to Use Facility](#) and [Payment Procedure](#) for more information. **Before registering the samples for this facility, users are requested to contact the FIB-SEM lab (Phone No. : 022-21596861 ; Email Id : fibsem@iitb.ac.in)** and also provide the details pertaining to Part A / Part B. You may decide the charges to be paid after mutually understanding the requirements pertaining to Part A & Part B.
2. After the online registration is completed, the appointment will be scheduled as per the queue.
3. The users will be informed about their date and time of slot by e-mail.
4. We prefer that you or your representative, who knows / understands the sample / material, should be present on the day of appointment.
5. Potentially hazardous/toxic/radioactive samples may not be accepted for analysis.
6. After registration, samples can be sent by post or submitted in person to **SAIF/CSIF office, IIT Bombay, Powai, Mumbai-400076.**