INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

 **Cryo High Resolution Transmission Electron Microscope Central Facility**

**(Cryo-HRTEM)**

# Analysis Request Form (Internal & External users)

## Applicant Details

User belongs to: IIT Bombay University National Lab Industry

User name: ..............................................................................................................................................

Institute/University/Organization: ...........................................................................................................

Email ID: .............................................................. Mobile No.: ..............................................................

Name of Guide/PI: ...................................................................................................................................

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

Address of Institute/Organization: ..........................................................................................................

## Sample information:

|  |  |
| --- | --- |
| Number of samples |  |
| Sample Identification codes |  |
| Sample types | Biological/Polymer/Metal/Thin film/Magnetic/Ceramic or Composite material/ Nano particles or Nano materials/Other................................... |
| Detailed description of allsamples |  |
| Expected Morphology |  |
| Expected Particle /feature Size |  |
| Biological sample preparation requirement(Refer Annexure II before filling) | 1. Staining (Positive/Negative)
2. Embedding and Sectioning
3. Freeze fracture
4. Cryo Plunging
 |
| Medium ofdispersion forpowder sample(Refer Annexure II before filling) | Ethanol Methanol Water Isopropyl Alcohol Acetone Toluene None of the above If None of the above, please send the medium of the dispersion also mention  sonication time. .................. |

 **Type of analysis** (Kindly tick):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TEM/HR Imaging****& Diffraction** | **CRYO****Imaging** | **STEM Imaging** | **EDS analysis****(spectrum+ Image)** | **Line Scan****analysis** | **Mapping****analysis** |
|  |  |  |  |  |  |

For EDS analysis, kindly mention the elements to be analyzed.

##  Material safety data:

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

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|  |  |
| --- | --- |
| **Sample Properties** | Carcinogenic\* (level) Toxic Radioactive Corrosive Explosive FlammableOther (specify): \* Carcinogenic level as per IARC grouping.  |
| **Moisture** |  | Present | Absent NA |
| **Volatile organic compound** |  | Present | Absent NA |
| **Stability of sample** | Room temp. Hygroscopic SublimesReactive in: Air Light Heat Vacuum Moisture May decompose when exposed to accelerated electron beam |
| **Mention the storage and handling conditions if anything specific** |  |
| **Is Refrigeration is needed** | Yes No  If Yes, Specify Temperature: 2°- 4° or Below 0°  |
| **Whether incompatible with any material** | Yes  | No |  (Specify the materials): ................... |
| **Health hazards** | Yes No (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**: |  |

 **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.**

## 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 Cryo High Resolution Transmission Electron Microscope facility at Department of Chemical Engineering, IIT Bombay for providing 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 cryohrtem@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/CRNTS 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:

**IMPORTANT NOTE:**

* 1. Potentially hazardous/toxic/radioactive samples may not be accepted for analysis.
	2. Requisition letter and proof of payment / DD of required amount should be send by post or submitted in person to **Incharge,** **Cryo-HRTEM Lab, Room number: 102 A, Chemical Engineering Department, IIT Bombay, Powai, Mumbai-400076.**
	3. The Demand Draft should be in favor of **"The Registrar, IIT Bombay"**
	4. Your appointment will be as per the queue, once we receive the Requisition letter, duly filled form and advance payment. Partially filled form will not be registered.
	5. We prefer that you/ your representative, who know/understands the sample/material and what is expected to be seen, will be present on the day of appointment. If the user is not present representative data will be taken for the samples.

## Attach reference images for the sample (if any) with the form.

## Internal samples (IITB) will be accepted 2 at a time.

## 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 **,** Viruses,Sludge**,** Fibrin gel, etc. |
| Polymer | Resin, Alginate, Polystyrene, Polypropylene, PDMS, PVC, Polymeric microspheres, Fibers**,** Thermoplastic polyurethanes**,**Polymeric scaffold |
| Metal | Alloy**,** Chips**,** Micro tools**,** Fractography |
| Geological | Soil**,** Fly ash**,** Sand**,** Activated carbon**,** Cement |
| Nonmaterial’s | CNT**,** Nano particles, Ferrite, Lamella |
| Thin film | Specify the material: Substrate: Glass/ Copper/Conductingmaterial/Silicon wafer |
| Ceramic or Composite material | Detailed description of the sample/composite material |

###  Example of Sample Description:

|  |  |
| --- | --- |
| **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,Liposomes |
| Polymer | polystyrene nanoparticles |
| Thinfilm | Material: ZnO/TiO2/CZTS substrate: glass |
| Nanomaterials | Gold nano particles or CNT or |
| Composite material | CNT in polymer, CNT/ carbon and graphene |

##  Annexure II

###  Sample preparation instructions for TEM (Room Temperature Mode and Cryo Mode):

1. **Powder sample** will be dispersed in the solvent and after ultarsonication, it will be loaded/drop casted on the TEM grid. The grid will be dried under IR lamp. The representative TEM Images will be taken for that sample. **Medium for Dispersion** Ethanol /Methanol / Water /Iso-propyl alcohol. Any other medium should be provided by the user. Dispersion will be done by ultrasonication.
2. In case of **bulk sample**, the sample dimension should be 3.0mm diameter circular disc with a thinned

 Electron transparent central area or **TEM** lamellas are prepared with the **FIB**-SEM if the area of interest

 needs to be precisely selected with an SEM and should be prepared at the user end.

 (Ion Milling, polishing etc.)

1. Sample preparation for **biological samples** Ultramicrotomy, freeze fracturing, High Pressure freezing, sample fixation for biological samples, staining of samples (Charges are different for all sample preparation techniques.)

Brief description for various Biological sample preparation techniques:

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1. **Staining: -** Positive staining, Negative Staining, Fume hood staining.
2. **Cryo-Plunger:-**Samples are cooled so rapidly that the surrounding water molecules do not have time to crystallize.
3. **Freeze facture:-**Breaking a frozen specimen to reveal internal structures. Samples to be imaged in a SEM (block-face) or TEM (replica).
4. **High Pressure Freezer**: Cryo-immobilize your aqueous samples under high pressure with a unique freezing principle. Alcohol free freezing allow a superior cryo-fixation of the specimen enabling better quality results
5. **Ultra-microtome:-**Preparation of semi- and ultra-thin sections as well as perfect, smooth surfaces of biological and industrial samples (tissue sample, polymer, rubber)for TEM, SEM, AFM and LM examination (Cryo and Room Temp. mode).Ultramicrotomes provide extremely thin sections and perfect surface quality in a wide range of applications. From materials science to cancer research.

For any further query, kindly contact on

 **Email:** cryohrtem@iitb.ac.in

 **Contact:** 022-2159-6166