INDIAN INSTITUTE OF TECHNOLOGY BOMBAY, POWAI, MUMBAI
Multi Material 3D Printer @ MEMS
Central Facility
Department of Metallurgical Engineering and Materials Science
Email: mm3dp.memsiitb@gmail.com

Registration Form for Internal Users

Roll No: ……..... Date: ……

1) Name of the User: ……..…..

2) Guide Name: ……..

……..

3) Department: ….……..

4) Email and Tel No: ……

5) Number of samples: ……

6) Design details (Users must provide their designs in .dxf format file):

……..……

……..……

7) Details of the ink (Please also indicate if the ink is provided by the user):

……...

……..……

8) Any other remarks: …… ……..

Note: Please see the attached instructions before putting up the request.

Please tick the following box:

*[ ] We **agree** to acknowledge the **Multi Material 3D Printer @ MEMS of IIT BOMBAY** in our Publications/Reports/Thesis/Product development/prototype development/ proof of concept in which the data/samples are used.*

Equipment	Total Charges (INR)	Work performed with date	Total Cost
Multi Material 3D printer @ MEMS			

To IRCC,

Please Transfer INR _____to _____

From the project WBS code - _____

Signature of the User: ……...

Guide's Signature: ……

For Official Use only:

Date of experiment:	Name of the operator:
Completion date:	Signature of operator:

Prof. Dipti Gupta
(Facility in charge)
Multi Material 3D printer @ MEMS

Multi Material 3D Printer Facility @MEMS

Registration: To avail the Multi Material 3D Printer Facility, located in the Room Number G017, Ground floor of the Department of Metallurgical Engineering and Materials Science, IIT Bombay, registration is absolutely essential.

Registration Process:

I) Internal Users:

User within IIT Bombay can apply from

https://drona.ircc.iitb.ac.in/ircc/NewFac/CentralFacilityIndex.jsp?facilityCode=MT015

The form should be completely filled up and all the sample details must be provided in the form. The user needs to stay in the laboratory during the entire duration of the experiment, as per the slot assigned. If a user wishes to change his/her time slot, an email should be sent immediately to 204116005@iitb.ac.in requesting change in appointment.

II) External Users:

Registration Link:

https://rnd.iitb.ac.in/research-facility/multi-material-3d-printer

External Users can register through above link. Payment should be made in advance by a Demand Draft (DD) drawn in favour of "The Registrar, IIT Bombay, P and C Account". The same should be sent to "Prof. Dipti Gupta, Convener, Multi Material 3D Printer Central Facility, Department of Metallurgical Engineering and Materials Science, IIT Bombay, Powai, Mumbai 400076,".

Appointments will be given after complete registration and payment. Any query should be emailed to 204116005@iitb.ac.in / 30004595@iitb.ac.in

Academic Institutions:

You can come personally or send a letter from the Guide/HoD on the Institution's Original Letter Head stating that the analysis is for research purpose, to qualify for academic concession along with the Registration Form and Demand draft. The letter should be addressed to "Prof. Dipti Gupta, Convener, Multi Material 3D Printer Central Facility, Department of Metallurgical Engineering and Materials

Science, IIT Bombay, Powai, Mumbai 400076”

Industry & Non- Government Agencies:

You can come personally or send a letter signed by an authorized signatory of your Institution on Original Letter Head along with the Registration Form and Demand draft. The letter should be addressed to “Prof. Dipti Gupta, Convener, Multi Material 3D Printer Central Facility, Department of Metallurgical Engineering and Materials Science, IIT Bombay, Powai, Mumbai 400076”

National R & D Labs:

You can come personally or send a letter signed by an authorized signatory of your Institution on Original Letter Head stating that the analysis is for research purpose along with the Registration Form and Demand draft. The letter should be addressed to “Prof. Dipti Gupta, Convener, Multi Material 3D Printer Central Facility, Department of Metallurgical Engineering and Materials Science, IIT Bombay, Powai, Mumbai 400076”

You are requested to check the appropriate box in the registration form if you agree (or not) to acknowledge the Multi Material 3D Printer @ MEMS of IIT BOMBAY in your Publications/Reports/Thesis/Product development/prototype development/ proof of concept in which the data/samples are used.

If you agree, you are requested to mention in your request letter that “We agree to acknowledge the Multi Material 3D Printer Central Facility of IIT Bombay when the data/samples obtained from this facility are used in our Publications/Reports/Thesis/Product development/prototype development/ proof of concept”. List of such acknowledgements with appropriate reference will be communicated to Multi Material 3D Printer @ MEMS of IIT BOMBAY facility vide email to 204116005@iitb.ac.in / 30004595@iitb.ac.in.

Kindly send the publication reference (Journal name/volume number/names of the authors/date of issue of the publication etc) to us as the continuing functioning of the lab needs this feedback.

Multimaterial 3D printer

Instruction Manual for Users:

1(a). What kind of samples can the equipment print?

Electronic material printing (Ag, Au, Pt, Cu nanoparticle-based ink),
Biomaterial/Polymer printing
Creating specific micro- patterns (minimum 100 μm)

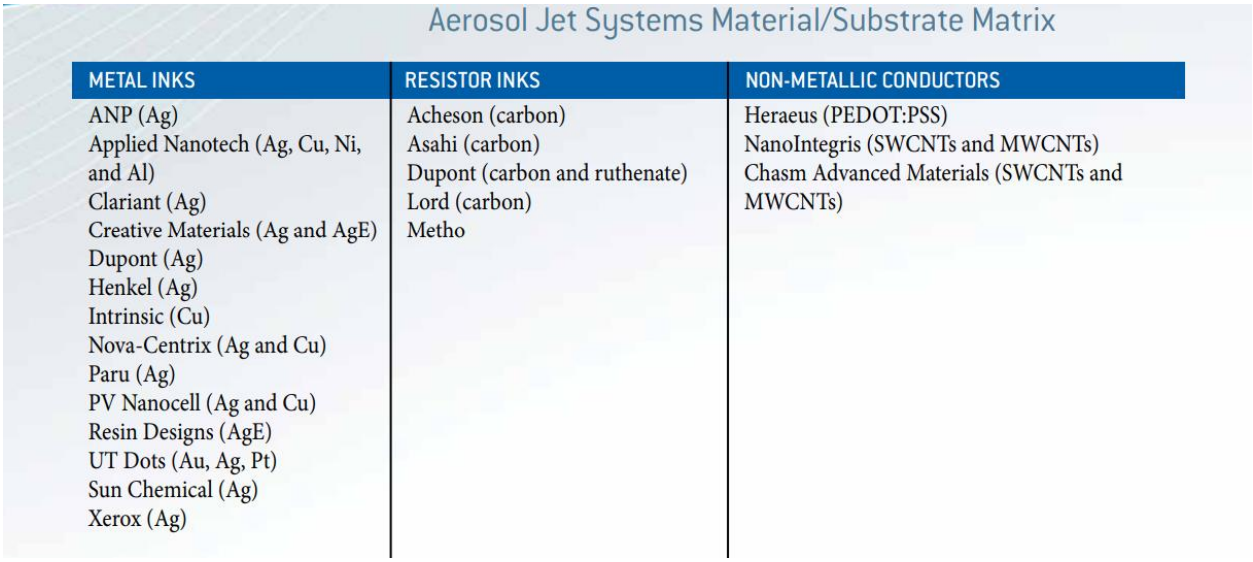
Substrate:
Metals, ceramics, and Polymers such as PET, polyimide, and others with smooth surfaces.
Substrate Size: Max.: 5cm×5cm and min.: 1cm×1cm

1(b). What kind of samples would not be done?

- Ink samples with toxic, corrosive and vaporizing at low temperatures.
- Substrate surface with high roughness.
- Just a blanket coating where other methods of large area can be used
- Where the specific micro-patterns are not required and can be done manually.
- Ink containing salts would not be done.

2. Inks preparation and Testing

a) **Commercial Inks** (Aerosol Inks and Its Vendor Names, MSDS, Date of purchase, Shelf Life)
The link for the ink:
https://optomec.com/wp-content/uploads/2014/04/AJ_MATERIALS_FAQs-Web0417.pdf



Aerosol Jet Systems Material/Substrate Matrix

METAL INKS	RESISTOR INKS	NON-METALLIC CONDUCTORS
ANP (Ag)	Acheson (carbon)	Heraeus (PEDOT:PSS)
Applied Nanotech (Ag, Cu, Ni, and Al)	Asahi (carbon)	NanoIntegris (SWCNTs and MWCNTs)
Clariant (Ag)	Dupont (carbon and ruthenate)	Chasm Advanced Materials (SWCNTs and MWCNTs)
Creative Materials (Ag and AgE)	Lord (carbon)	
Dupont (Ag)	Metho	
Henkel (Ag)		
Intrinsic (Cu)		
Nova-Centrix (Ag and Cu)		
Paru (Ag)		
PV Nanocell (Ag and Cu)		
Resin Designs (AgE)		
UT Dots (Au, Ag, Pt)		
Sun Chemical (Ag)		
Xerox (Ag)		

Link for AEROSOL JET MATERIAL STARTER RECIPES:

https://optomec.com/wp-content/uploads/2014/04/AJ-MaterialsRecipe_WEB-0817.pdf

b) Lab - prepared Inks

- **Particle size** (<50nm for ultrasonic atomizer and <300 nm for pneumatic atomizer)
- **Solvent** (Acetone, IPA, water, ethanol, and others with high boiling point with no toxic and corrosive in nature such as DMF, NMP)
- **Concentration** (<30% for ultrasonic atomizer and < 50% for pneumatic atomizer)
- **Viscosity** (<10cp for ultrasonic atomizer and <50 cp for pneumatic atomizer)
-

Characterization data to be shown before coming for printing

i) DLS (Repeated over 10 days period time, 3 sets of such data to check stability for one month)
ii) TEM for the particle size measurement
iii) Viscosity of the ink
iv) Shelf life

3. **CAD/CAM designs:** (*.dxf*) file format is required for designing the pattern files in CD/DVD.

4. Slots: 8 hrs. for one sample

5. Costing: For one slot (8 hrs.)

a) Ink provided by User (per sample):

IITB Users: 5000/- Rs
Academia Users from other Institutes: 10000/- Rs + 18% GST
Industry/Company Users: 20000 Rs + 18 % GST

(b) Inks provided by the 3D printing facility:

(Ink cost is variable and would be discussed before printing)

IITB Users: 5000/- Rs + Ink Cost
Academia Users from other Institutes: 10000/- Rs + Ink Cost+ 18% GST
Industry/Company Users: 20000 Rs + Ink Cost + 18 % GST