



IIT PATNA



DEPARTMENT OF
SCIENCE & TECHNOLOGY



IIT (ISM) DHANBAD

One Week Training Program on

"Use of Advanced Analytical Instruments for Energy and Coating Applications"



15th -21st July 2023



Organized by

Department of Chemical and Biochemical Engineering,
Indian Institute of Technology, Patna - 801106

Under

**SYNERGISTIC TRAINING PROGRAM UTILIZING THE SCIENTIFIC TECHNOLOGICAL INFRASTRUCTURE (STUTI)
PROGRAMME OF INDIAN INSTITUTE OF TECHNOLOGY (ISM) DHANBAD - 826004**

An initiative of Department of Science & Technology (DST), Govt. Of India

About The Institute

Indian Institute of Technology Patna is a premier academic institute under the ministry of education, established by act of the parliament in 2008. It is recognized as an Institute of National Importance by the Government of India. It has permanent campus situated in Bihta, Patna. The institute has 10 departments offering several undergraduate, postgraduate, and doctoral degree programs. Also, the focus is to conduct research in diverse areas including engineering, science and humanities. Research activity in IIT Patna has been exemplified by high quality research articles, grants, and patents. Institute has developed modern facilities that are fully equipped with the state-of-the-art facilities (equipment and softwares) that are routinely used to train and educate students.

IIT Patna has collaborated with many foreign universities such as National University of Singapore (NUS), University of Houston, Texas (USA), University of Missouri, Columbia (USA), University of New South Wales (Australia), and University of Saskatchewan (Canada) etc. The MoU is intended to give opportunities to B.Tech., M. Tech. and Ph.D. students and faculty from IIT Patna to go to foreign and develop their research skills and interact with people working in different areas of science and technology.

About The Department

The Department of Chemical and Biochemical Engineering of IIT Patna offers undergraduate, postgraduate, and doctoral programme in chemical engineering. The Department has received several grants from SERB (DST). The Department is actively involved in addressing pressing issues related to energy, environment, and water. The Department aims to continue its high-quality research programmes in the field of chemical engineering. Also, other departments of IIT Patna such as Department of Metallurgical and Materials Engineering (MME) and Department of Chemistry are highly research-vibrant departments, which are involved in cutting-edge research of world class and extended their DST-funded facilities for this programme.

About The Program

The Department of Science and Technology (DST) intends to build human resources and knowledge capacity by arranging training programs through open access science and technology infrastructure across the country under the banner of 'Synergistic Training program Utilizing the Scientific and Technological Infrastructure (STUTI)'. Each training session will be for seven (7) days and thirty (30) participants can be accommodated. All the training expenditures (travel by train, food and accommodation, training materials) will be borne by the DST. The present proposed program will be organized by the Department of Chemical and Biochemical Engineering, IIT Patna Under DST-STUTI Programme of IIT (ISM) Dhanbad to impart knowledge on some advanced Analytical instrumental techniques used for the Energy and Coating Applications. This module will be beneficial for the researchers actively engaged in research or consultancy work. Participants will have to go through the classroom teaching which will be followed by the laboratory demonstration of each instrument. So, the practical operation procedures, and interpretation of analysis results of each instrumental technique will be discussed in detail. The training program will be arranged from 15th - 21st July 2023. The participants may be allowed to bring their samples, if any, for hands-on analysis.

Eligibility Criteria for Participants of the Training Program:

- Person of Indian origin;
- Minimum qualification should be masters in Chemical/Biochemical Engineering and Chemistry;
- Professor/Scientist/ Post-Doc Fellow/ Ph.D. fellow/ Industry person who are actively involved in research and development (R&D);
- Not more than 3 participants from one institute per training should be allowed (Total 30).

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Contact Persons

Patron:

Prof. T. N. Singh
Hon'ble Director
IIT PATNA

Prof. Sushant Kumar

Program Coordinator
Dept. of Chemical & Biochemical Engg.
Indian Institute of Technology Patna
E-mail: sushantkumar@iitp.ac.in
Ph.: 6123028670/7634812213

Prof. Anup Kumar Keshri

Program Co-coordinator
Dept. of Metallurgical and Materials Engg.
Indian Institute of Technology Patna
E-mail: anup@iitp.ac.in
Ph.: 6123028184

Prof. Sagar Pal

Coordinator
DST STUTI Project
IIT (ISM) Dhanbad
E-mail: sagarpal@iitism.ac.in

Prof. R.K. Gangwar

Co-coordinator
DST STUTI Project
IIT (ISM) Dhanbad
E-mail: ravi@iitism.ac.in

Prof. Ejaz Ahmad

Program Coordinator
Dept. Chemical Engineering
IIT (ISM) Dhanbad
E-mail: ejaz@iitism.ac.in





One Week Training Program on “Use of Advanced Analytical Instruments for Energy and Coating Applications”



15th -21st July 2023



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The one-week training program on “Use of Advanced Analytical Instruments for Energy and Coating Applications” will be organized by the Department of Chemical and Biochemical Engineering, Indian Institute of Technology, Patna, under the banner of Synergistic Training program Utilizing the Scientific & Technological Infrastructure (STUTI) project of Department of Science and Technology (DST), Government of India. The training content is considered to impart knowledge on the development of formulation and some advanced instrumental techniques used for energy and coating applications. This module will benefit the researchers actively engaged in academics and industry. Participants will have to go through classroom teaching, which will follow the laboratory demonstration of each instrument. So, the practical operation procedures and interpretation of the analysis results of each instrumental technique will be discussed in detail. The theory session will be followed by a hands-on laboratory demonstration for a better understanding of the principle and operation of the instruments and the use/ interpretation of the data. Tentative schedule and topics to be covered within this module are as follows:

ACTIVITY

DELIVERABLES

**Helium Gas Pycnometer
(DST-funded)**

Gas pycnometry is a non-destructive technique that uses gas displacement to measure volume accurately, making it ideal for testing true density. Once we get the idea of True density, correlation can be established with the mechanical, tribological and corrosion property of the materials.

**Micro filtration Unit
(DST-funded)**

Around the globe, issue of getting drinkable water is serious concern. Our customized micro filtration unit has the capability to evaluate the drinkable water most precisely.

Plasma Spray Unit

To develop the high temperature ceramic coating, plasma spraying can be used. This developed coating will have higher wear and corrosion resistance behaviour.

**Nuclear Magnetic Resonance
(NMR) spectroscopy (500
MHz facility)
(DST-funded)**

NMR spectroscopy uses radio-frequency to identify the molecular framework of organic/inorganic/organometallic compounds. It is also useful to study reaction mechanisms.

**Mass Spectrometry (MS)
(DST-funded)**

MS is used to determine the molecular mass and the molecular formula of an inorganic/organic compound or supramolecular species, and to identify certain structural features.

**In situ Diffuse reflectance
infrared Fourier transform
spectroscopy (DRIFTS) and
Photoluminescence (PL)
Spectroscopy**

**It is an advanced spectroscopy technique equipped with HARRICK Praying Mantis Chamber which helps to analyze the reaction intermediates by simulating the reaction in real conditions. The reaction can be for photo catalysis, thermal catalysis, or any different kind.
PL is a non-destructive and contactless optical method of probing the electronic structure of materials.**

Sievert's type apparatus

This instrument is primarily analyze thermodynamics and kinetics of hydrogen storage capacity of any material.

**Autoclave and tubular
furnace
(DST-funded)**

Autoclaves are used to perform high pressure high temperature experiments under gaseous environment. It can be used to conduct CO₂ hydrogenation reactions for production of methanol/ethanol. Tubular furnaces are used to conduct pyrolysis, or heating of materials under different gaseous environment.

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<https://forms.gle/PjbmF2UXeueLfg8R9>

For any query mail us on:

stuti.cocr@iitism.ac.in



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SPEAKERS

Name of the Speakers	Name of the Institute
1. Prof. Sushant Kumar	Department of Chemical & Biochemical Engineering, IIT PATNA
2. Prof. Anup Kumar Keshri	Department of Metallurgical and Materials Engineering, IIT PATNA
3. Prof. Ejaz Ahmad	Department of Chemical Engineering, IIT (ISM) DHANBAD
4. Prof. Neeladri Das	Department of Chemistry, IIT PATNA
5. Prof. Debajit Sarma	Department of Chemistry, IIT PATNA
6. Prof. Kesavan Ravi	Department of Fuel, Minerals & Metallurgical Engineering, IIT (ISM) DHANBAD
7. Dr. Narendra Kumar Soni	Sr. Manager NTPC
8. Dr. Shrinivas Kulkarni (tentative speaker)	Head, CCUS and Hydrogen Thermax Limited

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