

CSIR Integrated Skill Initiative



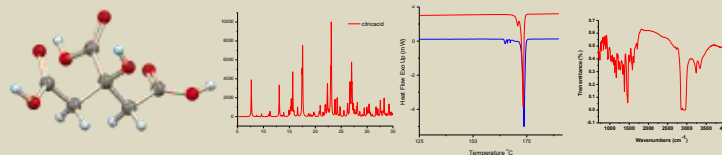
Skill Development Course in



Advanced Characterization Techniques

About the course: In materials science, the term characterization, refers to the broad and general methods used to probe and quantify a material's physical, structural & chemical properties. It is an important process in the field of materials science, without which no scientific understanding of engineering materials could be ascertained. Many characterization techniques have been practiced for centuries, such as basic optical microscopy, and X-ray techniques, along with constantly emerging methods. There is a host of characterization techniques used in chemistry and materials science such as electron microscopy, light or radiation scattering, spectroscopy, calorimetry, chromatography, gravimetric and other measurements.

In this course, we will teach and provide hands-on training on a wide variety of techniques which includes: Optical microscopy, Electron microscopy, Thermal analysis, X-ray techniques, magnetometers and other advanced techniques.



Course Content: We will cover the following techniques: Brunauer- Emmett-Teller (BET), UV-VIS, Absorption & Emission spectroscopy, Infrared (IR) spectroscopy, Raman spectroscopy, Electron microscopy which includes scanning electron microscopy (SEM) & Transmission electron microscopy (TEM), Powder X-ray diffraction, Vibrating sample magnetometer (VSM), superconducting quantum interference device (SQUID), Thermogravimetric analysis (TGA)-Differential thermal analysis (DTA), Differential scanning calorimetry (DSC), X-ray photoelectron spectroscopy (XPS). The relevant theory for all the techniques will also be covered during the course.

Course Instructors: Dr. Kirandeep Singh, Dr. Arup Rath, Dr. C.P. Vinod, Dr. Pankaj Poddar, Dr. J Nithyanandhan, Dr. Sayan Bagchi, Dr. Rajesh Kanawade, Dr. Shatabdi Mukherjee, Dr. Kadiravan Shanmuganathan, Dr. Ratnesh Jha, Mr. R.S. Gholap, Mr. S.S. Deo and Dr. Rajesh G. Gonnade

Course Code: SDP-NCL 45

Duration: 31st July to 11th August 2023,

Number of Participants: 15

Eligibility: M. Sc., M. Pharm., B. E.,
B. Tech., M. E., M. Tech.

Course Fees:

- **Students:** Rs.7,080 (including GST@18%)
- **Faculties:** Rs. 17,700 (including GST@18%)
- **Industry Participants:** Rs. 29,500 (including GST@18%)

Participants can make payment by DD.

For details see SDP website.

(Fee includes breakfast, tea and lunch)

Accommodation (Two weeks + 2 days)

A separate mail will be sent for accommodation fee payment procedure.

How to Apply

Application form is available at

<http://www.ncl-india.org/files/SDP/Default.aspx>

Mailing Address

Coordinator,
CSIR-NCL Skill Development Program,
CMC Division, CSIR- National
Chemical Laboratory, Dr. Homi
Bhabha Road, Pune-411008, India.

Email: ncl.sdte@ncl.res.in