

# Characterizing nanomaterials through X-ray photoemission spectroscopy

Oct 05- Oct 09, 2020

## Overview

Modern technology being advancing very rapidly demands new materials with improved properties in different field of our life from automotive or aerospace industries to electronics used in household and office appliances. The new materials have continued to be modified and improved at the expense of their composite construction and hence electronic structure. The best technique to know the inside of a material is the X-ray Spectroscopic tools.

High-energy (X-ray) spectroscopy methods play an outstanding role in research of the laws of atomic and electronic structure, and properties of various materials. The course provides complete information on the application of X-ray spectroscopy methods to study the composition, structure, nature of chemical bonds with an emphasis on carbon nanomaterials.

The course consists of an introduction and five sections, each of which is devoted to the fundamental principles, various aspects of the application and experimental implementation of various spectroscopic techniques for the diagnosis of carbon nanomaterials: X-ray photoelectron spectroscopy (XPS), photoelectron spectroscopy (PES), Auger electron spectroscopy (AES), X-ray absorption spectroscopy (XAS), X-ray emission spectroscopy (XES).

Course participants will learn these topics through lectures and hands-on practice in XAFS analysis. Also case studies and assignments will be shared to stimulate research motivation of participants.

<b>Modules</b>	<b>A: Theory and Applications of XPS : Oct 05 – Oct 09, 2020</b> (lectures and tutorials)  <b>Number of participants for the course will be limited to fifty (50).</b>
<b>You Should Attend If...</b>	<ul style="list-style-type: none"><li>➤ Executives, engineers and researchers from manufacturing, service and government organizations including R&amp;D laboratories.</li><li>➤ Student at all levels (BTech/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.</li><li>➤ You are a student or faculty from academic institution interested in learning about "<i>X-ray Photoemission Spectroscopy analysis</i>".</li></ul>
<b>Fees</b>	The participation fees for taking the course is as follows: <b>Participants from abroad: US \$500</b> <b>Industry/ Research Organizations: INR 5000</b> <b>Academic Institutions: INR 2500</b> <b>Discounted price will be offered to Bachelor and Master Degree students.</b> The above fee includes all instructional materials and assignments and 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

## The Faculty



**Dr. Igor Asanov**, Ph.D. in solid State Physics, Senior researcher scientist at Laboratory of Physics and Chemistry of Nanomaterials, Institute of Inorganic Chemistry Siberian Branch of Russian Academy of Science, Novosibirsk, Russia. Specialist in X-ray photoelectron spectroscopy and electronic structure of materials. The work experience includes the experimental study of electronic structure of chemical compounds including carbon-based nanomaterials (graphene compounds, especially fluorides and oxides, nanotubes, fullerenes), inorganic chalcogenides, and various inorganic compounds. He worked out different experimental approaches for analysis of experimental data including angle-resolved XPS for element in-depth distribution, chemometrics procedures for data analysis. He is skilled in exploration of laboratory and synchrotron based facilities. He has experience in the analysis of structural and spectroscopic properties of nanomaterials by XRD, neutron scattering, Auger, XAFS, Raman, etc.



**Dr. Sanjeev Gautam**, faculty in Dr. S.S. Bhatnagar University Institute of Chemical Engineering and Technology, Panjab University Chandigarh. He is a specialist for research in X-ray Absorption Spectroscopy (XAS), X-ray magnetic circular dichroism (XMCD) and High-resolution X-ray diffraction (HRXRD) using synchrotron radiation. His research experience includes the synthesis and characterization of various inorganic compounds and study of electronic structure of advanced functional materials including carbon based nanomaterials. Energy harvesting systems like perovskite photovoltaics, fuel cells, thermo-electrics and hydrogen catalysis and storage issues are of current interest in his research group Advanced Functional Materials Lab, Panjab University, Chandigarh, India.

## Course Coordinator

**Dr. Sanjeev Gautam**

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