

May 19 – 20, 2015 (1.5 Day Course)
Birck Nanotechnology Center Rm1001-9:00am

Introduction to XPS

What we should know about X-ray Photoelectron Spectroscopy

Course Objectives:

- Learn physics principles of X-ray Photoelectron Spectroscopy (XPS)
- Learn about the analysis of surfaces with XPS and limitations of the technique.
- Learn approaches for qualitative and quantitative analysis of XPS data.
- Learn the types of problems that can be solved with XPS examples
- Advanced data analysis: coverage calculation, thin film thickness calculation, etc.

Course Description:

XPS is widely used to determine the chemical composition of a surface (element concentrations, chemical states, lateral and depth distributions, etc.) Nowadays XPS has become a standard technique for the characterization of solid surface. The course will teach how and what information can be provided by XPS.

Audience:

The lecture is orientated at a general audience. Scientists, engineers, students and technicians who would like a detailed understanding for the use of XPS/ESCA for surface analysis.

Ideally every group involved in Surface Analysis Research should have at least one designated student familiar with XPS

Instructor:

Dmitry Zemlyanov, Surface Science Application Scientist, Birck Nanotechnology Center, Purdue University

Total 1.5 – Day Cost:

\$250 *NEW This fee can be used against future XPS Data Acquisition*

Registration at: <http://bit.ly/1eqIM8U>

Day 1 (9:00am-4:00pm):

Introduction: terminology, surfaces, types of surfaces.

The Principles of XPS: production of photoelectrons, electronic configuration of atoms and molecules, energy, spectra, peak labeling. Auger process, valence spectra, handbooks, books, surface sensitivity, information depth and attention length, spin-orbit splitting, chemical shift, plasmons, multiplet splitting, shake-up, handbooks and helpful references will be recommended.

Instrumentation: X-ray anodes, monochromatic radiation, electron energy analyzers, energy resolution, spectrum acquisition, energy scale calibration, electron detectors, small area analysis, imaging XPS, vacuum system, samples and sample handling.

Day 2 (9:00am-1:00pm):

Artifacts: radioactive and thermal damage, charging, methods for charge control, ghost peaks.

Qualitative Analysis: Identification of elements, changing x-ray sources, charging correction and reference lines, interpretation of chemical shift, relaxation effects. Auger parameter, peak widths, line shapes.

Quantitative Analysis and Data Processing: sensitivity factors, ionization cross section, asymmetry parameter, analyzer transmission, intensities, background subtraction, satellite subtraction, detection limit, effect of thin overlayers, peak area, line-shapes, curve fitting, deconvolution.

Depth Profiling: non-destructive and destructive methods, angle resolved XPS, elastic and inelastic scattering, sputtering, sputtering depth calibration.

Applications: some further examples of applications of XPS

Advance Data Processing: coverage calculation, thin film thickness calculation.

PURDUE UNIVERSITY
Discovery Park