PHYSICAL ELECTRONICS
A DIVISION OF ULVAC-PHI

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www.phi.com

Agenda

PHI MultiPak XPS & AES Data Reduction Software Training

The MultiPak training classes are designed to introduce new users to the MultiPak data reduction software environment and provide an overview of the tools available to perform spectral analysis, depth profiling and imaging analysis. The class registration form provides the opportunity for registrants to give the instructors input on their specific interests for the class.

Each student must bring their own laptop computer for use in the class and should have MultiPak version 9 installed. MultiPak version 9.6 will be used by the instructors.

Tuesday May 10, 2016
9:00 AM to 4:00 PM: Basic functions for XPS Data Reduction

1. Welcome
2. Introductions
3. What version of MultiPak do you have?
4. Updating MultiPak
5. What's new in MultiPak Version 9.6
6. Spectral deconvolution reference files
7. MultiPak user interface overview
8. MultiPak user interface settings
9. MultiPak system constants file
10. MultiPak Tutorial and associated data files
11. MultiPak XPS Handbook Library
12. Loading data files
    a. Single files
    b. Multiple files (shift and control keys)
    c. Overlaying files
13. Spectral Analysis
    a. Peak identification
        i. Automatic peak identification
        ii. Manual peak identification
        iii. Settings in the Periodic Table
        iv. Selecting an alternative peak for an element using the periodic table
        v. Saving the Periodic Table
        vi. Adding text to spectra
        vii. Removing peak labels and text

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b. Quantification
    i. How does MultiPak calculate atomic concentrations
    ii. TFC/Intensity Calibrate
    iii. AC Tables
        1. Formatting AC tables
        2. Single vs Multi-file processing
    iv. Survey spectra
    v. Multiple narrow spectra
    vi. Multiple data files
    vii. Adding an element when two elements are present in the same spectral region
    viii. Selecting an alternative peak for an element using the periodic table
    ix. How to change the background type
    x. Peak area vs peak height
    xi. Smoothing
    xii. Displaying AC on data displays

14. Basic Chemical Analysis
    a. Shifting the energy scale
        i. Automatically
        ii. Manually
        iii. Choosing an alternative element or peak position
    b. Chemical state identification tool
    c. XPS Handbook and other resources

Basic depth profile data reduction

    d. Elemental intensity display
        i. Background subtraction
        ii. Smoothing spectra
            1. Single region
            2. All regions
        iii. Smoothing the depth profile display
    e. Quantitative display
    f. Convert time scale to depth
    g. Adding and removing elements
    h. Survey (unknown) depth profiles
    i. Selected spectra displays
    j. Montage spectra displays
        i. Single region
        ii. Multi region
            1. Processing all regions
            2. Processing individual regions
            3. Toggling regions on and off

15. Basic map data reduction
    a. Peak intensity map displays
    b. Map display modes

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   c. Map adjustments
      i. Brightness (left arrow - left mouse button)
      ii. Contrast (right arrows – left mouse button)
      iii. Threshold (right arrows – shift left mouse button)
   d. Map smoothing
   e. Map filters
   f. Atomic concentration displays
   g. Removing the bright band
   h. Extracting spectra
   i. Extracting lines
   j. Micron markers
   k. Annotation
   l. Tape measure
   m. Stage Maps
16. Saving massaged data files
17. Data export
   a. Export to Microsoft Office programs
   b. Export data to text files

Wednesday May 11, 2016
9:00 AM to 12:00 PM: Advanced Functions for XPS Data Reduction

18. Curve fitting
   a. UI overview
   b. Spectra
   c. Depth profiles
   d. ARXPS
   e. Maps
   f. Saving curve fit settings
   g. Exporting / saving curve fit bands to ascii (.csv) file
19. Linear Least Squares Fitting
   a. UI Overview
   b. Applications
20. Target Factor Analysis
   a. UI Overview
   b. Applications
21. Spectral Deconvolution
   a. Introduction and Overview
   b. Applications
22. Image Enhance
   a. Introduction and Overview
   b. Applications
23. ADXPS
   a. Thickness routine
   b. Structure analysis

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Wednesday May 11, 2016
1:00 PM to 4:00 PM: Basic functions for AES Data Reduction

1. Welcome
2. Introductions
3. What version of Multipak do you have?
4. What's New in Multipak?
5. Updating Multipak
6. Multipak UI (User Interface) overview
7. Multipak UI settings
    a. System Settings
    b. Energy Cursor
    c. Spectrum Skip
8. Multipak AES Handbook Library
9. Loading files (browse or double-click)
    a. Single files
    b. Multiple files
    c. Overlaying multiple files
10. Spectral Analysis
    a. Peak identification
        i. Automatic peak identification
        ii. Manual peak identification
            1. Right mouse over element in table gives fingerprint
            2. Cursor to "Select Elements" is helpful
        iii. Settings in the Periodic Table
            1. RSF's
        iv. Adding text to spectra (Annotation)
        v. Removing peak labels and text
        vi. Save massaged data
            1. Save current spectrum (Massage 1)
            2. Save current file (Massage both & stack plot)
    b. Quantification
        i. Survey spectra
        ii. Multiplex spectra
        iii. Multiple data files
        iv. Adding elements using the periodic table when two elements are present in the same narrow spectrum
        v. Selecting an alternative peak for an element using the periodic table
        vi. Create AC table
            1. Formatting the AC table
                a. Compare Multiple Files
                b. Compare Multiple Points
        vii. Differentiation

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viii. Background subtract
ix. FWHM
x. Normalize
xi. Add/Subtract/Compare
xii. Shifting the energy scale
    1. Automatically
    2. Manually

Thursday May 12, 2016
9:00 AM to 4:00 PM: Advanced functions for AES Data Reduction

11. Sputter depth profile data reduction
    a. Convert sputter time scale to depth
    b. Noise reduction
        i. Smoothing spectra
        ii. Linear Least Squares fitting (LLS)
        iii. Smooth the profile display
    c. Chemical state depth profiles
        i. Linear Least Squares fitting (LLS)
            1. Quantitative depth profile display
        ii. Target Factor Analysis (TFA)
    d. Adding and removing elements from a depth profile
    e. Removing peak overlaps (LLS)
    f. Depth profile of unknown sample using survey spectra
    g. Exporting depth profile curves
    h. Montage spectra plots
    i. Add profiles
12. Map data reduction
    a. Changing display colors
    b. Map Adjustments
        i. Brightness (left arrow)
        ii. Contrast (right arrow)
        iii. Threshold (right arrow-shift left mouse)
        iv. Multiple SEMs
    c. Micron markers, annotation, and .tif
    d. Tape measure tool
    e. RGB overlays
    f. Extract Line
        i. Map
        ii. SEM

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   g. Filter
      i. MultiPak Manual page 3-56
      ii. Maps
      iii. SEM
   h. Extract Spectra & LLS (Window Maps Only)
13. Line Scans
   a. Topographical Correction
   b. Window Line Scan
      i. LLS & AC