Simple and Easy Chemical Bond Analysis in XPS

JPS-9000MC/SpecXPS: Photoelectron Spectrometer

External view of JPS-9000MC/SpecXPS

X-ray photoelectron spectroscopy (XPS) is widely used for elemental analysis and chemical state analysis on the surface of metal, polymer, and semiconductor materials. Since XPS uses X-rays as an excitation source, samples are free from charge accumulation and are subject to a minimum of damage. This is one of the advantages over other surface analyzers. A new computer system for XPS has been developed to further enhance its performance. An outline of this new system is as follows.

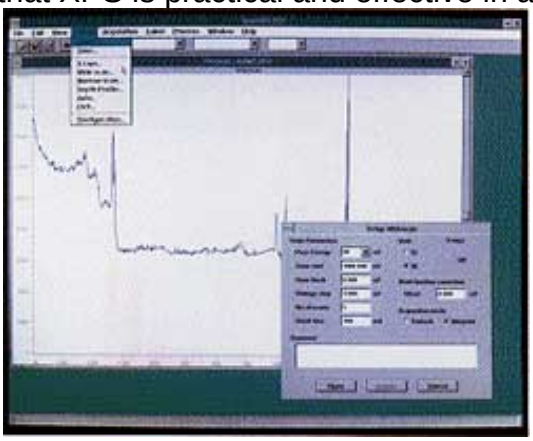
Features

- Windows® based
  MS-Windows® based system for global applications
- Menu driven easy operation
  Operation for data acquisition and processing is menu driven and easy to learn.
- Multiple windows
  Data processing tasks such as peak separation, quantitation, and data output are simultaneously performed during data acquisition.
- Acquired data can be processed by the integral software as well as a number of commercial application programs.
- Data transfer between programs
  Part or all of spectral data and windows can be copied, cut, and pasted to other programs, facilitating documentation of analysis.
- Connection to network
  The Ethernet interface is available as standard for easy networking with other instruments or computers.
- Auto analysis
  Optional upgrade is available to enhance the speed and comfort of operation, including auto depth profiling, auto tilt analysis, multi point analysis, and multi sample analysis.

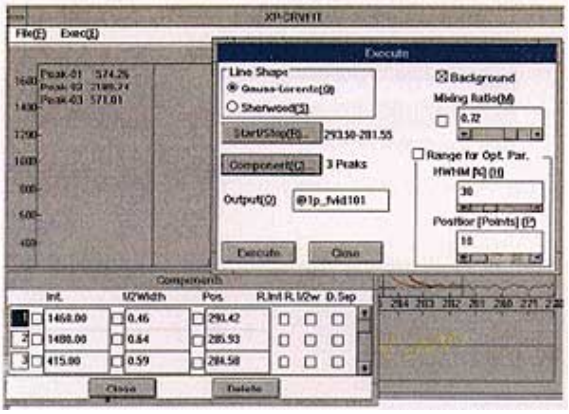
An example of analysis

As a typical insulator, a piece of coated paper was analyzed. High quality paper is often coated with a layer of alumina or silica to increase the reflectance, providing a glossy surface on the paper. When developing this glossy film, a binder is applied to enhance the adhesion with the paper. A binder of a paper sample was analyzed in XPS to examine its physical properties. Figure 1 is the wide spectrum acquired. Elemental analysis on the surface detected impurities. Peak separation was applied to examine the bonding of carbon, a major component of the binder. Figure 2 shows the Peak Separation Control window,

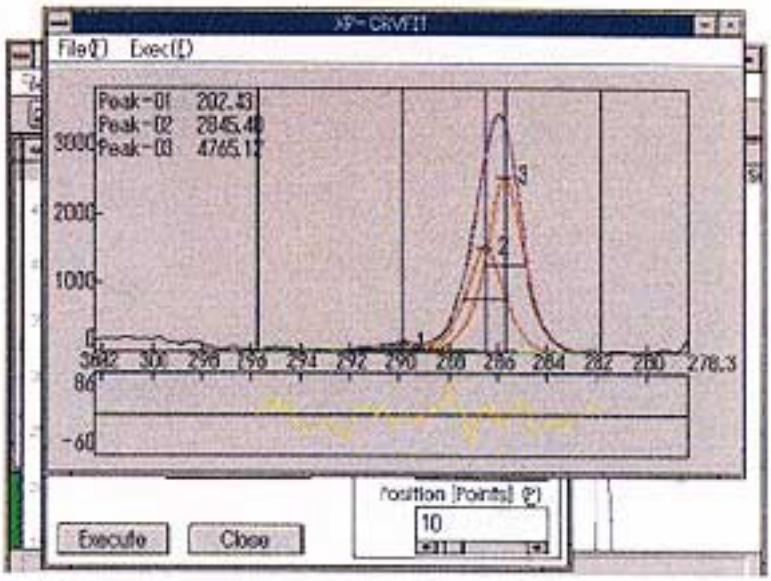
where the necessary parameters are entered. Figure 3 shows the calculated results. The C1s spectrum was separated into 3 peaks; peak-01 was C=O, peak-03 a CH bond, and peak-02 a modified C-O bond. The amount of peak-02 determined the adhesive power of the coating film. This example demonstrates that XPS is practical and effective in analyzing insulators.



Wide Spectrum Acquisition Window



Peak Separation Control Window



C1s peak separation spectrum (sample: coated paper)