K-Alpha
The Shining Light in Surface Analysis

Thermo Electron Corporation's K-Alpha - a fully integrated and compact X-ray photoelectron spectrometer (XPS).

State-of-the-art performance, reduced cost of ownership, increased ease of use and compact size are key requirements in modern laboratories and production facilities. New production techniques have allowed Thermo's engineers to incorporate all of these benefits in the design of K-Alpha.

K-Alpha is designed for a multi-user environment. It is the first XPS tool to deliver a fully automatic mode of analysis, from sample entry to report generation. Built-in automation means that new users can produce high-quality sample analysis reports with minimal training.

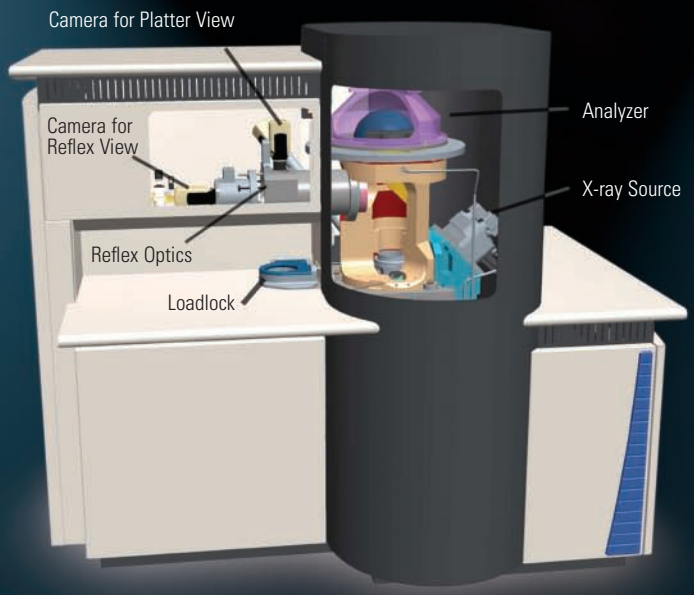
The microfocusing monochromator maximizes both the sensitivity of the instrument and the precision of chemical state determination. Further sensitivity improvements come from the design of the new energy analyzer and lens.

Thermo's advanced charge compensation technology has been included to deal with insulating samples. K-Alpha is the ideal instrument for all types of solid sample analysis, including inorganic, organic, biological, metallurgical, semiconducting and magnetic.

The integral ion gun produces composition depth profiles of exceptional quality.

Sample transfer and navigation is fully automated. The unique Reflex Optics for live sample viewing is used in combination with co-axial and diffuse sample illumination to allow accurate and precise set up for small area XPS.

Avantage, Thermo's world-class XPS data system, controls all functions of K-Alpha.



XPS Performance

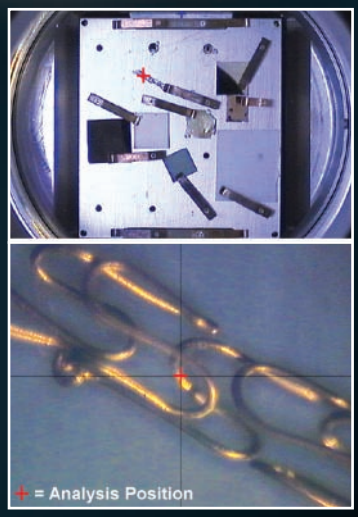
An innovative new transfer lens combined with a high-flux X-ray source and optimized geometry ensures maximum sensitivity for all types of analysis.

Multi-channel detection further increases sensitivity and allows 'snap-shot' acquisition for fast profiling and mapping applications.

For small feature analysis and XPS mapping, the monochromated X-ray beam may be focused into a small spot, providing an ultimate lateral resolution of 30 µm.

Quantitative XPS maps contain a spectrum at each pixel, allowing peak fitting to reveal chemical state distributions.

A high-flux, low-energy ion source is integral to K-Alpha for depth profiling. Low energy sputtering combined with azimuthal rotation produces profiles having excellent depth resolution.



Three Operation Modes for Maximum Flexibility

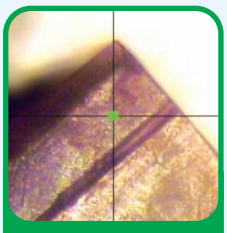
- Fully automatic mode to minimize user intervention
- Recipe mode for routine analysis
- A fully interactive expert mode

Flow chart for fully automatic operation

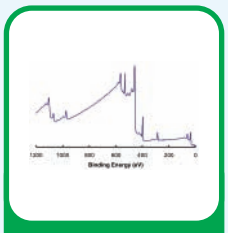
No user intervention required | User intervention required

Step 1
Place samples in loadlock and choose analysis position

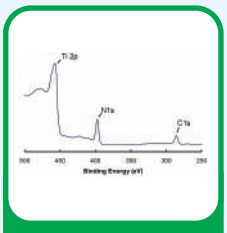
Step 2
Pump load lock & transfer to analysis position



Step 3
Set analysis position and height



Step 4
Collect survey spectrum



Step 5
Auto element identification

K-Alpha

XPS analysis has never been so easy.

- Low cost of ownership
- Automation maximizes throughput
- High sensitivity across the analysis range
- Small footprint

Calibration and Alignment

Automatic calibration and instrument set up mean that your K-Alpha is always operating at peak performance.

- Calibration samples are built into sample stage and are always available
- Energy scale and transmission calibration
- Computer-control of monochromator crystal
- Ion gun and flood gun are focused and aligned under computer control
- System performance logged for traceability

Easy Maintenance

- K-Alpha is totally self contained so that installation is quick and simple
- Small footprint (1.8 m x 1.2 m) is ideal for space-limited labs
- Bake-out is simple with no cables to remove and no ovens to fit. Automatic de-gas procedures follow bake-out

Reliability

- Designed and tested beyond its specified performance to minimize down time
- Long interval between anode/cathode replacement

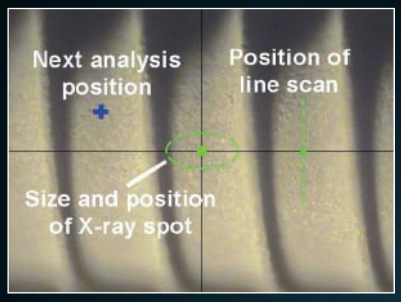
Sample Navigation

Platter View, automatically generated in the loadlock, is used for coarse navigation between samples.

For small feature analysis, precise alignment is achieved using the live Reflex View. The Reflex View provides a real-time, magnified image of the analysis position. Analyses of points, lines and areas are defined using this tool, a true 'point-and-shoot' user interface.

Sample Illumination

K-Alpha provides two light sources. Off-axis illumination is ideal for rough samples, such as powders or ceramics. On-axis illumination is essential for feature alignment on highly reflective samples such as glasses or semiconductor wafers.



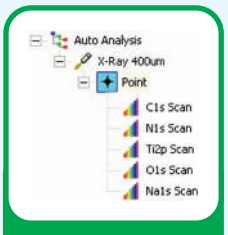
Live Reflex View of dental implant in the analysis position. Two analysis points, a line scan position and the X-ray marker are shown.

Avantage Data System

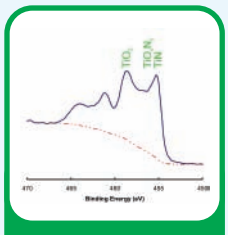
The *Avantage* data system incorporates a comprehensive suite of software for:

- Full instrument control
- Data acquisition
  - *Spectra*
  - *Maps*
  - *Profiles*
  - *Line scans*
- Data processing
  - *Peak fitting*
  - *Elemental and chemical state determination*
  - *Quantification*
- Report generation
- Vacuum system and sample handling

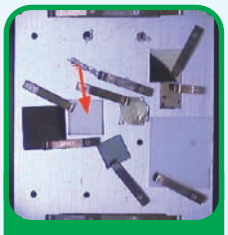
Avantage runs on a PC under the Windows XP™ operating system.



Step 6
Select narrow scan regions



Step 7
Elemental quantification Chemical state appraisal



Step 8
Repeat for each sample

Step 9
Report generation

Step 10
Reload sample holder for next analysis

K-Alpha Configuration

Electron Analyzer

- Double-focusing hemispherical analyzer
- Multi-element, high-transmission spectrometer input lens
- 128-channel detector for high quality snapshot spectra

Charge Compensation

- Patented design
- Precise alignment with analysis position
- No requirement for user adjustment

Microfocused Monochromated X-ray Source

- 250 mm Rowland circle monchromator
- Microfocus electron gun
- Computer-controlled monochromator alignment
- Source-defined small area XPS
- Continuously variable spot size

Sample Entry

- Automated entry lock and sample transfer
- Safety interlocked
- Turbomolecular pumped loadlock

Sample Viewing

- Platter View of whole sample holder automatically recorded
- Platter View for sample to sample navigation
- Live Reflex View for feature alignment
- Microscope camera view for accurate height setting
- Both co-axial and off-axis sample illumination

Sample Stage

- High-precision, automated sample stage with internal stepper motors
- Maximum analysis area 60 x 60 mm
- Maximum sample height 20 mm

Ion Gun

- Energy range 200 eV to 3 keV
- High flux even at low beam energy
- Computer-controlled beam alignment
- Computer-controlled for optimum depth profile performance

Avantage Data System

- Complete control of K-Alpha
- Data acquisition
- Data processing
- Report generation
- Automatic calibration and alignment
- Auto analysis mode of operation

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BR31075_E 07/06C

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