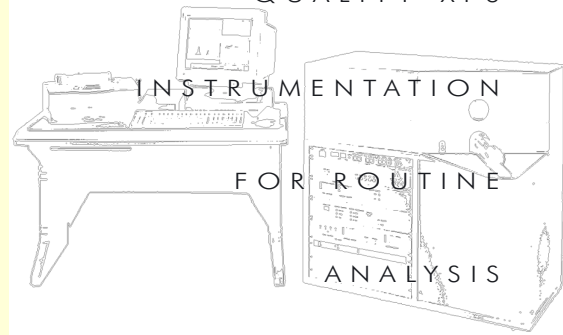


QUALITY XPS

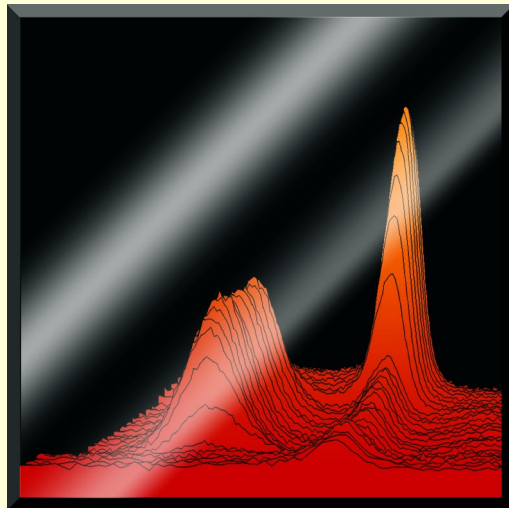


INSTRUMENTATION

FOR ROUTINE

ANALYSIS

# AMICUS

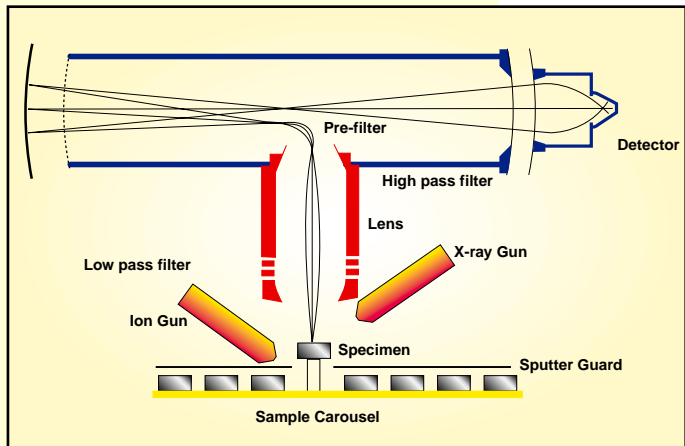


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# AMICUS

A COMPACT, VERSATILE  
XPS INSTRUMENT  
DESIGNED FOR A WIDE  
RANGE OF APPLICATIONS



*Non-dispersive energy analyser of  
the AMICUS electron spectrometer*

The AMICUS instrument has been developed from proven technology and incorporates the latest in digital control electronics producing an easy to use, flexible system suitable for all levels of expertise.

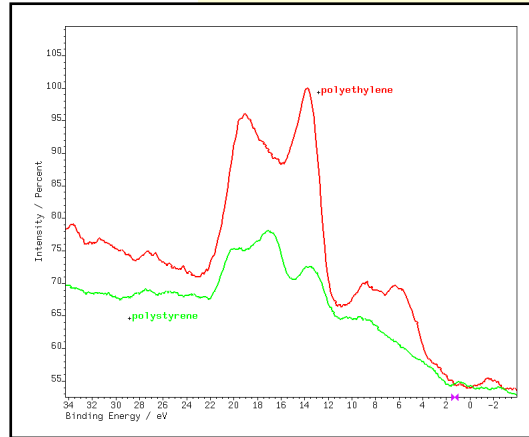
The AMICUS XPS instrument has been designed with a compact footprint enabling it to be used for a wide range of applications from routine laboratory use to quality control and assurance in production environments.

The compact design has been accomplished through the incorporation of the successful 'Dupont' type analyser and optimised digital electronics.

A simple, rapid sample introduction system has been incorporated with a fully automated multi-sample carousel system to allow a wide range of applications to be addressed including unattended operation. The standard highly user friendly XPS acquisition and data processing software package allows simple and complex studies to be carried out in a totally automated fashion. The ability to set up and store previously defined data acquisition parameters ensures reproducible procedures can be obtained, an important criterion in quality control environments.

## ROUTINE XPS ANALYSIS

The high efficiency energy dispersive analyser of the AMICUS means that a high sample throughput can be obtained. Even valence band spectroscopy is possible in a matter of minutes. In this example two hydrocarbon polymers, polystyrene and polyethylene were examined. Analysis of the C 1s core level reveals only minor differences. The valence band spectra (right) show that each polymer has a characteristic "fingerprint" associated with subtle changes in bonding of the valence electrons of the C 2p and C 2s levels allowing easy identification.

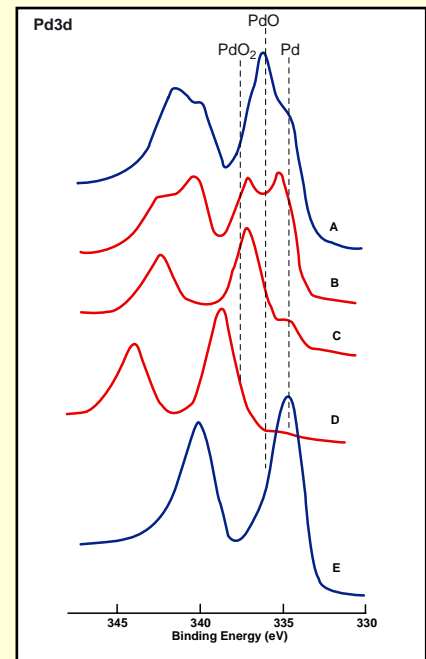


Hydrocarbon polymer analysis

## PROCESS CONTROL - ANALYSIS OF PALLADIUM CATALYSTS

Many industrial processes rely upon the surface chemical properties of materials. The performance of Pd based catalysts for example is directly related to their surface properties. Pd pellets have been taken from the reaction vessel at various stages of their active lifetime. As the lifetime increases activity decreases, XPS analysis of the Pd 3d core level reveals a gradual dominance of the surface oxide. Regeneration can reactivate the Pd pellet via reduction of the oxidised surface as shown by sample E. The AMICUS is ideally suited to this type of analysis due to the fully automated batch analysis capability.

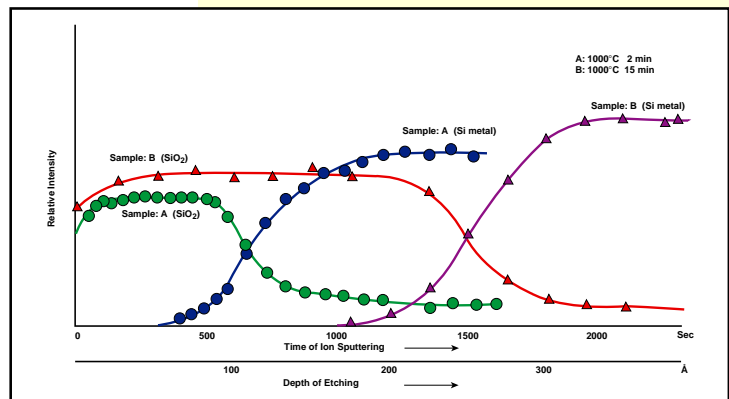
- A: Fresh
- B: Used (active)
- C: Used (activity lowered)
- D: Deteriorated
- E: Regenerated



Measurement of surface oxide levels in Pd pellets

## QUALITY CONTROL - CHEMICAL STATE PROFILING

Combining XPS analysis with the ion sputter gun of the AMICUS can provide depth dependent chemical state information. Here two Si samples were heat treated for 2 min (Sample A) and 15 min (Sample B) respectively in an oxidising atmosphere. The powerful data interpretation facilities available enable an oxide and metallic Si component to be extracted from the Si 2p feature and then plotted as a function of depth. It is clear that the SiO<sub>2</sub>/Si interface has extended from ~10 nm to ~15 nm with the prolonged heat treatment.



Heat treated Si samples analysed for composition variation with respect to depth

# AMICUS

QUALITY XPS

INSTRUMENTATION FOR

ROUTINE ANALYSIS

## SYSTEM SUMMARY

### VACUUM SYSTEM

#### Sample analysis chamber (SAC)

150 l/sec turbomolecular pump  
Base vacuum  $5 \times 10^{-7}$  Pa

#### Sample introduction chamber

50 l/sec turbomolecular pump  
10 sample introduction chamber (optional)

#### System baking

Integrated timer controlled heating tapes

### SAMPLE HANDLING

#### 10 sample carousel

Fully software controlled

#### Sample dimensions

$\leq 10$  mm diameter  
 $\leq 5$  mm thick

### X-RAY SOURCE

#### Conical formed Mg target

300W max power 12kV 25mA  
Dual Mg/Al anodes (optional)

### ELECTRON ENERGY ANALYSER

#### Low pass/high pass filter

Selectable pass energy 25, 75 and 150eV  
Single channeltron detector

### ION ETCHING SYSTEM

#### Standard ion etching source

0.5, 1, 1.5 and 2 kV accelerating voltage  
Etch rate 5-100 Angstrom/min (material dependent)  
Sample rotation during etching

#### Kaufman high speed etching source (option)

0-1000 V accelerating voltage (continuously variable)  
Etch rate 50-800 Angstrom/min (material dependent)

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