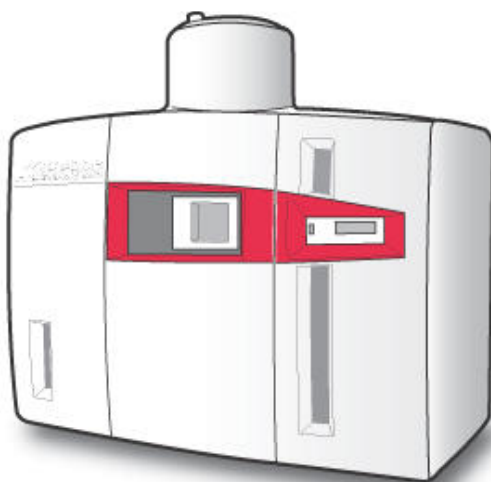


XPS @ RMS



X-Ray Photoelectron Spectroscopy (XPS)

Chemical surface analysis for

- **Quality Control: Cleanliness**
- **Contaminants and residues**
- **Monitoring of surface modifications**

How does XPS work?

In an X-ray photoelectron spectrometer electrons are excited with X-rays so strongly that they leave their atom and eventually the sample surface as well. The energy of these photoelectrons is analysed and hence their binding energy is calculated. This permits to determine quantitatively the chemical composition in the top 5 to 10 nm of the surface.

With this technique all elements except hydrogen and helium can be detected and their binding states analysed. The detection limit is approximately 0.1 at%, which corresponds to about 1 ng/cm² on a surface.

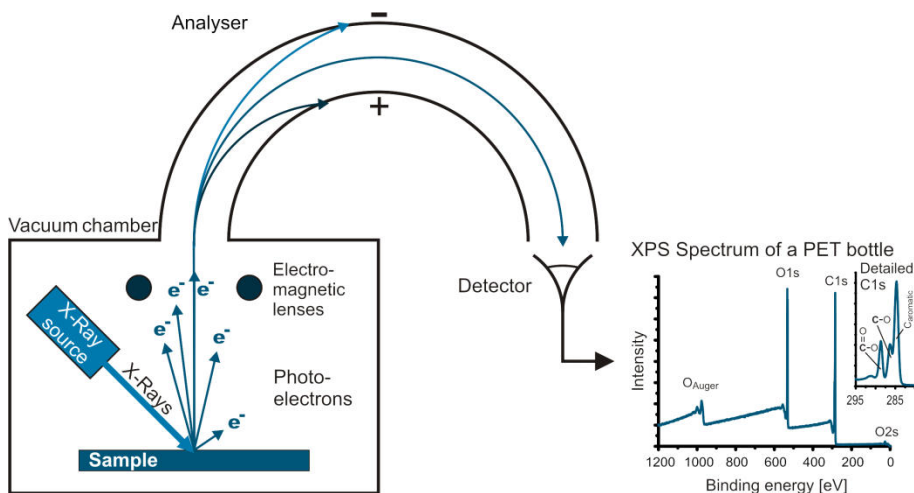


Figure: XPS principle.

Applications

XPS is a non-destructive technique to analyse the

- Cleanliness of surfaces for quality control
- Chemical composition of contaminants and residues
- Chemical modification after surface treatments (e.g. for research)

XPS Analyses serve our customers in the medical technology field but also in other fields such as watch-, coating-, electro- & semiconductor industry.

Equipment

Axis Nova from Kratos Analytical, Manchester, UK.

Our spectrometer is equipped with a large sample holder, a monochromatic AlK α X-ray source, charge neutraliser, argon ion sputtering, a hemispherical analyser and a 2D-detector. This configuration allows for the acquisition of chemical maps with a lateral resolution of 3 μ m, which is the strength of our instrument!

Types of Analysis & Costs

XPS Cleanliness Analysis / Standard Surface Analysis

Such an analysis includes the acquisition of survey spectra, the data processing and a report (German or English). The report consists of spectra, a table with the quantitative chemical composition and information about the chemical bindings if possible (e.g. distinction between sulphides and sulphates).

Table: Costs for an XPS Cleanliness Analysis / Standard Surface Analysis

Number of analysed spots	Costs [CHF] *
1	550
2	780
3	990
4	1200
5	1380
6	1560
7	1740
8	1925
9	2115
10	2300
further Spots	+230/Spot

* XPS Analyses of special spots, complicated or magnetic samples need more time to analyse and thus the additional expenses are charged (approximately 10-50% higher than for standard analyses).

Special XPS Investigations

- ➔ Detailed spectra Acquisition of detailed spectra of selected elements for a more accurate chemical analysis.
- ➔ Angle resolved XPS Analysis of tilted samples in order to determine the depth distribution of the elements in the top 10 nm.
- ➔ Depth profiling Applying argon ion sputtering, the depth profile between 10 nm and 1 μ m depth can be determined.
- ➔ Imaging XPS Chemical map with the distribution of elements or oxidation states with a lateral resolution of 3 μ m!

For these special investigations the actual expenses are charged, i.e. use of XPS: 430 CHF/h, personnel cost for the measurement, analysis & report: 190 or 230 CHF/h). Please ask us for a quotation.

Accreditation & Norms

Our XPS services are accredited according to ISO 17025 and certified according to ISO 9001. The Norms ISO 10993-18 and ASTM F2847 recommend XPS for the *in-situ* analysis of the chemical surface composition of medical devices (for organics, inorganics and insoluble particulates).

ISO 17025	General requirements for the competence of testing and calibration laboratories
ISO 9001	Quality management systems - Requirements
ISO 10993-18	Biological evaluation of medical devices - Part 18: Chemical characterization of materials
ASTM F2847	Standard Practice for Reporting and Assessment of Residues on Single Use Implants

Preset Values:

- **Materials** Vacuum-resistant, metallic and non-metallic solids and powders. Magnetic materials can also be analysed.
- **Dimension** Sample diameter of max. 100 mm; height of max. 20 mm, larger samples can be reduced to the maximum dimensions.
- **Sample Handling** Ideally, the samples are not touched by hand and packed in common aluminium foil under dry conditions for the transportation.

Contacts

Roman Heuberger

Dr. sc. ETH Zurich
Team Leader Surfaces & Tribology
Phone +41(0)32 644 20 22
roman.heuberger@rms-foundation.ch

Olivier Loeffel

XPS & SEM Operator
Phone +41(0)32 644 20 19
olivier.loeffel@rms-foundation.ch

Please discuss with us! We will be happy to advise you.

Or ask for our service catalogue. You will find this and other information on www.rms-foundation.ch as well.

