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# Nexsa Surface Analysis System

High-performance XPS with multi-technique integration



**ThermoFisher**  
SCIENTIFIC

# Confident analysis

Surface and interface analysis can be challenging. It requires instrumentation that can deliver results with confidence to inform the next steps. The Thermo Scientific™ Nexsa™ Surface Analysis System is a high-performance X-ray photoelectron spectrometer, designed for the integration of other analytical techniques without compromising data quality or sample throughput.

## High-performance XPS

- A new design X-ray source delivers excellent sensitivity for the detection of low concentration components, and a micro-focused spot for small feature analysis

## Multi-technique integration options

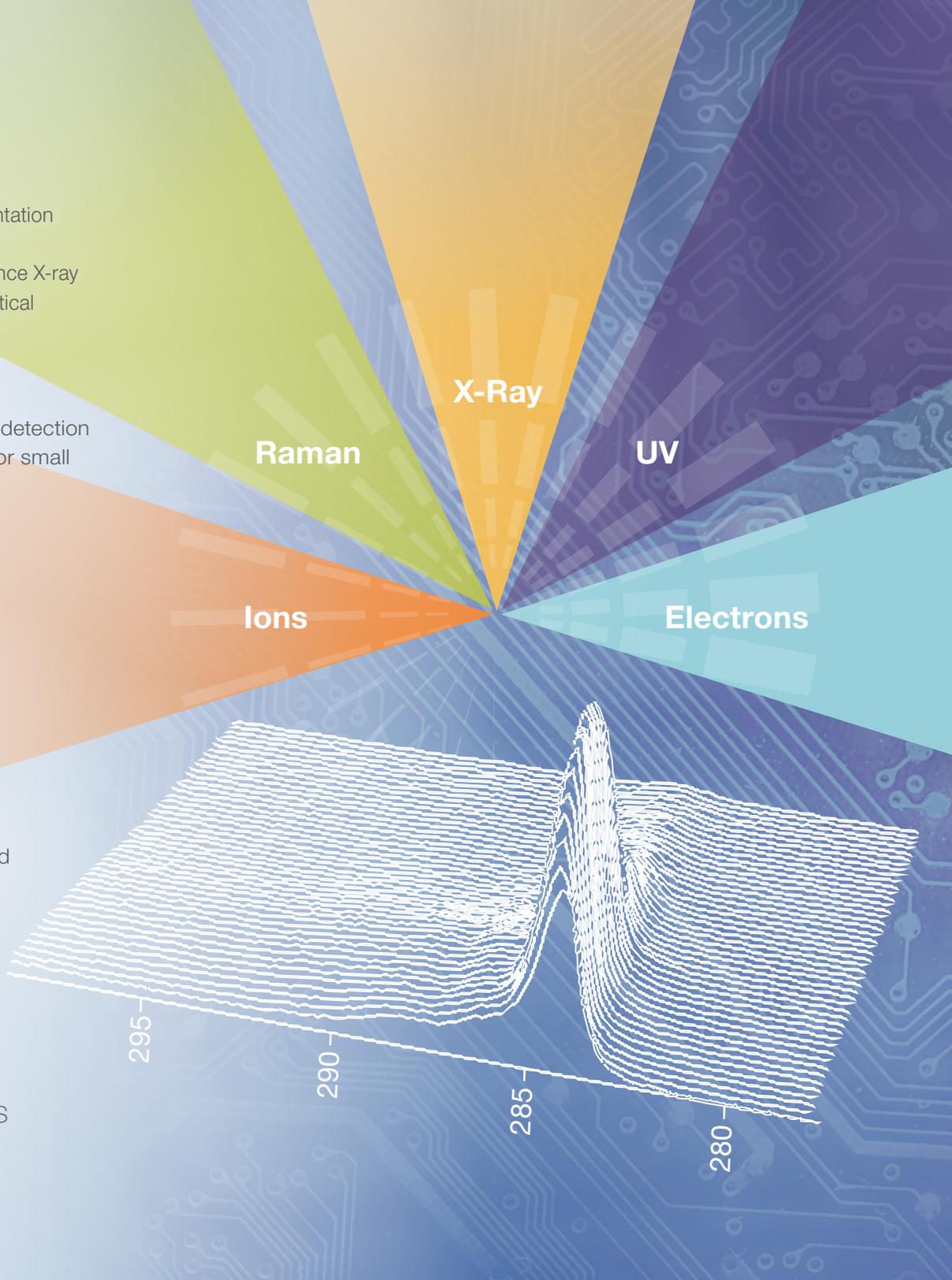
- UPS: ultra-violet photoelectron spectroscopy
- REELS: reflected electron energy loss spectroscopy
- ISS: ion scattering spectroscopy
- Raman: Molecular bonding and structural information with Thermo Scientific™ iXR™ Raman Spectrometer

## Dual mode ion source option

- Thermo Scientific™ MAGCIS™ dual mode ion source for expanded depth profiling capabilities

# Applications

Batteries ■ Bio-surfaces ■ Catalysts ■ Ceramics  
Glass coatings ■ Graphene ■ Nanomaterials  
OLEDs ■ Metals & oxides ■ Polymers ■ Solar cells  
Semiconductors ■ Thin films



## Standard Configuration

Micro-focused, monochromated  
Al K- $\alpha$  X-ray source  
Adjustable from 10-400  $\mu\text{m}$

EX06 monatomic ion source  
200 eV – 4 keV ion energy

Dual beam electron / ion source  
for charge compensation

Rapid pump down load-lock  
with automated transfer  
for fast sample loading

Triple camera viewing system &  
XPS SnapMap to easily find  
features to analyze

Fully featured Avantage software

## Analytical Options

**MAGCIS**  
Replaces EX06 for dual mode  
monatomic & gas cluster ion source

**Bi-polar spectrometer**  
For ISS

**UV source**  
For UPS

**High energy flood gun mode**  
For REELS

**Vacuum transfer module**  
For air-sensitive samples

**Tilt module**  
For ARXPS measurements

**Sample bias module**  
For work function measurements



# Why Nexsa?

## Fast, research-quality spectroscopy

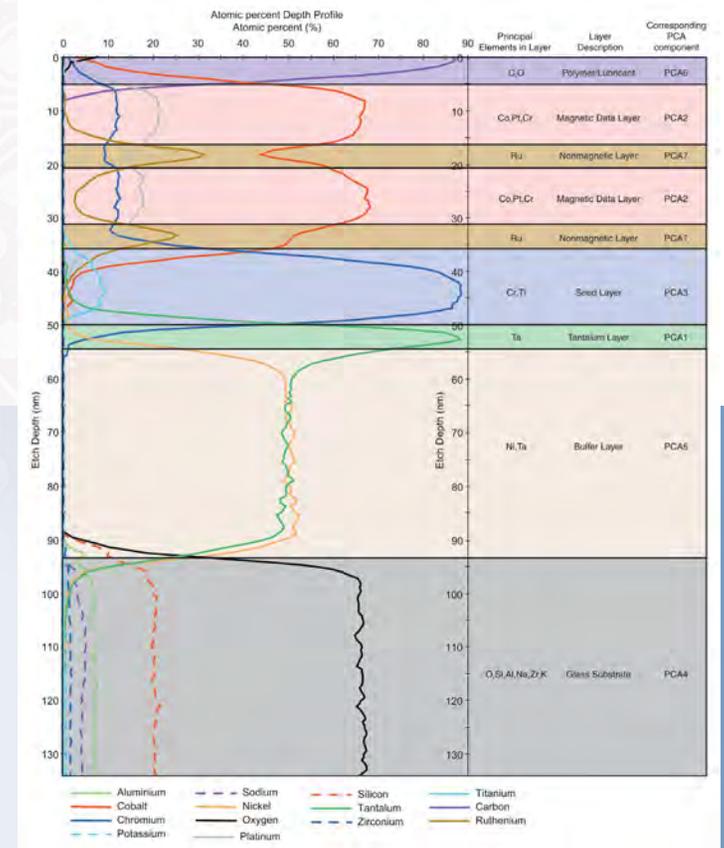
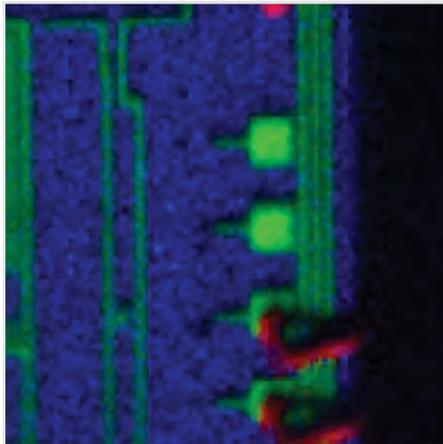
The new X-ray monochromator allows the operator to select an X-ray spot from 10  $\mu\text{m}$  to 400  $\mu\text{m}$  in 5  $\mu\text{m}$  steps, ensuring that the analysis area can be tuned to the feature of interest, and to maximize the signal. The high efficiency electron lens, hemispherical analyzer and detector allow for superb sensitivity, and rapid data acquisition.

## Insulator analysis

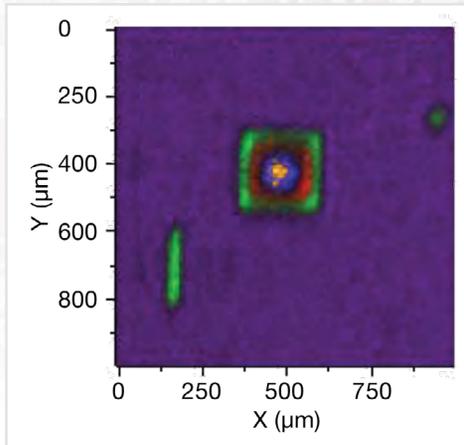
The single-click charge compensation system on Nexsa makes insulator analysis easy. The patented dual beam flood source is designed to prevent sample charging, and by using very low energy electrons, it eliminates the need for charge referencing in most cases.

## Depth profiling

Nexsa is built to go beyond the surface with either the standard ion source or MAGCIS, the optional dual mode monatomic and gas cluster ion source. Automated source optimization and automated gas handling ensures excellent performance and experimental reproducibility.



- Si oxide
- W oxide
- Ti nitride
- Ti oxide
- Co silicide



# XPS SnapMap

## Bringing features into focus

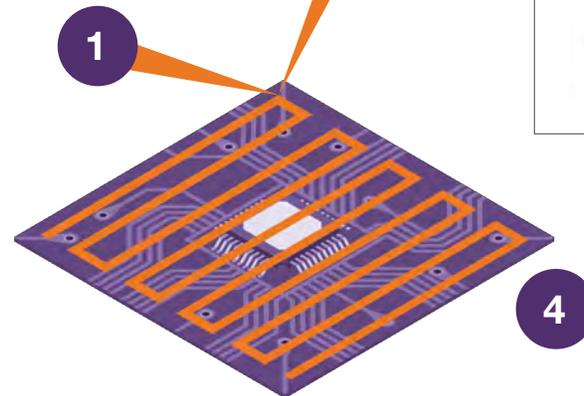
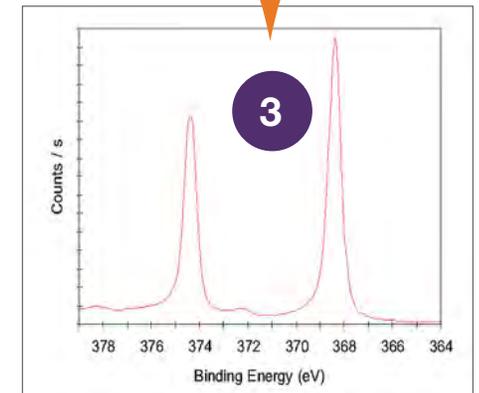
To start an analysis, you have to know where to look. Nexsa Surface Analysis System has a unique, three camera optical system to help you find the areas of interest quickly, and align them with the analysis position.

If areas of interest can't be seen easily, XPS SnapMap can come to the rescue. SnapMap rapid imaging can be used to produce a fully-focused XPS image to use for defining experiments.

SnapMap can also be used for analysis. Data can be collected and processed using Thermo Scientific™ Avantage™ software, which contains the tools required, including principal component analysis, to generate quantified chemical state images.

The micro-focused X-ray source and SnapMap stage raster team up to safeguard sensitivity and ensure consistent pixel size and focus across the image. In short, Nexsa brings clarity to complex samples.

- 1 X-rays illuminate a small area on the sample
- 2 Photo electrons from that small area are collected and focused into the analyzer
- 3 Spectra are continually acquired as the stage is moving
- 4 Stage position monitored throughout data acquisition, positions used to generate SnapMap



# The system for all your samples

With the Nexsa Surface Analysis System, you can have the techniques you need at your fingertips. The standard configuration includes everything you need for high-quality XPS. Optional upgrades transform the system into a complete analysis workstation, dedicated to solving your material analysis problems, and accelerating your productivity.

**XPS:** X-ray photoelectron spectroscopy provides quantified chemical state information from the surface of the sample

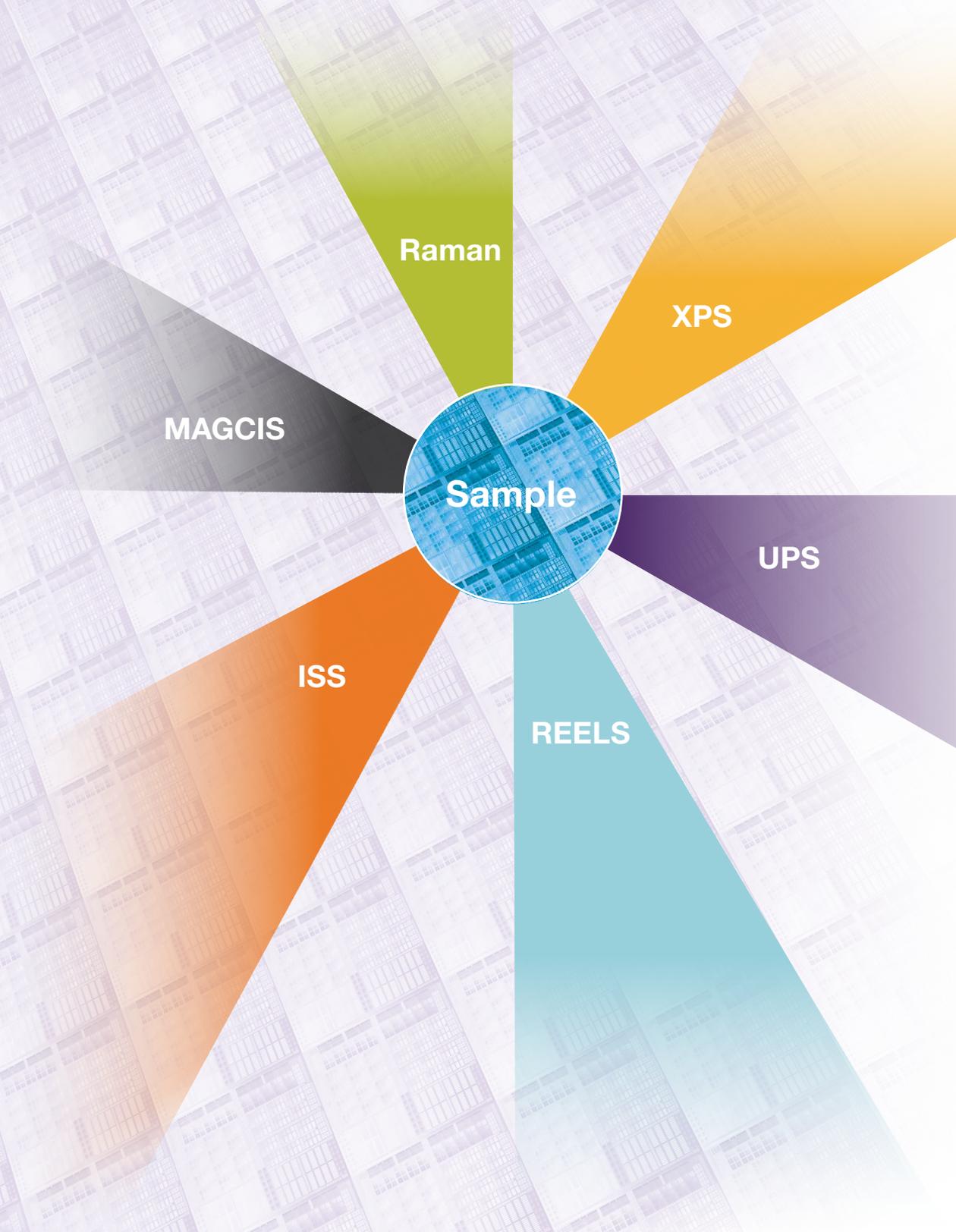
**ISS:** Ion scattering spectroscopy provides elemental composition information from the top atomic layer of the surface

**Raman:** Molecular bonding and structural information

**REELS:** Reflected electron energy loss spectroscopy provides information on electronic structure and can measure the presence of hydrogen

**UPS:** UV photoelectron spectroscopy provides information from the valence electrons

**MAGCIS:** Monatomic & gas cluster ion source which extends the depth profiling capabilities to be able to analyze “soft” layered materials such as polymers



# Avantage Software

## The surface analysis data system

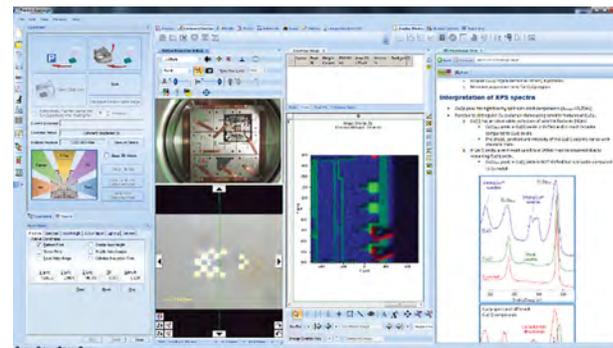
The most crucial component of a modern XPS instrument is its data system. The Nexsa Surface Analysis System, like all Thermo Scientific XPS systems, uses Avantage Software for instrument control, data processing, and reporting. Whether working in a dedicated research lab or in a multi-user environment, Avantage has the flexibility, feature-set, and intuitive operation to enable users of all abilities to maximize their sample analysis.



## Control

From the moment samples are loaded into the system, Avantage handles all the instrument operations to prepare for data collection. Samples are pumped down, and transferred into the analysis chamber automatically. The time

to transfer samples is defined by the monitored pressure in the system, set to ensure that out-gassing samples remain in the load-lock until they are ready to analyze. Avantage monitors all system parameters, storing the data to keep a record of the performance of every system component, and can automatically calibrate Nexsa with a single button press.



## Acquire

Data acquisition could not be simpler. Choose the analysis point, line the area from the optical view or the platten view, use the mouse-wheel to set the analysis area and match the feature of interest, define the elements of interest from the periodic table, and start the experiment. Complex experiments can be ready to run in no time. Multiple positions and experiment types (point, line, area, depth profile) can be programmed into the same experiment for long, unattended runs on large sample sets. Sensible default parameters and automated analysis routines even allow the system to make decisions for the operator to guide them through the analysis process all the way to generating a report.

## Analyze

Avantage has a vast selection of data processing tools to help the user maximize their sample analysis. From basic tools to quantifying individual spectra, and powerful peak deconvolution routines, to sophisticated multivariate statistical analysis tools for images and depth profiles, Avantage can meet the demands of users of all abilities. Online interactive reference guides assist with spectrum interpretation, with reference spectra and peak-fit schemes to move from data to results – fast.

## Report

Avantage offers a range of tools to output data to reports in a range of formats to suit the requirements of the user.

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XPS with multi-technique integration



## Standard Configuration

Micro-focused, monochromated X-ray source

Dual beam flood source

Monatomic ion source

## Analytical Options

UV photoelectron spectroscopy

Ion scattering spectroscopy

Reflected electron energy loss spectroscopy

Raman spectroscopy

MAGCIS dual mode ion source

ARXPS tilt module

Vacuum transfer module

Adaptor for glove box integration

Find out more at [thermofisher.com/surfaceanalysis](https://thermofisher.com/surfaceanalysis)

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