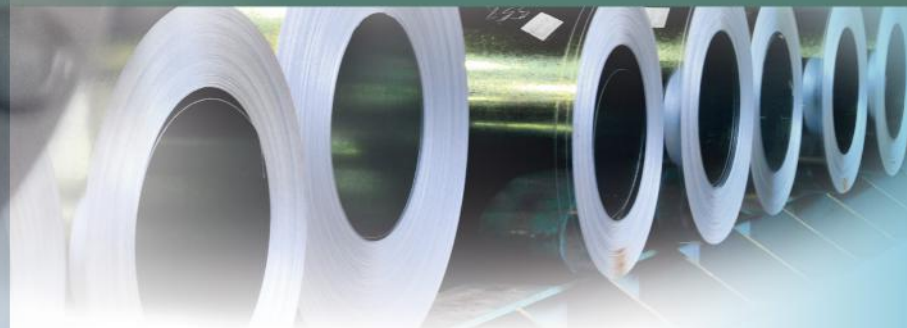


**Thermo Scientific ESCALAB Xi+**  
X-ray Photoelectron Spectrometer (XPS) Microprobe



XPS Microprobe

## for Quantitative Imaging and Multi-technique Surface Analysis

**Thermo**  
SCIENTIFIC

# Designed for Performance

The Thermo Scientific™ ESCALAB™ Xi+ X-ray Photoelectron Spectrometer (XPS) microprobe is the latest development in the highly successful ESCALAB product line. The ESCALAB Xi+ is an expandable, optimized, multi-technique platform with unparalleled flexibility and configurability. Cutting edge technology, driven by intuitive software and hardware, leads to world class results and productivity. System control, data acquisition, processing and reporting are seamlessly integrated by the powerful Thermo Scientific™ Avantage™ data system.



## Leading Analytical Performance

- Quantitative spectral imaging
- Fast parallel imaging <math><3\ \mu\text{m}</math>
- Signature-free detector
- Sub-6  $\mu\text{m}$  spectroscopy
- Best in class sensitivity and energy resolution
- Microfocused monochromator
- Compositional image analysis
- Auto-tuning high flux ion profiling source
- Turn-key charge compensation

## Streamlined Operation

- Advanced Automation
  - Selection of analysis area and angular resolution
  - Automatic gas handling and vacuum control
- Calibration on demand
  - Energy Scale and transmission function
  - Ion gun alignment and beam focusing
- Point and click sample navigation and analysis setup
  - Live view of analysis position
  - High intensity illumination

## Flexibility by Design

- ISS and REELS as standard
- Preploc chamber as standard
- Automated UPS option
- Field emission electron source option for AES/SEM/EDS
- Optional preparation accessories include:
  - Fracture Stage, crystal cleaver, specimen scraper
  - Specimen heating/cooling
  - Sputter cleaning ion gun
  - High pressure gas cell

# ESCALAB Xi+ – The Versatile Tool For Surface Analysis

## Large Area Spectroscopy (LAXPS)

The combination of high efficiency lenses and detectors ensures the highest sensitivity for large area spectroscopy applications; high resolution spectra acquired in seconds!

- Maximum chemical detectability
- Six channel electron multipliers for maximum dynamic range
- Twin crystal monochromator for maximum X-ray flux

## Small Area Spectroscopy (SAXPS)

ESCALAB Xi provides fast and precise small area analysis.

- Small feature analysis from greater than 900  $\mu\text{m}$  to 20  $\mu\text{m}$
- Source-defined analysis from greater than 900  $\mu\text{m}$  to less than 200  $\mu\text{m}$
- Lens-defined small area down to less than 20  $\mu\text{m}$
- Software enabled feature selection via real time iris and image control

## Fast Parallel Imaging (XPI)

Parallel imaging produces rapid, high-resolution XPS chemical images.

- Less than 3  $\mu\text{m}$  chemical imaging resolution
- Small area retrospective spectroscopy less than 6  $\mu\text{m}$
- Signature free detection system
- Imaging of both large and small features
- Single input lens and analyser for imaging and spectroscopy
- Collection of image stacks for quantitative chemical state imaging
- PCA for composition image analysis

## Energy Resolution

Excellent energy resolution is achieved with the combination of advanced analyzer design and a twin-crystal microfocusing X-ray monochromator.

- Identification and quantification of individual chemical states
- Resolve overlapping peaks and subtle differences in surface chemistry

## Insulator Analysis

Insulating samples are easily analyzed using state-of-the-art charge compensation.

- Automated analysis of insulators
- Excellent performance under all analysis conditions

## Depth Profiling

The advanced new ion gun provides high current density even at low beam energy. Auto-tuning of the ion gun ensures optimum crater quality and profiling speed.

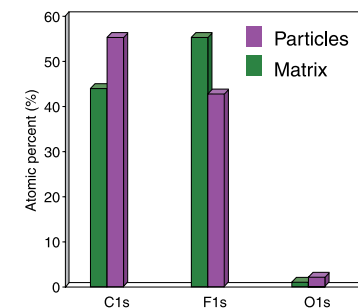
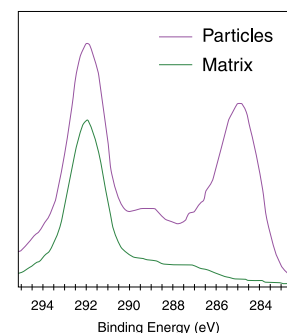
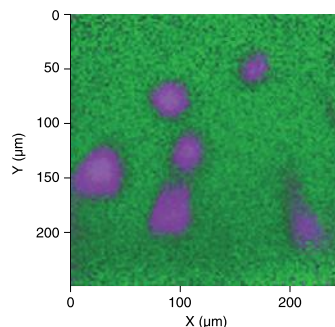
- Azimuthal and off-axis sample rotation during profiling
- Full computer control of the ion gun operation modes
- Automated gas handling for etch rate repeatability



## Angle Resolved XPS

- Software controlled angular resolution ensures optimum repeatability
- Eucentric tilt for constant analysis position regardless of sample thickness
- Direct mechanical drive ensures accuracy and precision of tilt position
- Integrated suite of ARXPS processing tools, including Max-Ent (profile reconstruction) and multilayer thickness calculator

Spectroscopic imaging of contaminant particles in a fluoropolymer matrix



## Complementary Techniques

### Standard

#### Reflection Electron Energy Loss Spectroscopy (REELS)

Complementary electronic, structural and phase information can be provided using the ESCALAB Xi+ in-lens electron source.

- Hydrogen identification and quantification for polymers and other materials
- Narrow energy spread and an energy range of 0 to 1000 eV

#### Ion Scattering Spectroscopy (ISS)

Reversible polarity lens and analyzer power supplies make ISS a standard feature.

- Channel electron multipliers provide maximum dynamic range while avoiding image detector damage

### Optional

#### Auger Electron Spectroscopy, (AES, SEM, SAM)

The ESCALAB Xi+ can be configured with a Schottky field emission source.

- Auger analysis at very high spatial resolution, 95 nm spot size at 5 nA
- Multiple channel electron multiplier detector essential for high count rates

#### Ultra-violet Photoelectron Spectroscopy

Rapid, high-resolution UPS measurements are possible with the high-flux UV lamp option.

- Excellent electronics stability and low-energy performance required for work-function measurements
- Mu-metal analysis chamber provides optimum magnetic shielding

## Configuration Detail

### Electron Analyzer

- Double-focusing full 180° spherical sector analyzer
- Magnetic and multi-element electrostatic input lenses
- Motorized, computer controlled irises to define lateral and angular resolution

### Detection System

- Channel Electron Multipliers – *For applications needing high dynamic range: LAXPS, REELS, AES, ISS*
- Image Detector – *Two-dimensional detector based on a pair of channel plates and having true pulse-counting capability*

### Microfocused Monochromated X-ray Source

- 0.5 meter Rowland circle
- Microfocused electron gun
- Multi-position aluminum anode
- Optional silver anode
- Two toroidal quartz crystals

### Flood Gun

- Charge compensation
- Electron imaging
- REELS

### Ion Source

- Depth profiling
- Sample cleaning
- ISS operating mode

### Sample Navigation and Manipulation

- Point and shoot sample navigation and analysis set-up
- Live optical view of sample and analysis markers
- Automated 5-axis Sample Manipulator
- Heating and cooling enabled<sup>1</sup>
- Azimuthal Rotation<sup>2</sup>

### Avantage Data System Package

- Full digital instrument control
- Advanced, acquisition, processing and reporting package
- Recipe mode, from acquisition to report
- Auto analysis function available

### Twin Anode Non-Monochromated XPS Option

- Dual anode (MgKa/AlKa) X-ray source
- Other anodes available (e.g. Ag, Zr etc.)

### Thermo Scientific™ MAGCIS™ Option (Monatomic and Gas Cluster Ion Source)

- Dual mode ion source
- Cluster mode for profiling “soft” materials such as polymers and gentle cleaning of samples prior to XPS
- Monatomic mode for standard ion gun operation



### UV Photoelectron Spectroscopy (UPS) Option

- High intensity UV lamp
- Automated noble gas admission system

### 95 nm AES/SEM/SAM Electron Gun Option

- Schottky type field emission source
- Dedicated source ion pump
- SEM detector
- Optional EDS detector
- System vibration isolation
- Charge compensation for insulating samples

#### Notes

1. Sample heating requires the use of one of the optional heated sample holders.
2. Sample rotation requires the use of the optional rotation sample holder.



|                              |                   |
|------------------------------|-------------------|
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