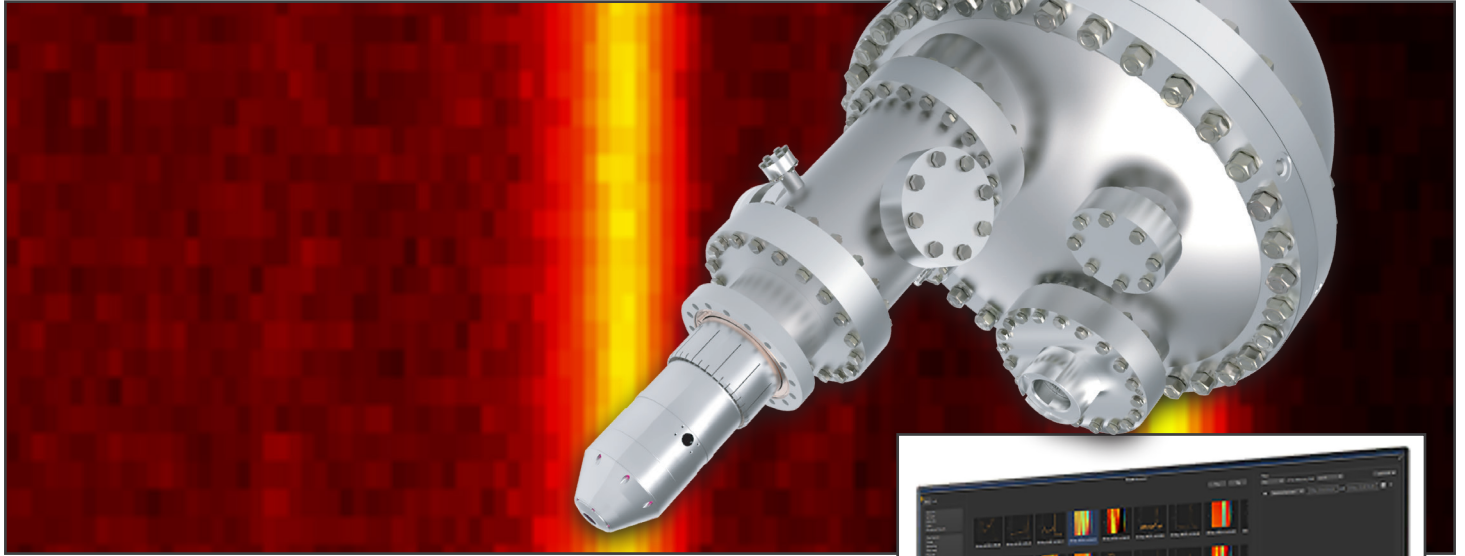


Exceptional XPS Performance



- New dynamic modes
- Multi-peak monitoring
- Fast survey acquisition (< 2 sec)
- Highest spectrometer sensitivity
- Quantitative snapshot mode
- Energy range up to 3.5 KeV
- NEO software suite

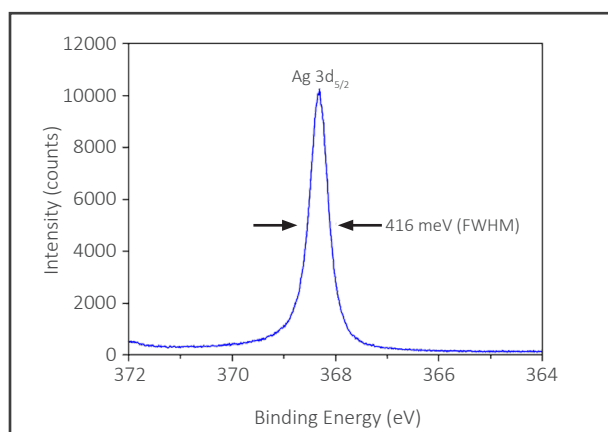


The ASPECT Dynamics analyser is a high-end multipurpose photoelectron spectrometer combining unsurpassed count rate performance and new controller technology to allow for advanced XPS studies such as new types of operando experiments and in-situ observations of surface reactions with chemical resolution.

The electron optical lens modes are well balanced to combine transmission and energy resolution in high performance XPS applications. The particle counting multi-channel detector is setup for quantitative snapshot detection with wide energy windows. The in-vacuum detector electronics ensures a low noise level and enables fast data transfer for successive snapshot acquisitions in the sub-millisecond range. The spectrometer electronics supplying high voltages to the electron optical system are designed for fast rise and settling times. As a result, the full energy range of 3.5 keV is accessible within some milliseconds. This way, time resolved processes can be observed with XPS data acquisition of all core levels even with wide apart binding energies on the millisecond time scale. At the same time, synchronous data acquisition of up to four individual analogue signals with the spectrometer electronics enables the direct correlation of process parameters with XPS data. With these capabilities, full range photoelectron spectra can be acquired in as little as 2 seconds where conventional XPS scans would take several minutes.

Spectrometer

ASPECT Dynamics consists of a thoroughly designed and characterised electron optical system with a 160 mm mean radius hemisphere offering highest transmission and fully quantitative XPS experiments.

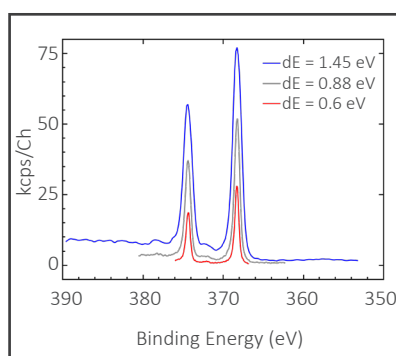


A high resolution spectrum of the Ag 3d_{5/2} peak shows excellent energy resolution of 416 meV. Data is recorded in combination with the monochromated X-ray source MECS.

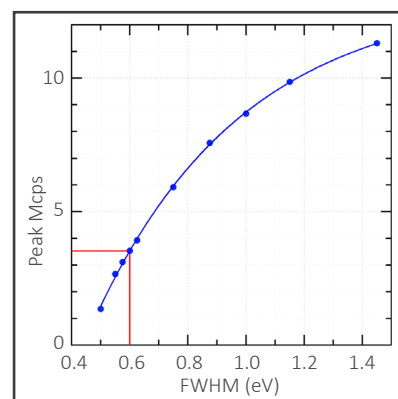
The optimised lens modes ensure that photoelectrons are transferred from the sample surface onto the detector in a most efficient way with high energy resolution, making the ASPECT ideally suited for high sensitivity chemical state analysis.

128-channel particle counting detector

A multichannel plate (MCP) stack multiplies incoming electrons to be picked up by anode stripes located long the dispersive direction of the detector. These are directly coupled to in-vacuum readout electronics to form 128 individual detection channels. A high speed data transfer link to the analyser controller allows for data acquisition orders of magnitude faster compared to standard XPS detectors. As a result, ASPECT Dynamics can detect as many as 50.000 spectra in a time window of 2.5 seconds. In addition, the detector offers excellent life time and cost-of-ownership. Due to the low noise level at the detector a far lower MCP gain is required to detect electrons compared to other MCP driven detectors and therefore significantly reducing aging of the MCP stack.



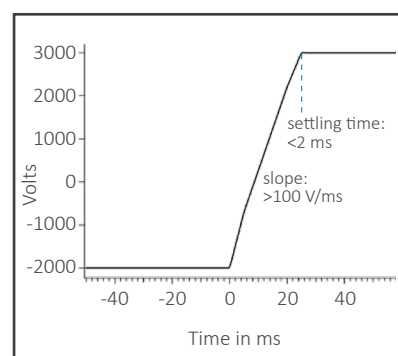
Snapshot energy interval and peak heights for given energy resolution (FWHM) on the Ag 3d_{5/2} peak.



The Aspect Dynamics analyser offers best-in-class transmission. The Ag 3d_{5/2} peak is measured at a count rate of >3.5 Mcps with an energy resolution of 0.6 eV (FWHM). Data is recorded in combination with the monochromated X-ray source MECS.

Control Unit

Ultra-fast electronics for up to 3.5 keV incorporates state-of-the-art voltage amplifiers allowing for ultra-fast ramp rates of lens voltages with settling times in the millisecond regime. Ultra-fast ramp rates guarantee that the spectrometer can change the analyser energy 100 times faster than normal spectrometers. Even large changes of the lens potentials of 5000 V can be applied in milliseconds without sacrificing accuracy in the measured peak positions or line shapes. Sophisticated embedded software and powerful processors ensure accurate timing of all required lenses during fast spectrum acquisition.



High voltage switching of spectrometer electronics on millisecond scale.

In addition, the powerful processors supported by a consequent design of controller architecture are geared up to process and store the fast stream of incoming and outgoing data. Ultimately, the electronics ensures that spectra are recorded with a precision in the milli electron volt regime. A large kinetic energy range of up to 3.5 keV can be accessed with the ASPECT analyser offering an extended range when using higher excitation energies to detect photoelectrons and Auger electrons from deeper core levels.

Snapshot Acquisition and Dynamic XPS

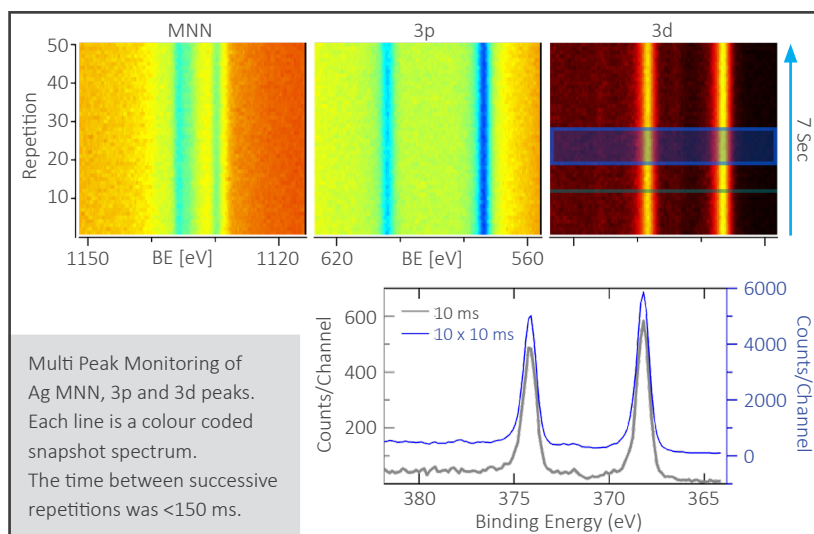
Within the ASPECT's multi-channel detector multiple stripe anodes are arranged in parallel to acquire a spectroscopic interval simultaneously. This snapshot acquisition forms the basis for Dynamic XPS measurements. Dynamic XPS provides information on the temporal evolution of chemical states and elemental quantities on the millisecond timescale.

Fast Survey Acquisition

With Fast Survey Acquisition full range overview spectra can be acquired in as short as 2 seconds. This mode of acquisition allows users an instant view of the analysed sample. Exposure times can be significantly reduced for sensitive samples in turn to reduce radiation damage otherwise impairing the spectroscopy data. For improved statistics the spectrum acquisition can be repeatedly run to accumulate the photoelectron counts.

Multi Peak Monitoring

In the acquisition mode "Multi Peak Monitoring" snapshot spectra are acquired at different binding



energies (BE) in sequence, with each sequence repeated for a predefined number of times. The ASPECT Dynamics combines (1) high temporal resolution and (2) high data quality. This combination is ideally suited e.g. for studying transitions and reactions at surfaces, monitoring and optimising processes or controlled sample preparation.

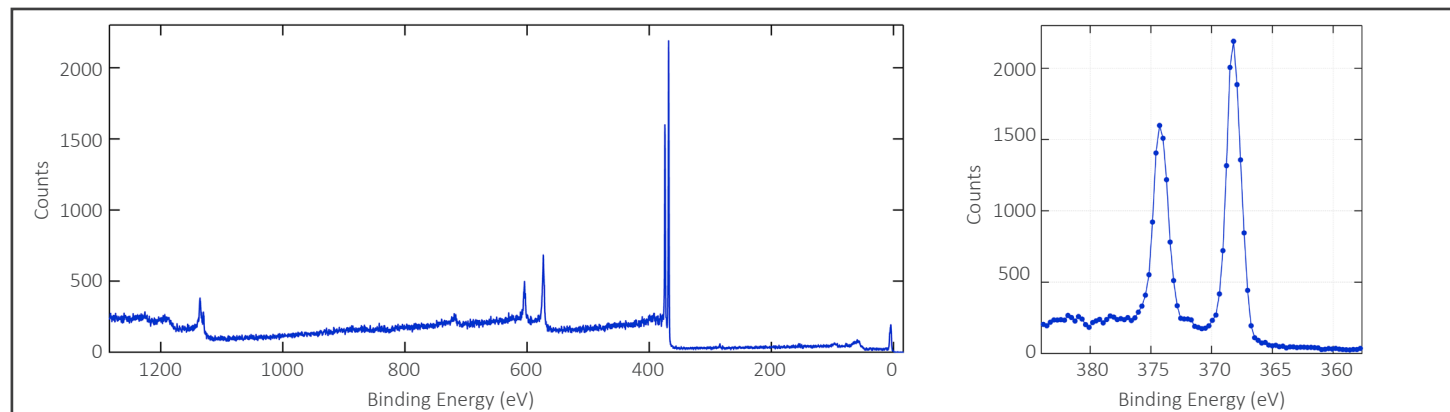
NEO control suite

ASPECT Dynamics is operated through the NEO control suite. NEO is a modern, versatile and configurable software suite for electron spectroscopy applications. Its guided workflows allow setting up and running of acquisitions and

experimental sequences with ease while providing the user with full control over relevant parameters at the individual stage of an experiment and integrated instruments including fine focused ion source and electron flood source for charge neutralisation.

Build in calibration and conditioning routines allow easy to use and automated setup and maintenance procedures of the spectrometer and detector.

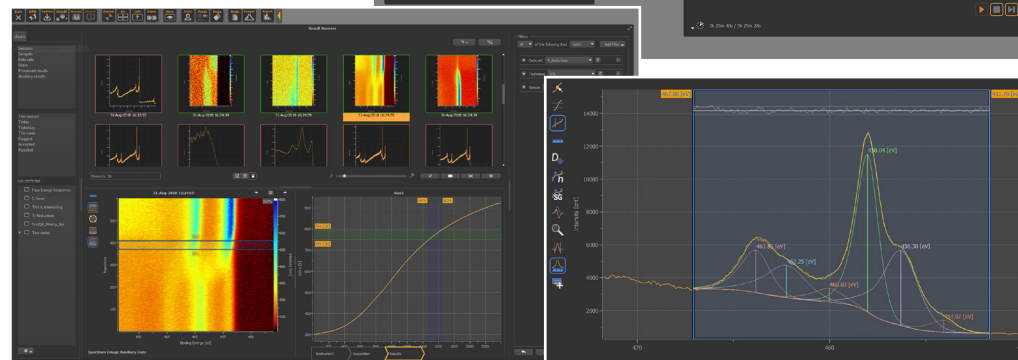
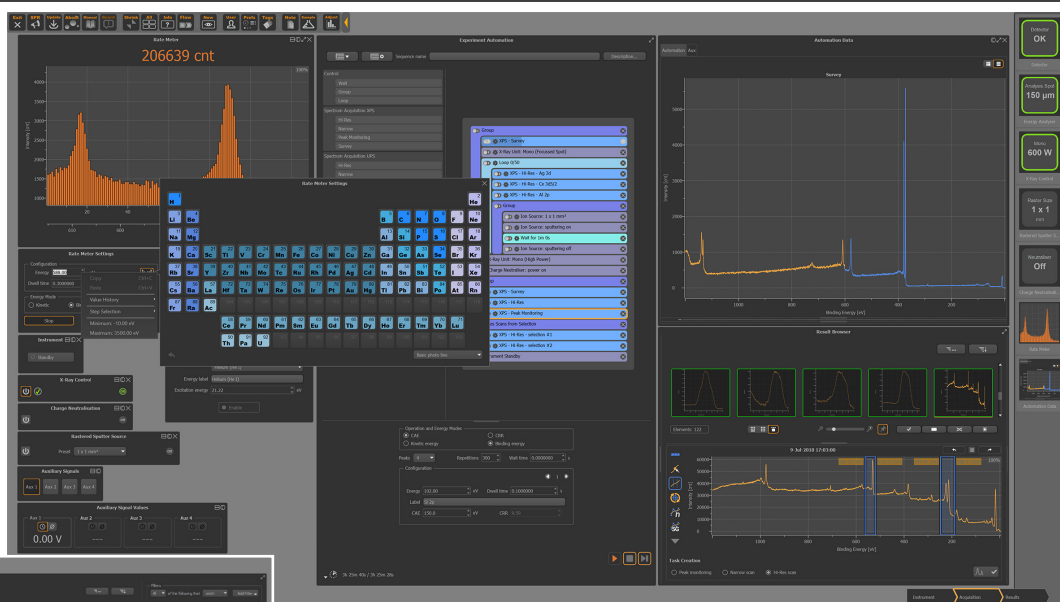
The built-in result data browser lets you retrieve, review, manage, or analyse any acquired data and its associated information instantly, whenever you need it and regardless whether you've run your experiments today or a year ago.



Full range overview spectrum of silver taken within 2 seconds.

Excerpt of the Ag 3d peaks from the overview spectrum showing high data quality at this short measurement time.

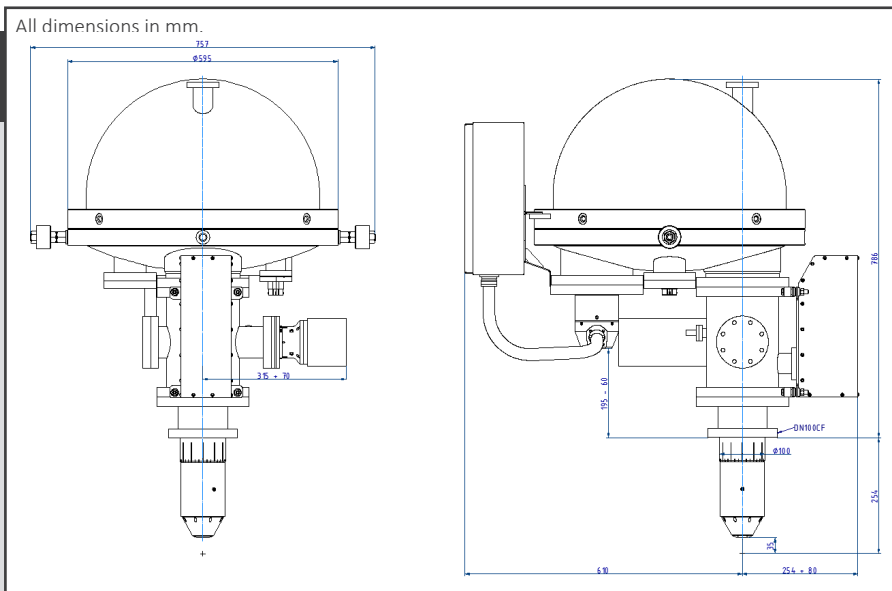
Experimental sequences and acquisition tasks with clear and well-arranged instrument control and results display.



Results filtering, reviewing and exporting as well as data processing tools in the results browser. Data exports in ASCII or VAMAS file format. Full control of all results and meta data stored in a database. Collate your results in collections for clear data management.

Technical Data

Detector	Multi-channel (snapshot acquisition)
Input lens	Particle counting DN100CF mounting flange 254 mm flange to sample distance 35 mm working distance Software controlled aperture selector
Hemisphere	Kinetic energy range up to 3.5 keV 160 mm mean radius
Acquisition modes	Sweep Snapshot acquisition Fast survey acquisition Multi Peak Monitoring (Dynamic XPS) Analogue signal (4 channels)
NEO Control Suite	Instrumental control Data acquisition Data management



How to contact us:
www.ScientaOmicron.com
info@ScientaOmicron.com