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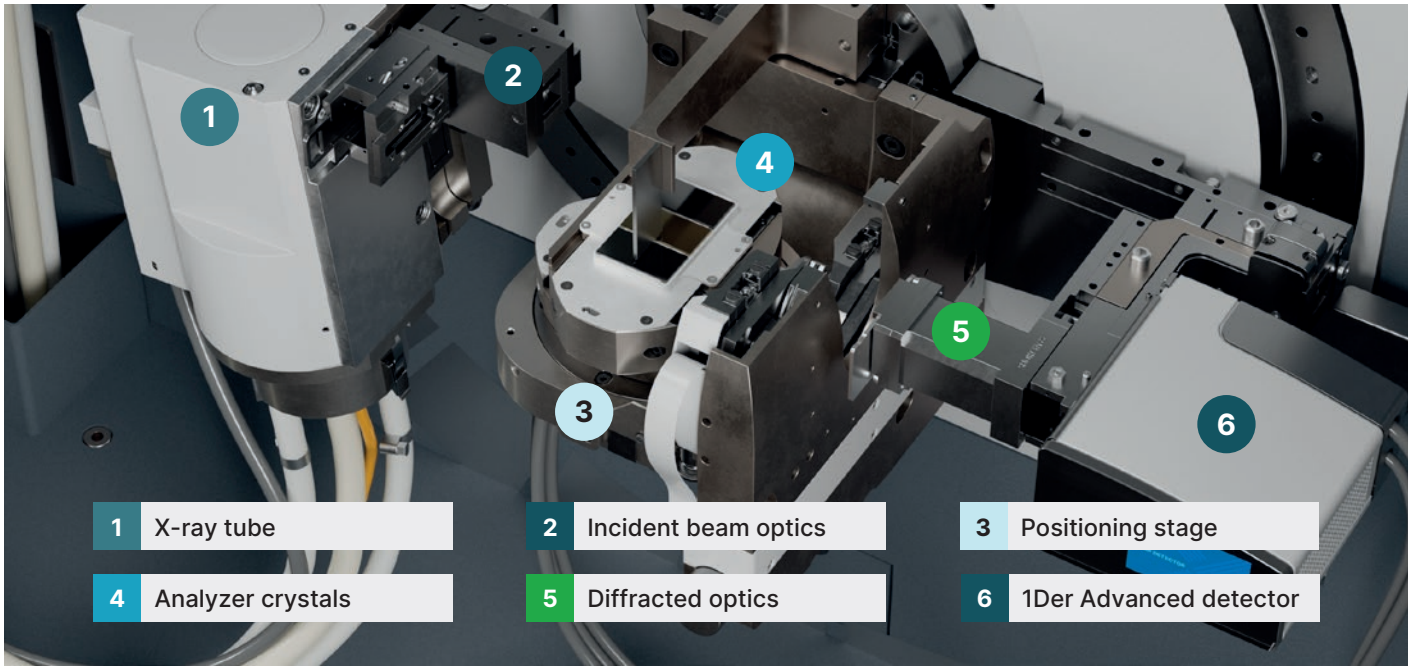
Empyrean XAS

Synchrotron-comparable chemical insight, directly in your lab

Reveal the local chemical environment of materials and connect chemistry, atomic scale structure, and long-range crystallography on a single instrument.

XAS setup on Empyrean



Why Empyrean XAS?

See what diffraction cannot

Reveal oxidation state, local structure, and chemical state information beyond average crystallographic structure.

Correlate chemistry and crystallography

Combine XAS, XRD, scattering, PDF, and imaging on a single Empyrean platform.

Work on your schedule

Perform routine XANES and EXAFS measurements without competing for synchrotron beamtime.

Trust your results

Generate synchrotron-comparable data with excellent agreement to reference synchrotron measurements.

Key highlights

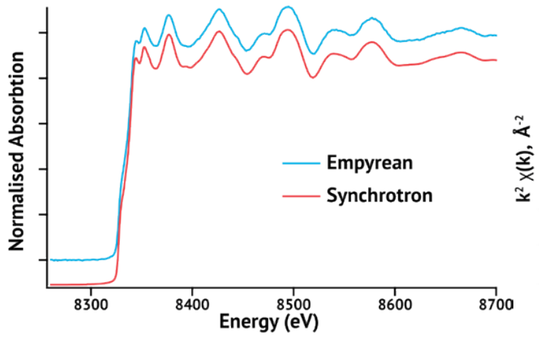
- Laboratory-based XANES and EXAFS
- Multi-edge capability
- Broad elemental coverage
- Integrated multipurpose workflow
- Transmission measurements

Validated against synchrotron measurements

Laboratory XAS without compromising data quality

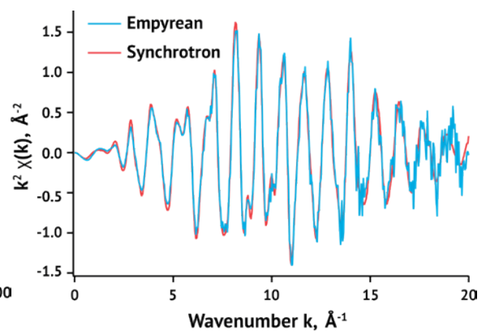
Laboratory based Empyrean XAS delivers XANES and EXAFS measurements with excellent agreement to synchrotron reference data. By combining high-quality spectroscopy with the flexibility of an in-house instrument, researchers can rapidly investigate chemical state and local structure without waiting for beamtime.

Ni K-edge



Excellent agreement in edge position, white-line intensity, and spectral features allows reliable determination of oxidation state and local symmetry.

Pt L_3-edge



Strong agreement in EXAFS oscillations provides confidence in quantitative analysis of local structure, bond distances, and coordination environments.

What can XAS reveal?

Oxidation state
Track changes in chemical state and redox behavior.

Coordination geometry
Understand the local arrangement of neighboring atoms.

Bond distances
Measure atomic-scale structural parameters.

Local disorder
Investigate deviations from average crystal structure.

Two complementary regions, one complete picture

XANES	EXAFS
Oxidation state	Bond distances
Electronic structure	Coordination number
Local symmetry	Local atomic order

Together, XANES and EXAFS provide direct, element-specific insight into the relationship between local chemistry and material function.

Applications across advanced materials research

Energy storage

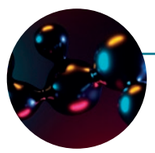
Track redox chemistry during battery operation

Study oxidation state changes and local structural evolution in cathode and anode materials to better understand degradation mechanisms and improve performance.

Catalysis

Investigate active-site structure

Characterize oxidation state, coordination environment, and local structure to understand catalyst activity, selectivity, and stability.



Advanced materials

Characterize local order, defects, disorder, and electronic structure in functional materials.

Environmental science and geology

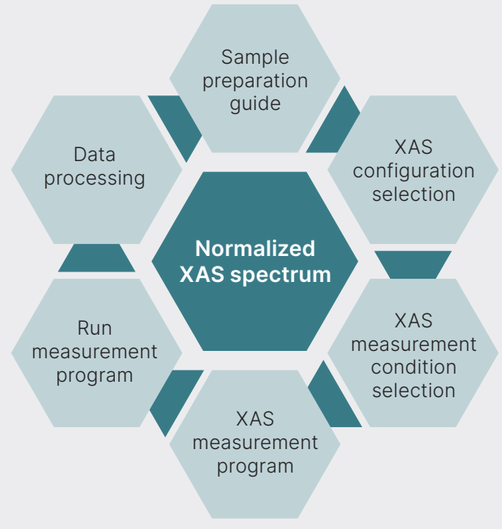
Analyze elemental speciation, coordination environment, and trace-element chemistry in complex natural systems.

AbraXAS software

From measurement to interpretation

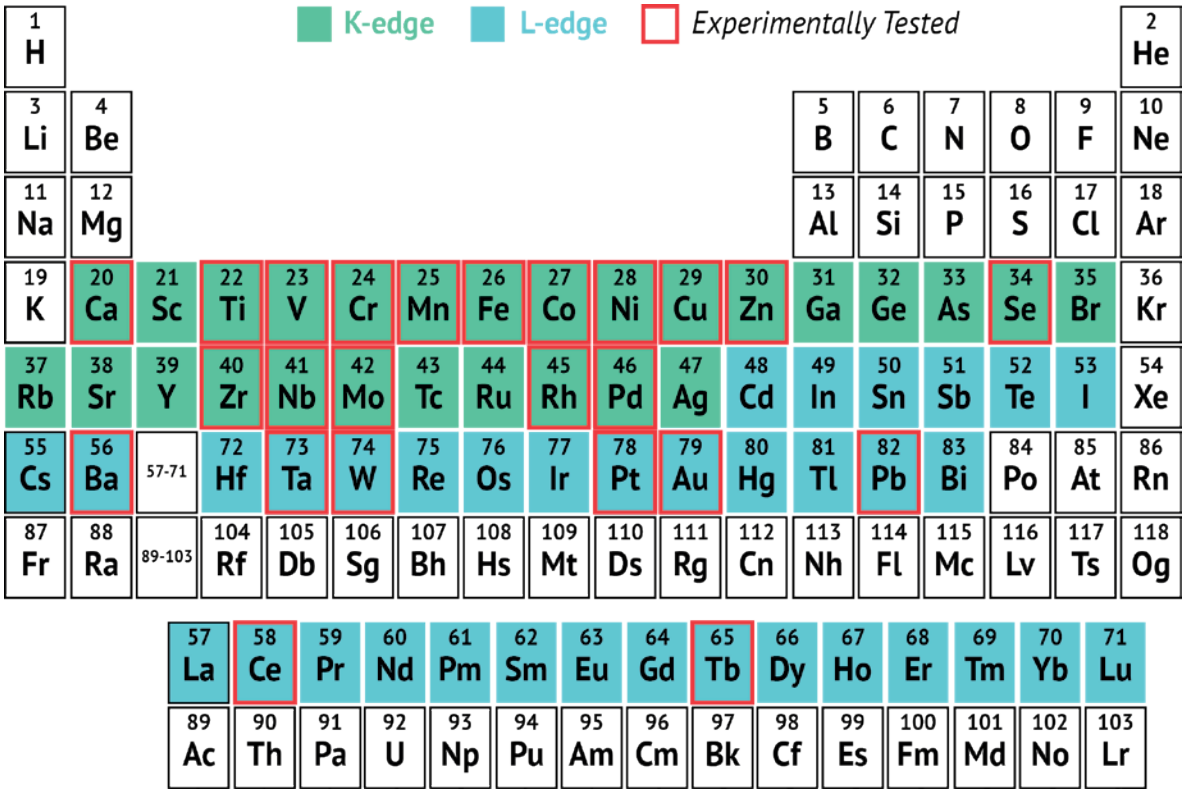
- Automated data acquisition
- Energy calibration
- Scan alignment
- Background subtraction
- XANES normalization
- EXAFS processing
- Spectral analysis and interpretation

The integrated workflow enables researchers to move efficiently from measurement to insight without relying on multiple software environments.



Technical specifications

Broad elemental coverage
4 - 20+ keV



Specification	Value
Techniques	XANES, EXAFS
Energy range	4-20+ keV
Measurement mode	Transmission
Energy resolution	Down to 1.3 eV @ 8 keV
Resolving power	Up to E/ΔE ≈ 6150
Accessible edges	K-edges of 3d transition metals and L-edges of heavy elements
Environment	Ambient air operation
Operando studies	Supported
Measurement time	Minutes to hours

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