



vitesse

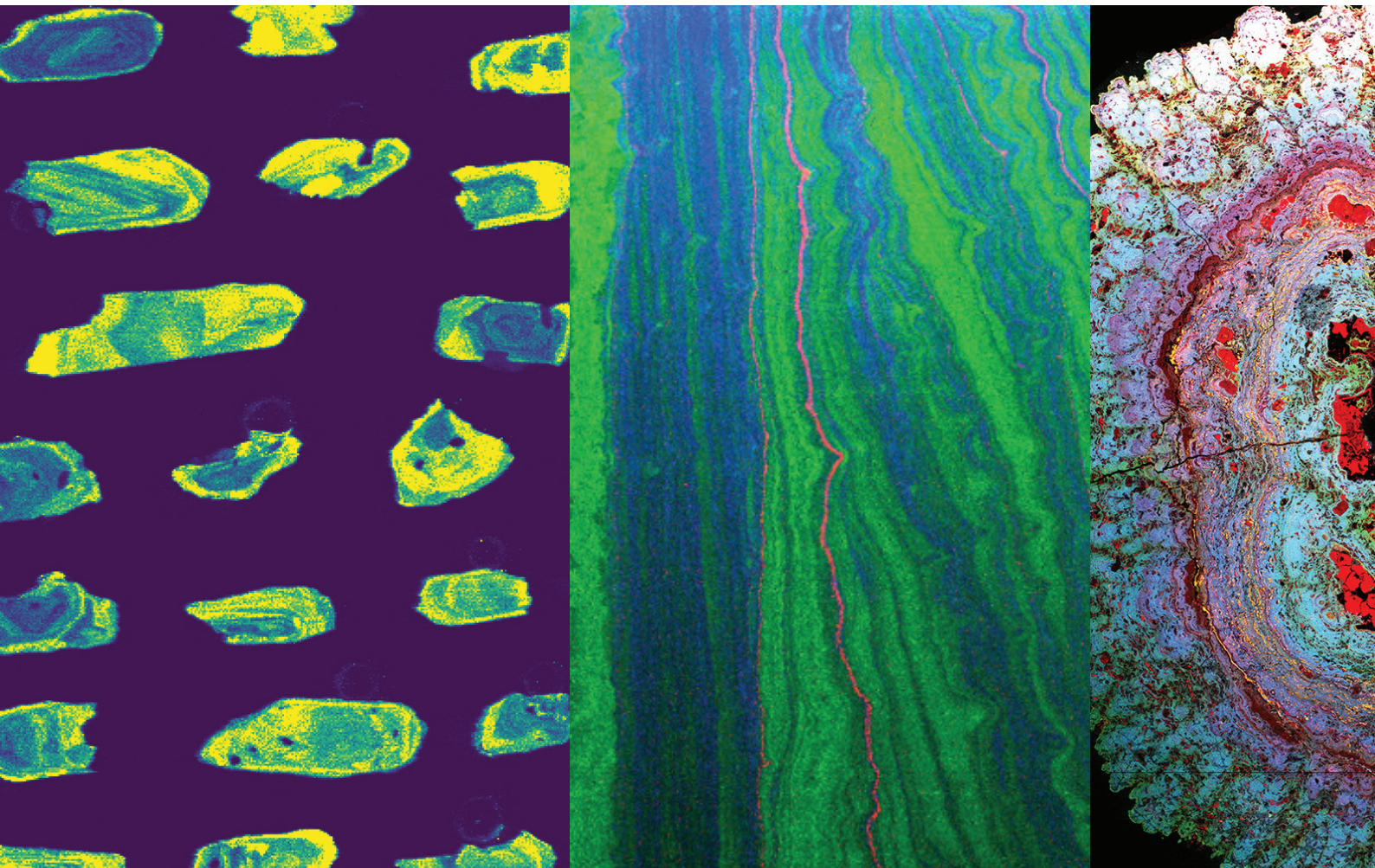
**Time-of-Flight
ICP-MS**



Vitesse

Vitesse is a next-generation Time-of-Flight Inductively Coupled Plasma Mass Spectrometer (TOF-ICP-MS), purpose-built for high-speed, high-resolution multi-element analysis. Whether you're conducting laser ablation imaging or nanoparticle characterization, Vitesse delivers unmatched performance, sensitivity, and flexibility.

With the fastest wide mass range data acquisition available, Vitesse enables detailed exploration of micron-scale features and the elemental composition of individual nanoparticles. Its segmented reaction cell and high physical resolving power ensure interference-free, selective analysis across a broad range of elements.



Key Features

High Speed Acquisition

Continuous spectral acquisition at speeds of more than 10k spectra/sec. Allows for fast high resolution imaging and accurate nanoparticle identification.

Simultaneous detection of isotopes

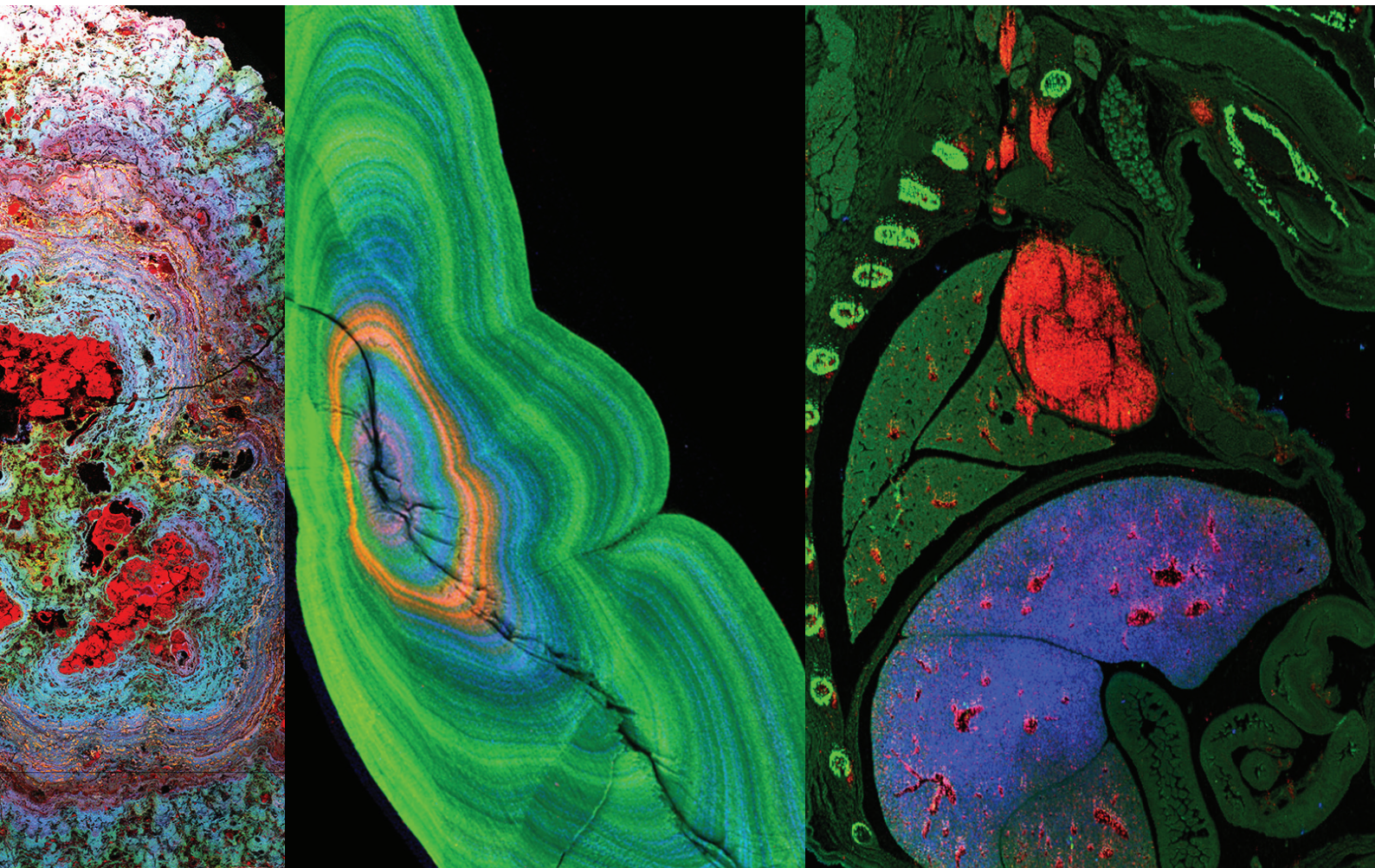
Quasi simultaneous measurement of packets of ions. Allows for detection of multiple elements within one nanoparticle and easy non-target analysis of various samples.

Robust CoDaq software

Acquire data at gigabytes per minute whilst interacting with the software. View high resolution images as they are being acquired. Live readbacks aid complicated tuning procedures.

Flexibility of analysis

Configurable mass range, allows targeted analysis of smaller mass ranges at higher sensitivity. Extend the dynamic range with Nu's patented attenuator.



Overview of Vitesse

Key parts of the instrument

Plasma Source:

- Robust plasma generator
- Field proved extraction and focusing optics

Quadrupole:

- Mass range selection
- Patented bypass optics

Attenuator:

- Patented physical attenuation
- Increased dynamic range

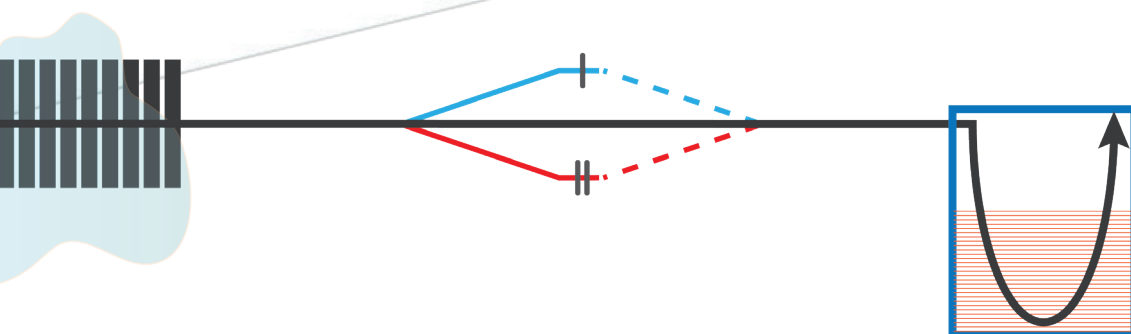
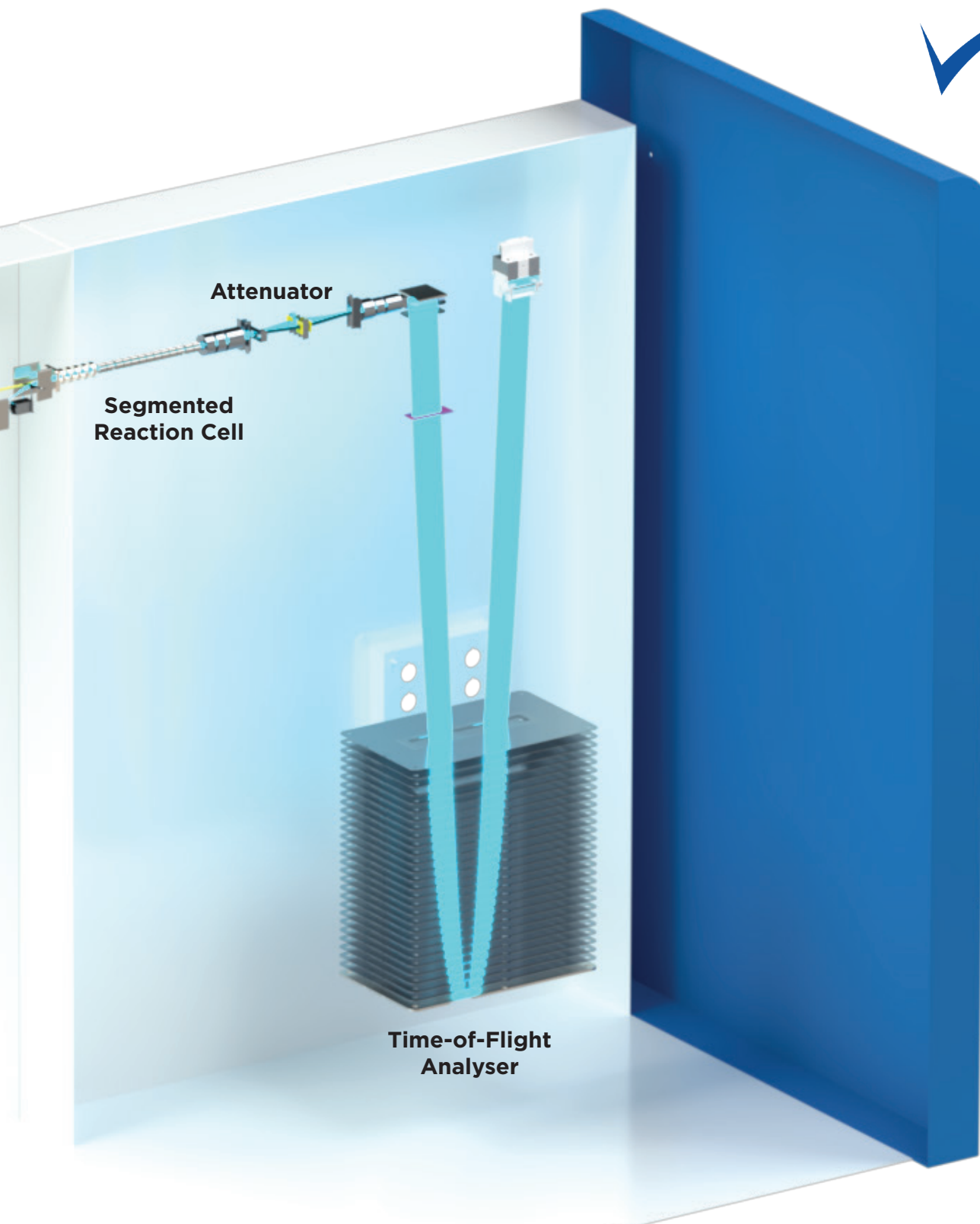
Segmented Reaction Cell:

- Effective interference removal
- Always enabled

Time-of-Flight Analyser:

- Flexible mass range
- High resolution





Segmented Reaction Cell

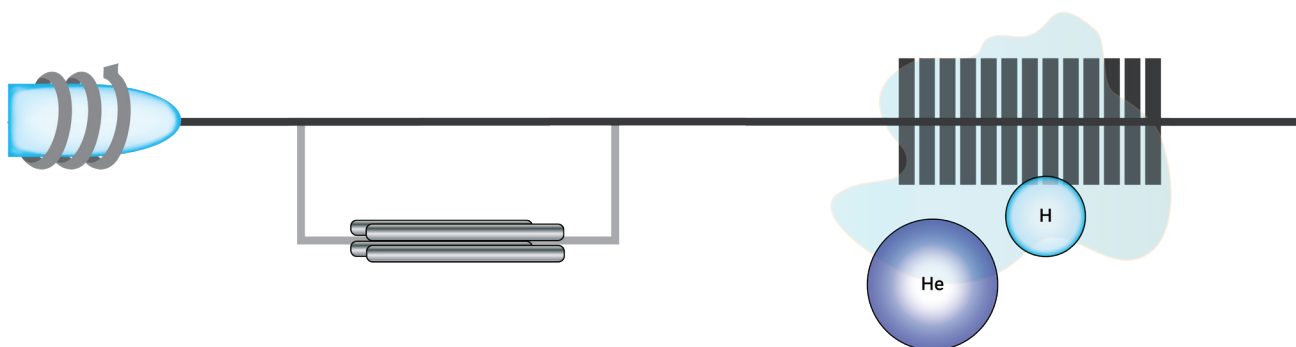
Effective interference removal

Using the SRC

A complete mass spectrum is only meaningful if spectral interferences are effectively eliminated. The use of a Segmented Reaction Cell (SRC) enables the chemical removal of major polyatomic interferences such as Ar^+ and ArO^+ , while preserving accurate measurement of key isotopes like ^{40}Ca and ^{56}Fe . Its segmented design provides exceptional control over reaction conditions, ensuring optimized interference removal without compromising sensitivity or resolution.

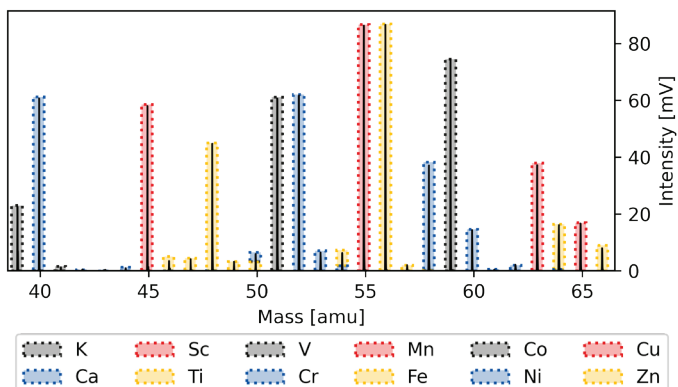
Setup:

- He and H as collision/reaction gases
- By-passing quadrupole to avoid mass bias effects
- Effective for any type of analysis: Bulk, single particle, laser ablation



Results:

- Effective removal of Argon-based interferences
- Less complex spectra – easier analysis
- Higher sensitivity for interfered isotopes (^{40}Ca , ^{56}Fe , etc.)



Quad & SRC (QCT)

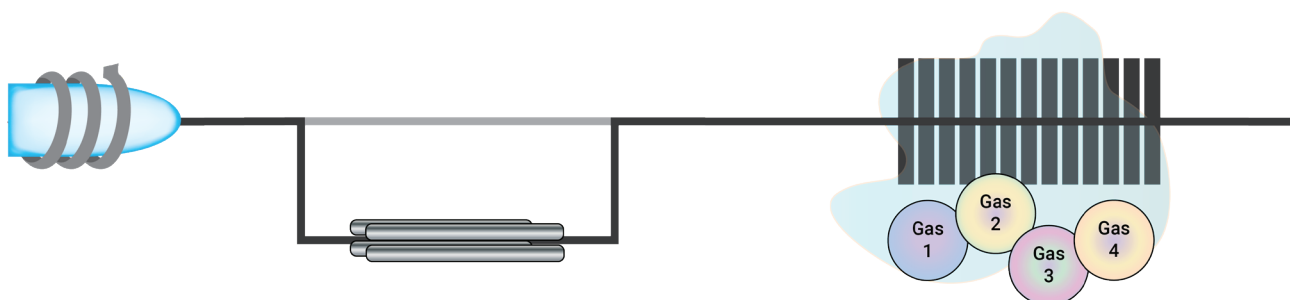
Unmatched analytical flexibility

Using the Quad

Combining a quadrupole with a TOF delivers unmatched analytical flexibility. The quadrupole acts as a precise mass filter before the Time-of-Flight analyser, enabling targeted ion selection and reducing spectral complexity. When paired with the SRC, this configuration effectively removes interferences by isolating specific precursor ions for controlled reactions and enabling mass shifting with reaction gases.

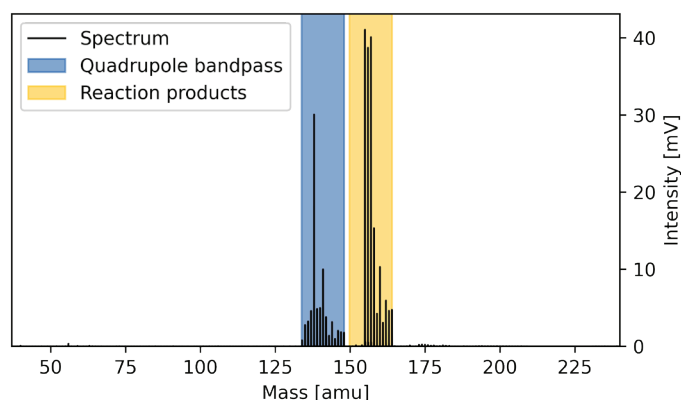
Setup:

- Various reaction gases possible (O_2 , SF_6 , etc.)
- Removal of isotopes before the reaction cell
- Useful when standard interference removal is not sufficient



Results:

- Absolute control and analysis of reaction in the SRC
- Mass shifting capabilities for ultimate interference removal
- More accurate measurements of heavily interfered isotopic systems

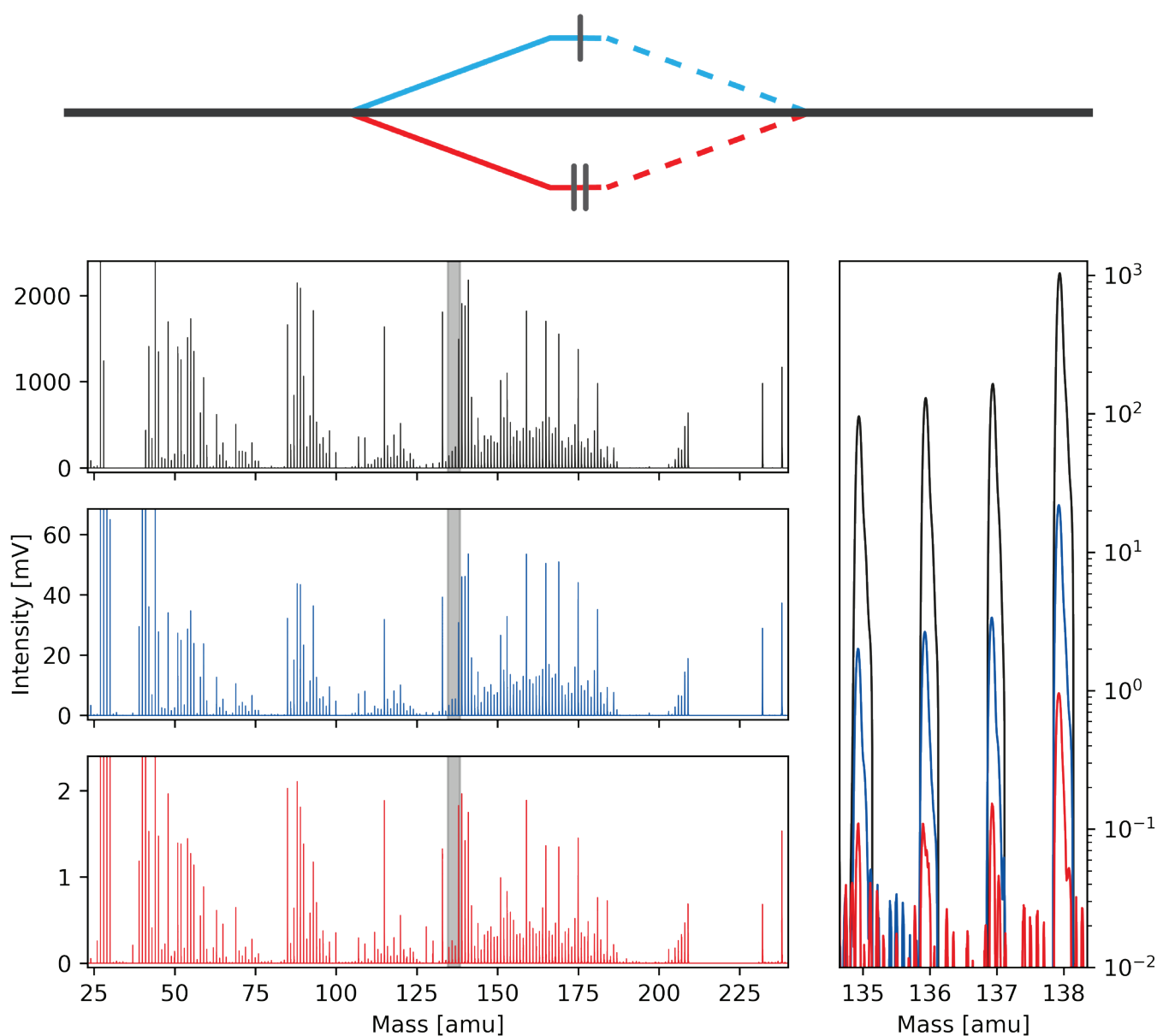


Attenuator

Extending the dynamic range

When collecting full mass spectra, it becomes difficult to fit the dynamic range of all isotopes into the desired range. The mass independent attenuation of the attenuator allows for the sequential measurement of spectra at reduced intensities thereby allowing the detection of both traces and main components.

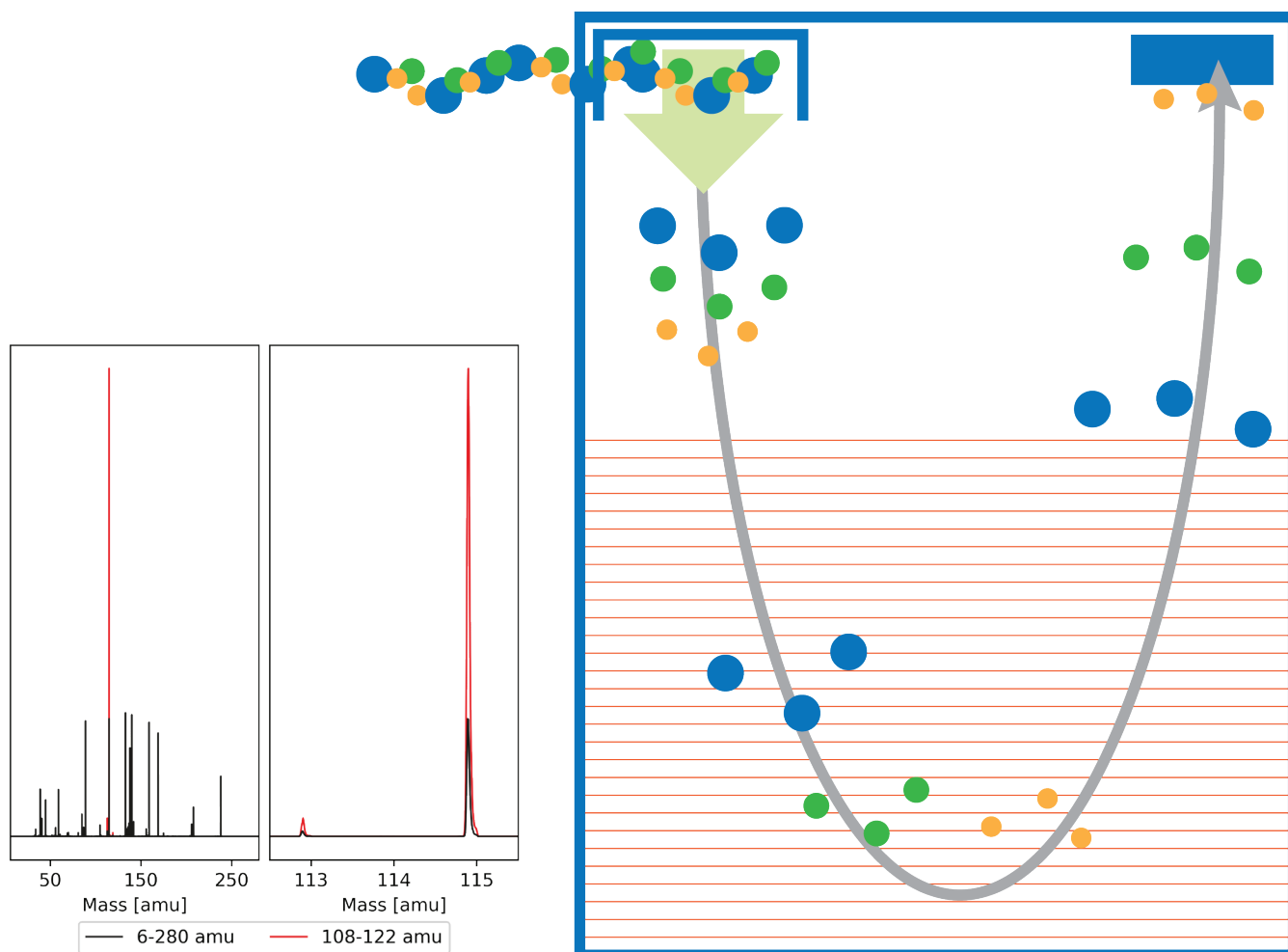
- Mass independent increase of the dynamic range
- Create LA-ICP-MS images with concentrations ranging from low ppm to 100%
- Detect particles from a few nanometers up to a few micrometers
- Record varying attenuations of the full spectrum in multiple times a second



Flexible fast multi element detection

Measuring all elements is never simple. Flexibility is therefore key when it comes to an effective time of flight mass analyser. The detection system of the Vitesse allows for not only the analysis of the entire mass range, but also increased sensitivity for smaller mass ranges, the effective removal of high signals and acquisition speeds between 0.5 s and 0.08 ms per spectrum to perfectly match the needs of the samples being acquired.

- High resolution to differentiate between analytes and interferences
- Ability to save over 12000 background corrected full mass spectra to disc continuously
- Increased sensitivity through the selection of a variable mass range
- Effective automatic removal of high abundant signals



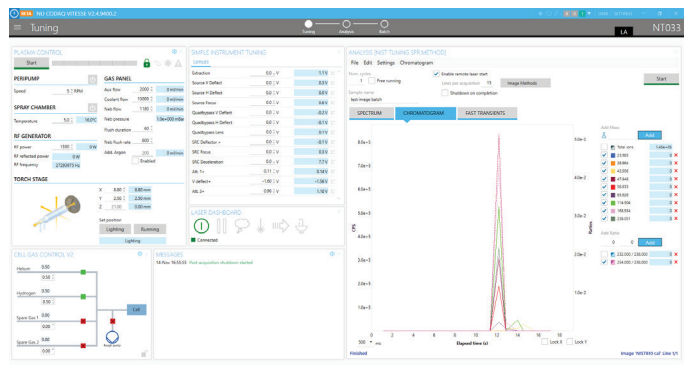
Software

CoDaq & NuQuant

CoDaq

Featuring a flexible user interface and feature-rich software, CoDaq delivers excellent usability for both experienced and new users in all settings.

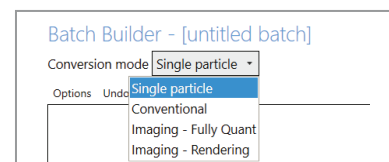
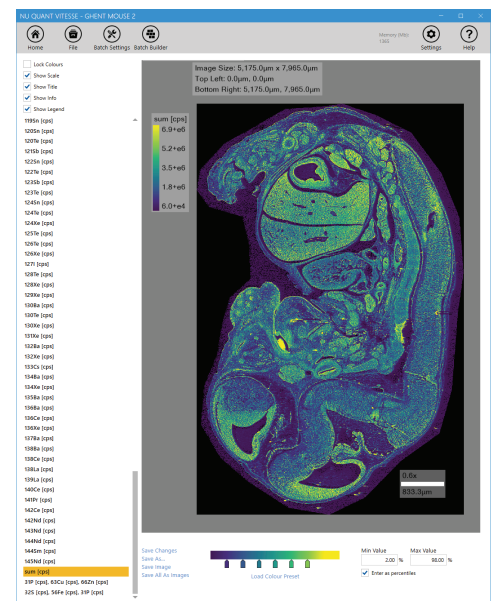
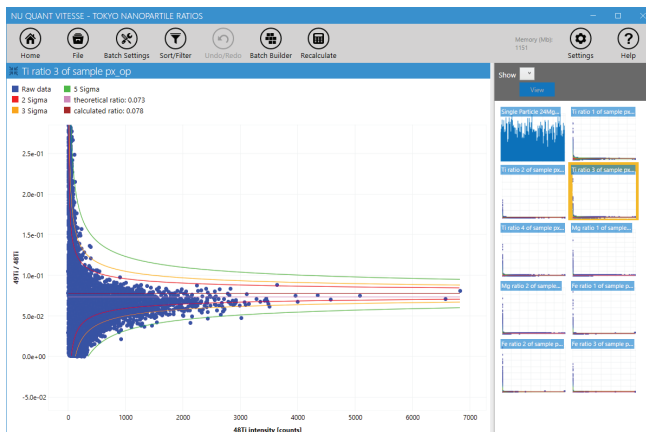
- Full control over peripherals such as autosamplers and lasers
- Flexible batch runs in both laser and liquid mode
- Comprehensive control over all parts of the instrument
- In depth readbacks for easy tuning of any type of signal
- Automatic shut down after completion



NuQuant

Making sense of the vast amounts of data produced is a crucial task. NuQuant provides simple workflows with flexible python scripts to adapt to every type of analysis. From simple bulk solution quantification to nanoparticle or laser ablation image analysis.

- Comprehensive software solution for bulk solution analysis
- User editable python scripts for traceable analysis
- All data analysis types in one software package
- Live image rendering of treated data
- Accurate nanoparticle identification and analysis
- Easy export into other software packages and workflows

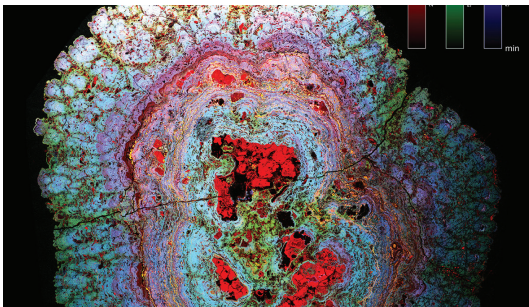


Examples

The complexity of modern research demands tools that can keep pace.

The Vitesse TOF-ICP-MS offers fast, simultaneous multi-element and isotopic analysis. Along with the high sensitivity, this enables complete characterization in a single run.

This makes it the perfect solution for diverse fields, from geology and life sciences to material engineering, where understanding intricate compositions is critical. By combining speed, accuracy, and full-spectrum capability, it empowers scientists to overcome even the most difficult analytical challenges.



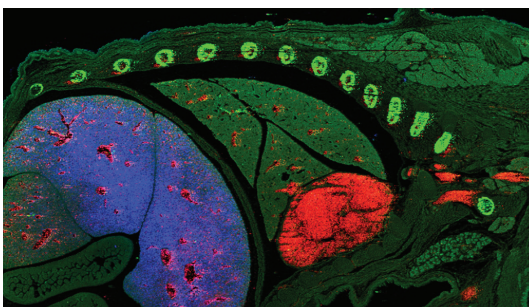
Geological Sciences

Gain complete elemental and isotopic profiles in a single, rapid analysis. Perfect for geochemical mapping, mineral characterization, and provenance studies, especially when coupled to a laser ablation system. This approach delivers high-resolution insights for even the most complex geological samples, saving time without compromising accuracy.



Material Sciences

Analyse advanced materials with full-spectrum elemental and isotopic detail in a single run even when you don't know which element you are looking for. From thin films to alloys and nanomaterials, this method supports quality control, failure analysis, and innovation by providing rapid, accurate data for complex samples.



Bio and Life Sciences

Achieve comprehensive multi-element and isotopic data from biological samples in one fast measurement. Ideal for studying nutrient pathways, trace metal interactions, and environmental exposure, enabling researchers to uncover critical insights into health and ecosystems with unmatched precision. The high resolution when coupled to a laser ablation system or fast acquisition speed in flow single cell mode allows the examination of each individual cell.



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Time-of-Flight ICP-MS

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