FOUR Qs ARE BETTER THAN QQQ

NexION® 5000
Multi-Quadrupole ICP-MS

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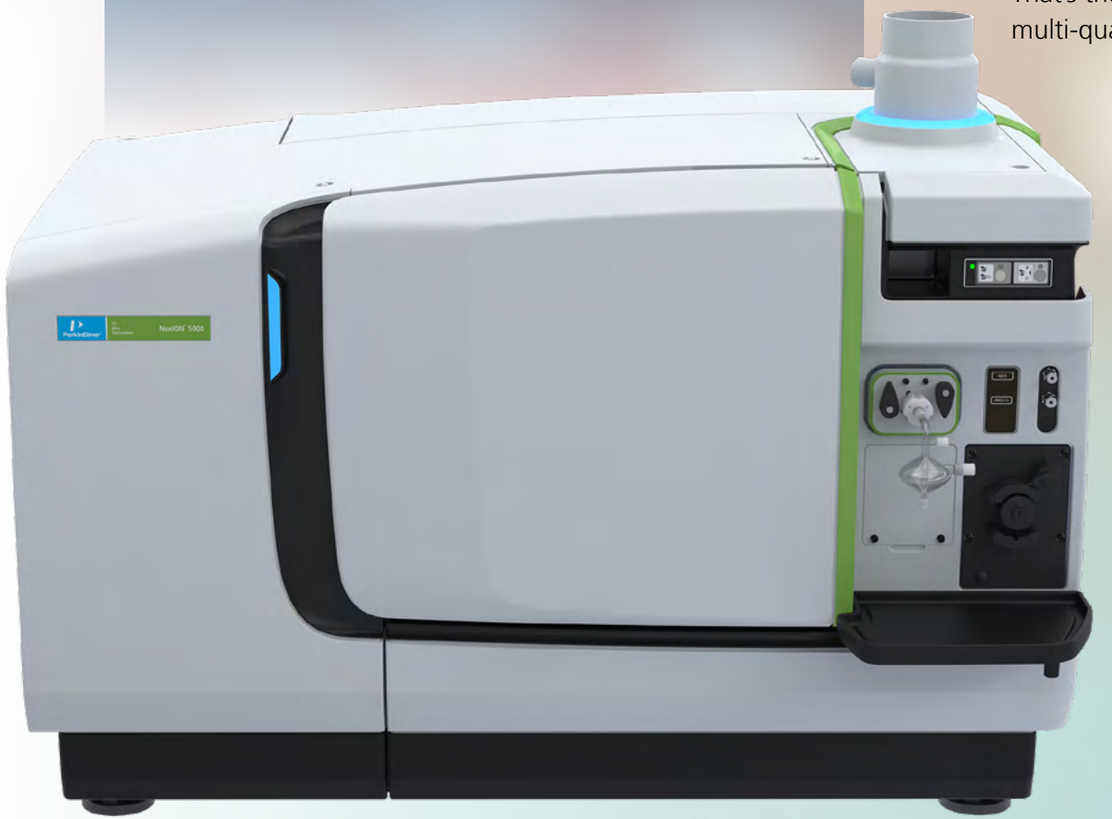
For the Better

NO INTERFERENCE BETWEEN YOU AND EXCEPTIONAL PERFORMANCE



In the fast-paced analytical world, accurate and reproducible results are essential to guaranteeing quality and ensuring safety. This means having instrumentation that can deliver outstanding interference removal. Examples? In the semiconductor industry, the purity of the chemicals used in manufacturing impacts the quality and performance of the finished product. And in the health sector, especially biomonitoring, you need to understand the role of essential elements and the impact of toxic ones through monitoring their levels in blood, serum, and urine. What these and other industries have in common is a need for trace-element analysis where superior interference removal, extremely low detection limits, and outstanding background equivalent concentrations (BECs) are crucial.

That's the thinking behind the **NexION® 5000 ICP-MS**, the first multi-quadrupole system of its kind.

The NexION 5000 is a four-quadrupole instrument innovatively designed to address the most challenging applications, taking ICP-MS performance beyond high-resolution ICP-MS and traditional triple-quad technology to deliver exceptionally low BECs – under one part per trillion, even in hot plasma, for alkaline and alkaline earth elements; unmatched matrix tolerance; and outstanding detection limits. Plus, the NexION 5000 system delivers:

- A whole host of other proprietary technologies, both new and enhanced
- User-friendly Syngistix™ software that makes complex triple-quad workflows simpler
- Lowest maintenance of any triple quad, for long-term stability and reproducibility

The NexION 5000 multi-quadrupole ICP-MS: Performance to the power of four.

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NOTHING INTERFERES WITH ACCURACY

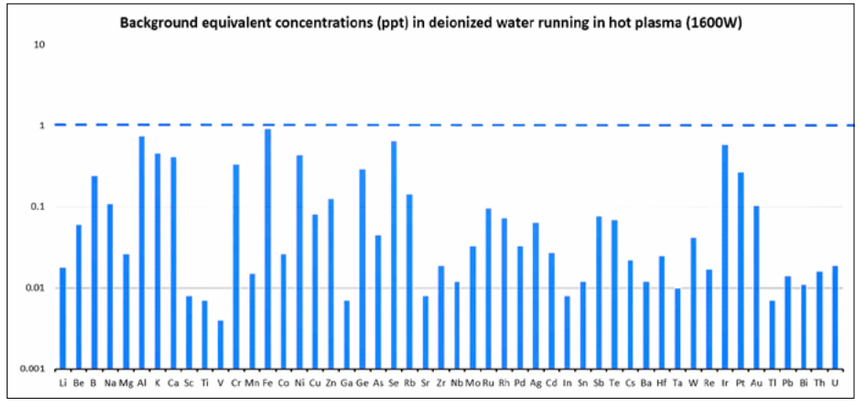
Our ICP-MS systems have always delivered exceptional detection capabilities. But we've raised the stakes on sensitivity and performance with the NexION 5000 ICP-MS. Here are some of the features that set this system apart...

- ▶ **Superior Interference Removal**
- ▶ **Excellent Stability**
- ▶ **Unmatched Matrix Tolerance**
- ▶ **Lowest Maintenance**

SUPERIOR INTERFERENCE REMOVAL

Unlike triple-quad systems, the NexION 5000 multi-quadrupole ICP-MS delivers four stages of mass resolution. A clean, focused ion beam of the mass of interest is introduced into the ion optics, enabling you to control the fate of interferences as early in the process as the Quadrupole Ion Deflector.

In the NexION 5000 ICP-MS, the ion beam is shaped and directed within Q0 (Quadrupole Ion Deflector) and filtered in Q1 (first Transmission Analyzer Quadrupole). The reaction is controlled in Q2 (Quadrupole Universal Cell), and the resulting ions are separated in Q3 (second Transmission Analyzer Quadrupole). This combination allows the system to deliver less than 1 ppt BECs in hot plasma even for elements such as calcium and potassium.



▶ Learn more about the advantages of the NexION 5000's interference removal capabilities

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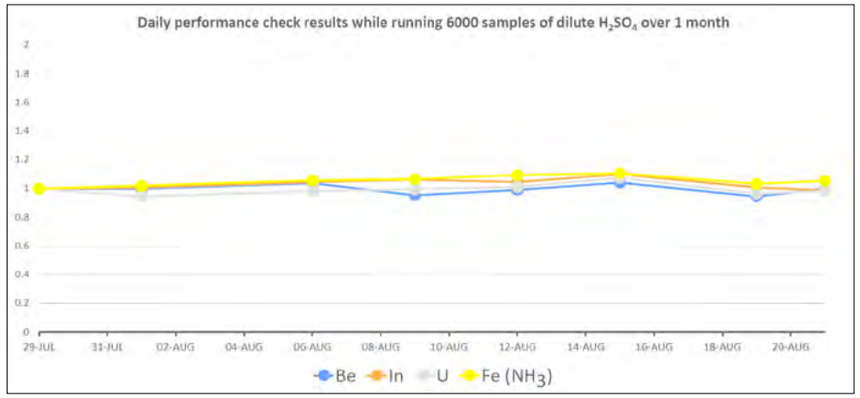
EXCELLENT STABILITY

Everything about the NexION 5000 ICP-MS says *stability* – for your instrument and your results: For example, our free-running 34-MHz RF generator delivers the fastest impedance matching on the market. Our Triple Cone Interface with wide-aperture cones offers unparalleled resistance to clogging even for tough matrices. And the ability to use pure gases in our Universal Cell, a true quadrupole, ensures that the reaction is stable and fully reproducible.



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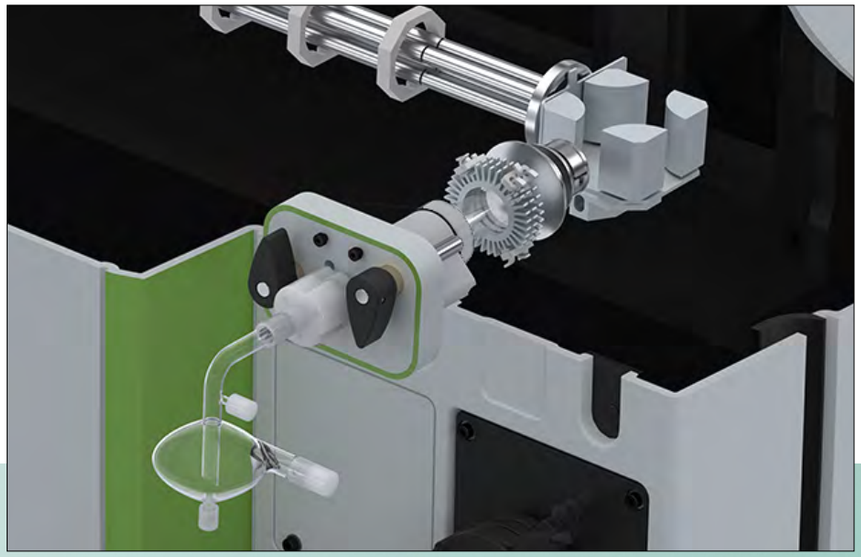
UNMATCHED MATRIX TOLERANCE

The NexION 5000 ICP-MS is perfect for laboratories requiring extremely low detection limits and BECs in a variety of different matrices, from aqueous to organic, from ultrapure water (UPW) to high total dissolved solids (TDS).

The patented design of our second-generation Triple Cone Interface provides unique solutions to space-charge effects, as a result of its coupling to the highly effective OmniRing™ technology. The innovative solid-state, free-running RF generator with unique LumiCoil™ technology provides accurate impedance matching to easily handle even the most difficult matrices, such as naphtha. Plus, the powerful All Matrix Solution (AMS) sample introduction system is able to deliver up to 200x dilution and support samples even with 35% TDS without needing to manually dilute.



- Learn more about the novel design of the Triple Cone Interface with OmniRing
- Learn more about the advantages of the NexION system's All Matrix Solution

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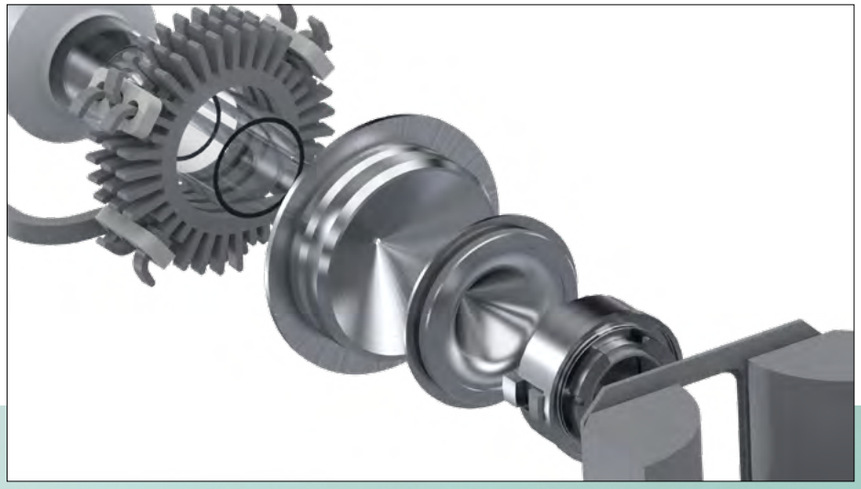
- **Unmatched Matrix Tolerance**
- **Lowest Maintenance**

LOWEST MAINTENANCE

Whatever your industry, uptime is key to keeping your lab running at peak performance. That's why our NexION 5000 system eliminates virtually all maintenance requirements, for unsurpassed instrument uptime.

First, our LumiCoil technology is guaranteed for the life of your instrument and requires no water or gas cooling. The system's Triple Cone Interface features a unique third cone (hyper-skimmer) with OmniRing technology that produces the most tightly focused ion beam – and cones are located outside the vacuum for quick, easy access. The wide-aperture cones maximize signal stability and minimize cone clogging during extended high-TDS sample runs. What's more, the patented combination of the Triple Cone Interface and Quadrupole Ion Deflector controls and focuses the beam in the downstream ion optics, ensuring that the cell in the NexION 5000 ICP-MS requires no cleaning or replacing.



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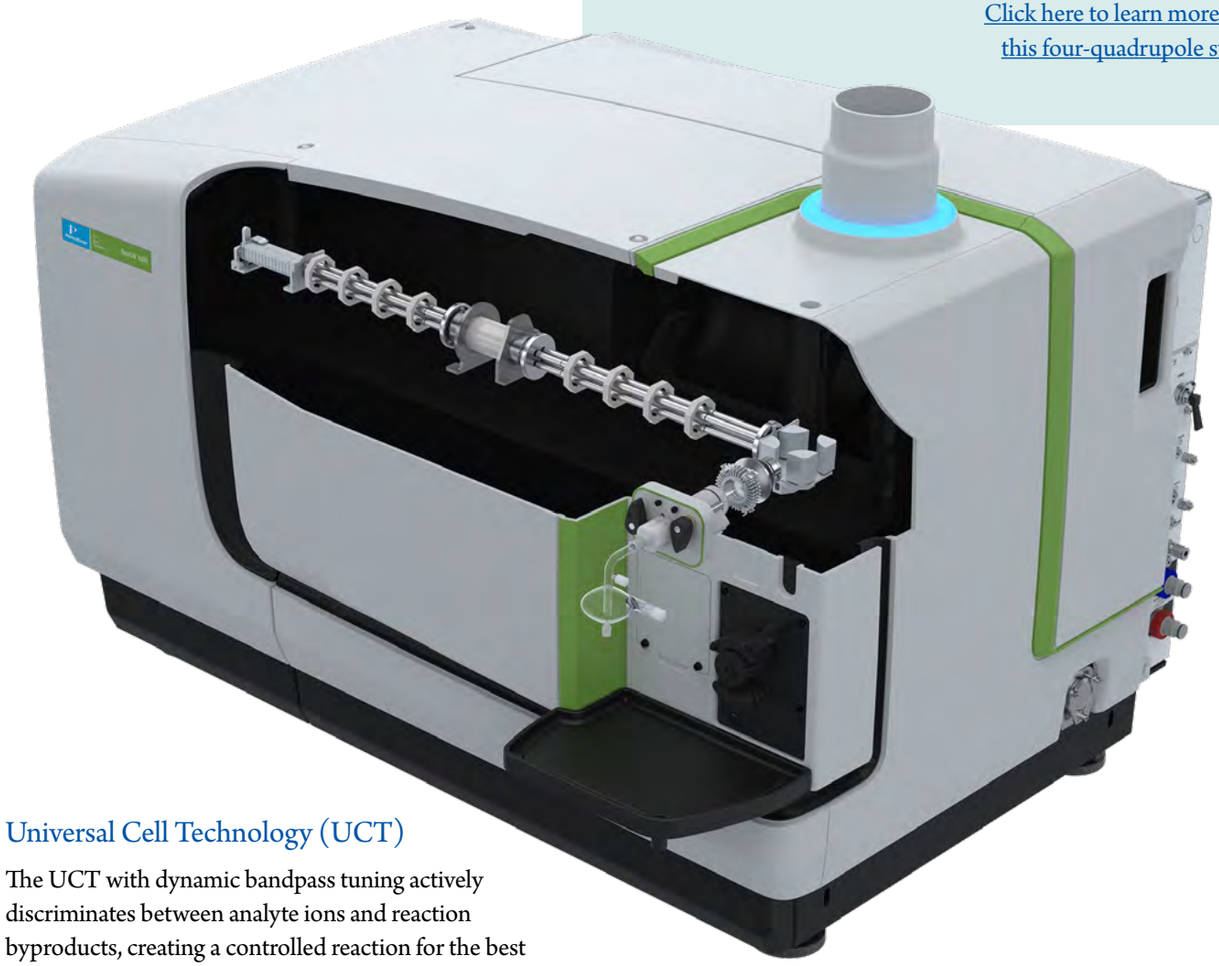
WHAT'S INSIDE MAKES ALL THE DIFFERENCE

Four Quadrupoles

This multi-quadrupole system provides the best ion beam control, capable of suppressing and eliminating spectral interferences found in complex samples, for the best BECs in hot plasma.

Click here to learn more about this four-quadrupole system.



Free-Running RF Plasma Generator

This unique technology can handle the toughest matrices and solvents. The plasma is generated by innovative LumiCoil technology, which requires no cooling or maintenance and can quickly and easily switch between cool and hot plasma in a single run.

Triple Cone Interface with OmniRing

Second-generation Triple Cone Interface with patent-pending OmniRing technology can operate in extraction, focusing, or cold plasma modes for outstanding sensitivity and detection limits.

Quadrupole Ion Deflector (QID)

The QID turns the analyte ion beam 90°, focusing ions into the entrance of the first mass filter. This optimizes the range of masses transmitted into the quadrupole, improving sensitivity and eliminating photons and neutral species.

Universal Cell Technology (UCT)

The UCT with dynamic bandpass tuning actively discriminates between analyte ions and reaction byproducts, creating a controlled reaction for the best interference removal. Plus, it boasts the added flexibility of using up to four cell gases with on-the-fly gas mixing.

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MULTI-QUAD IS THE SMARTER WAY

The NexION 5000 is the first ICP-MS system to boast four quadrupoles while delivering high-end triple-quad performance. The Quadrupole Ion Deflector separates ions from photons and neutral species, and two full-sized Transmission Analyzer Quadrupoles (Q1 and Q3) are separated by the Universal Cell, a true quadrupole, with dynamic bandpass tuning capability.

1

Our **Quadrupole Ion Deflector (Q0)** is an electrostatic analyzer that provides mass separation based on ion energy. It allows filtration of the ion beam before Q1 and ensures the complete removal of neutral species and photons without altering ion energy distribution.

2

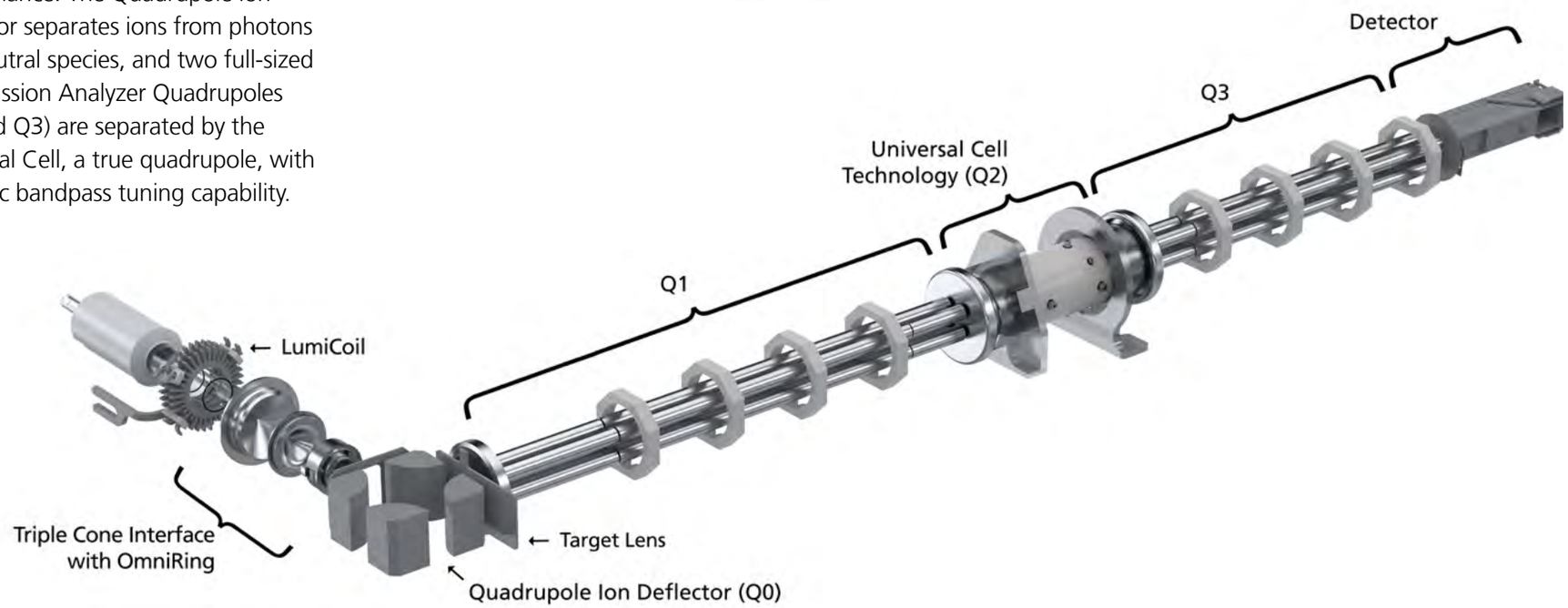
The first **Transmission Analyzer Quadrupole (Q1)** is used for unit mass separation or better of precursor ions. This quadrupole boasts a unique prefilter that helps focus high energy ions into the main quadrupole, where it delivers custom resolution down to less than 0.3 amu.

3

The **Quadrupole Universal Cell (Q2)** is a reaction/collision cell with dynamic bandpass tuning capability using frequency modulation. This cell makes gas-phase reactions more predictable and provides an additional stage of mass separation to maximize specificity of these reactions.

4

Finally, the second **Transmission Analyzer Quadrupole (Q3)** is used for unit mass separation or better of ions exiting the Universal Cell. It can also deliver custom resolution down to less than 0.3 amu.



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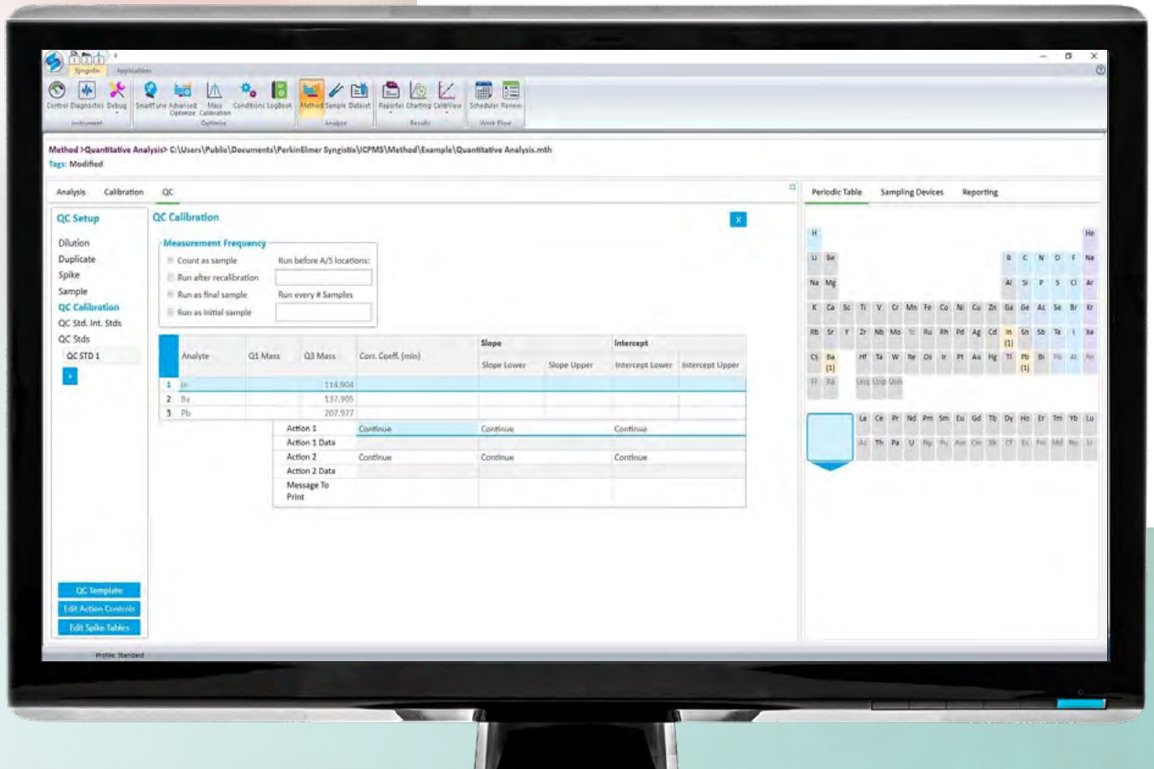
EXPERIENCE THE SOFTWARE BUILT FOR ICP-MS

Syngistix for ICP-MS software is designed to offer a streamlined user experience, enabling you to quickly harness the powerful analytical capabilities of the NexION 5000 system. The modern, intuitive user interface encapsulates the power of triple-quad ion optics into an easy-to-understand workflow. With just a few clicks, you can quickly access and complete a suite of automated optimizations that tune the instrument for optimal performance. Also included is an ever-growing number of tried and tested methods for a variety of different applications.

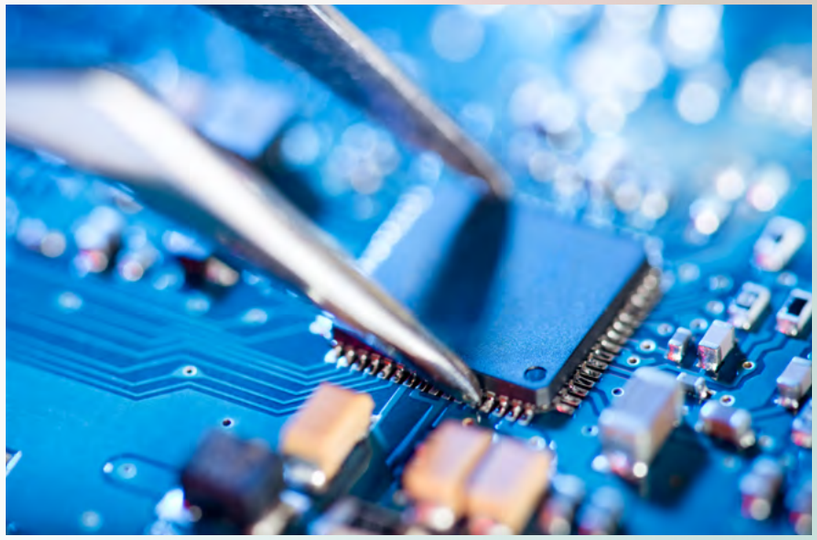
Plus, its user-defined, customizable reporting capabilities facilitate support for a variety of ancillary products, including online autodilution systems, laser ablation, and flow injection.



GREAT DETECTION FOR THE TOUGHEST MATRICES

We're continuing to push the boundaries of ICP-MS with the NexION 5000 system. This cutting-edge instrument combines the simplicity of a reaction/collision cell with multi-quadrupole technology that transcends traditional triple quad, delivering unparalleled removal of spectral interferences, great sensitivity, and extremely low detection limits.

- ▶ **Semiconductors**
- ▶ **Biomonitoring**
- ▶ **Research**



▶ Click here to read more about the multi-quadrupole NexION 5000 ICP-MS in semiconductor applications.

SEMICONDUCTORS: WHAT THE FUTURE IS MADE OF

The increased demand for smaller, more powerful electronic devices, such as phones and computers, has increased the drive for the semiconductor industry to develop faster, smaller, and less power-hungry components. The manufacture of such powerful, miniaturized products requires the use of higher purity materials. So the detection of low levels of impurities in chemicals is essential to this industry.

The NexION 5000 ICP-MS is an indispensable analytical tool for semiconductor quality control because of its ability to rapidly determine analytes at the ultratrace (ppt or lower) level in various process materials. Today, analyses performed by traditional triple quad ICP-MS instruments use both hot and cold plasma conditions to obtain low backgrounds. In contrast, the NexION 5000 ICP-MS can obtain BECs below 1 ppt for semiconductor-essential elements (SEMI F63-0918) in hot plasma conditions due to more efficient removal of spectral interferences using undiluted reaction gases.

- Sub-ppt BECs: four quadrupoles effectively remove interferences, even under hot plasma conditions
- Exceptional detection limits using cold plasma (with fast switching)
- Long-term stability with less maintenance
- Fast analysis time for small sample volume
- Easy upgrade to meet SEMI S2 (equipment safety evaluations) and SEMI S8 (ergonomic evaluation) standards

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- **Semiconductors**
- **Biomonitoring**
- **Research**

- Click here to read more about the multi-quadrupole NexION 5000 ICP-MS in biomonitoring applications.

BIOMONITORING: THE SCIENCE OF HEALTHY LIVING

ICP-MS has long been the tool of choice for trace analysis of elements such as lead, arsenic, mercury, and copper in a variety of different biological matrices including urine, blood, serum, saliva, and tissue. Toxic and nutritional elements are tested in these matrices, providing medical professionals with detailed information on the health and well-being of their patients. With the increased adoption of medical implants worldwide, elements such as titanium and cobalt have been added to the list of commonly tested analytes, which can give medical personnel information on an implant's degradation.

With the industry's best interference removal technologies, the NexION 5000 ICP-MS ensures the accurate determination of low and high levels of analytes in biological matrices within a single analytical run. With one simple sample preparation technique and the appropriate diluent, panels or individual analytes can be measured quickly and precisely in these challenging matrices.

- Comprehensive interference removal for complex matrices via Universal Cell with four gas channels, delivering low detection limits and sub-ppt BECs
- Matrix tolerance through robust plasma, Triple Cone Interface, and Quadrupole Ion Deflector
- Small sample volume and customizable order-of-acquisition modes
- Analysis of both high and low concentration elements in a single analytical run with Extended Dynamic Range (EDR), resulting in fewer reruns

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- ▶ **Semiconductors**
- ▶ **Biomonitoring**
- ▶ **Research**

TAKING ON OTHER CHALLENGING MATRICES

Because even small concentrations of some elements can have an impact on health, the environment, and industrial processes, it's highly advantageous to have the most powerful analytical tool to support current and future research in these areas.

Whether it's drinking water, effluents, wastewater, soil, foods, or pharmaceutical products, the NexION 5000 ICP-MS is the instrument for precise, accurate analysis to ensure that the environment we inhabit and products we consume are safe – and that all levels of elements are in compliance with regulations.

Other industries, such as mining and geological exploration, can also benefit from the NexION 5000 system's superb spectral interference removal and a tolerance for the high TDS matrices and high concentrations of acids used for digestion.

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PRECISION ENGINEERED CONSUMABLES

NexION 5000 ICP-MS consumables and supplies are designed with your instrument in mind, with each part fit to perform and manufactured with the highest quality materials available. Whether you're looking for sample introduction components or standards, we have the consumables you need to keep your NexION 5000 instrument up and running smoothly and efficiently.

Sample Introduction Solutions

NexION SMARTintro™ sample introduction kits are tested as a complete unit to ensure intra- and interlaboratory performance. Each system utilizes specific combinations of sample introduction components, and the kits are color-coded according to user application.

Cones

Precision-designed and manufactured, wide-aperture sampler and skimmer cones provide superior long-term stability and resist clogging, allowing analysis under both low and high sample-uptake conditions.

Standards

We offer a complete selection of atomic spectroscopy reference materials that are tested and proven to provide you the *certified* quality and reliability you expect for all your application needs.

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COMPLETE SERVICES FOR INCREASED PRODUCTIVITY AND EFFICIENCY

OneSource® Laboratory Services

- Asset optimization
- Lab environment and instrument monitoring
- Asset location
- Education and training
- Technology and descriptive analysis
- IoLT/Lab of the future
- Multivendor services
- Compliance
- Lab support
- IT solutions
- Instrument qualifications

Today's lab leaders are facing several challenges, from tighter deadlines to increased budget scrutiny to teams with various degrees of comfort with lab equipment. Time that could be spent getting ahead is spent on noncore activities.

To help you overcome barriers to success, OneSource® Laboratory Services has built a team of trained scientists and engineers who bring their real-life knowledge to you, helping increase your productivity with recommendations on how to best utilize your assets. With this knowledge, you can get back to your core mission.

Labs of all sizes need to know their equipment will work as expected, every time they turn it on. From contracts and performance maintenance available for our instruments as well as other manufacturers' equipment to full lab asset management delivered globally, we can help you make the most of your important lab assets.

And for labs looking to introduce new equipment and techniques, we offer training at our facilities and at yours.

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COMPLIANCE

Navigating the complexities of global regulatory entities and requirements can be difficult for even the best-run laboratories. OneSource Compliance Services can be your partner to get you back to focusing on your core activities. With our consultative approach we can offer gap analysis or inspection readiness and provide comprehensive training.

OneSource offers the most robust range of products and levels of service to make the qualification process run smoothly while reducing downtime. Simply review our standard recommended OQ protocols and customize to your specifications. Our highly trained service engineers then go to work, following the protocol to test instruments against approved specifications. Your final qualification report is delivered in a concise, easy-to-review layout in paper and secure electronic format. This is compliance made simple.

EDUCATION SERVICES

Whether you're looking for a basic instrument refresher course, simple troubleshooting techniques, general application support, or method optimization, our field application scientists or service engineers will come directly to your lab.

Through education, you'll gain knowledge and insights into the latest techniques, not only increasing your confidence, but also unlocking the full potential of your instrument.

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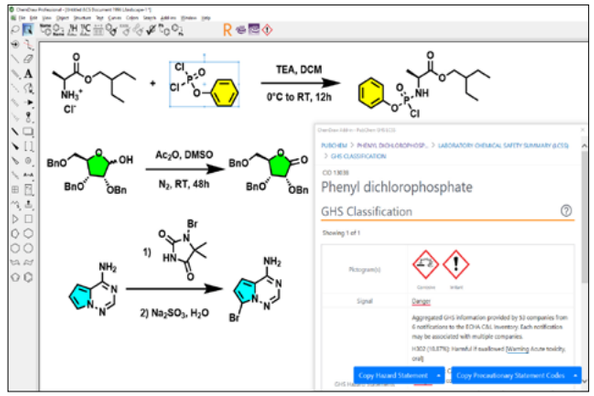
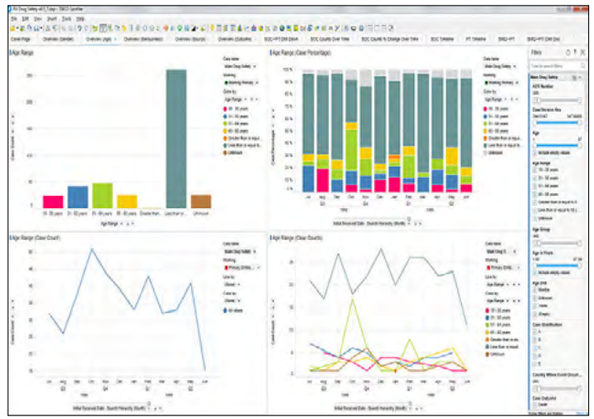
SMARTER QUESTIONS FASTER ANSWERS

Looking for industry-leading informatics software? Or to overcome challenges like volatile pricing, increased environmental regulation, and data complexity? Browse our suite of informatics software and improve collaboration, spark R&D innovation, and deliver predictive analytics in real time.



CHEMDRAW™

The world's most trusted chemical research application, ChemDraw accelerates the creation and communication of chemistry reports, leverages smart functions to generate chemical structures, and integrates with key research-literature and chemical-safety databases.



TIBCO SPOTFIRE®

Quickly analyze disparate data from multiple sources and create a complete picture of what's happening in real time. This software will completely transform the way you work, allowing you to connect disparate data sources and uncover new insights – all within minutes.

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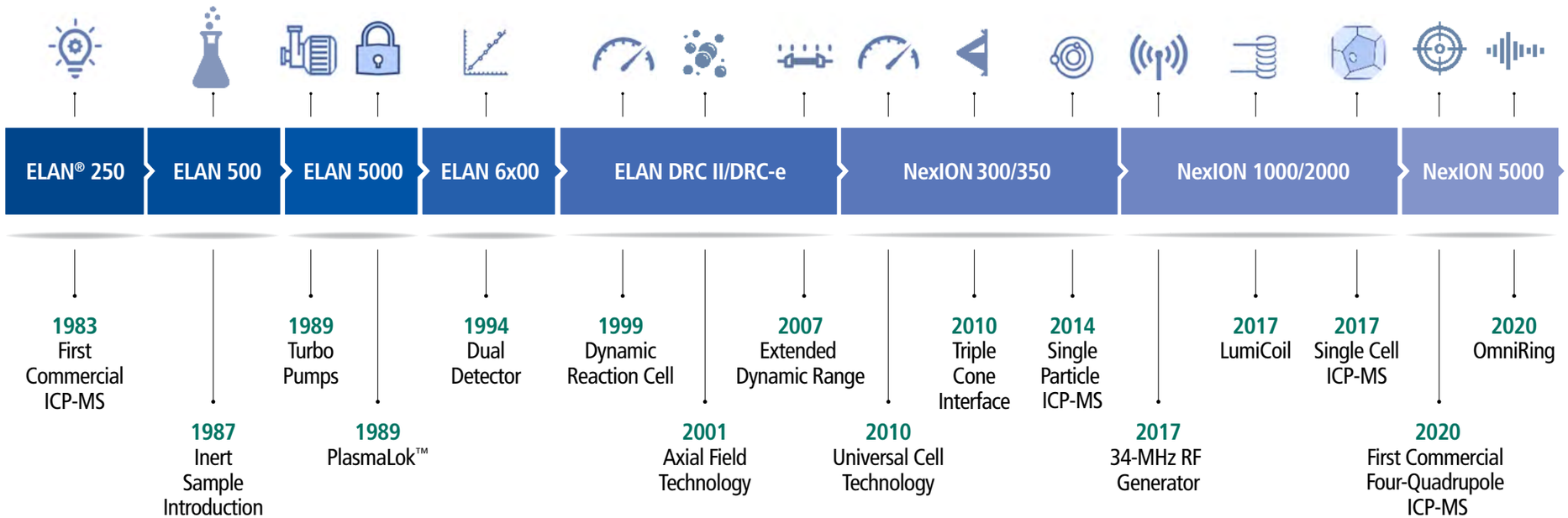
PERKINELMER AND ICP-MS: A HISTORY OF INNOVATION

From the introduction of the very first ICP-MS back in 1983 to the industry's first four-quadrupole system today, we've logged nearly four decades of patents, innovations – and accolades.



For more information on our NexION 5000 ICP-MS, visit www.perkinelmer.com/nexion5000

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