thermo scientific

Thermo Scientific ICP-MS solutions for the semiconductor industry

Maximize wafer yields with ultralow elemental detection in chemicals and materials

ThermoFisher SCIENTIFIC

Trace impurity analysis in chemicals an used in the semiconductor industry

Robust and reliable solutions delivering ultralow elemental detection for improved quality control to ensure optimal wafer yield in semiconductor production lines

Single Quadrupole (SQ) ICP-MS

Robustness and productivity for routine, automated inspection of process chemicals

The Thermo Scientific iCAP RQ ICP-MS is a low maintenance, robust tool for the automated inspection of ultrapure chemicals used in wafer fabrication. The small footprint, high sensitivity and versatility make the iCAP RQ ICP-MS an ideal tool for laboratory and on-line applications.

Triple Quadrupole (TQ) ICP-MS

Performance and unique ease-of-use for QA/QC in the wafer fabrication process

The Thermo Scientific iCAP TQs ICP-MS delivers enhanced interference removal allowing improved detection of elemental impurities in the most challenging of matrices. With small footprint and unique streamlined workflows with automated method development, the iCAP TQs ICP-MS is the ideal inspection tool for on-line quality control to ensure the consistency of critical manufacturing processes and to improve wafer fabrication yields.

d materials

The continually growing demand for advanced electronic devices is driving the need to improve production efficiencies and increase yield in the semiconductor wafer manufacturing industry. Control of the wafer fabrication process, manufacturing environment, chemical reagent purity and level of wafer surface contamination are of utmost importance to improving yield.

Ensuring consistent conditions of every process step and meeting the daily challenges of routine wafer QA/QC, requires the use of many diverse characterization and inspection techniques, including Inductively Coupled Plasma Mass Spectrometry (ICP-MS) for ultralow detection of elemental impurities. Thermo Fisher Scientific supplies a range of innovative, sensitive and robust trace elemental analysis solutions for manufacturing processes and trace contaminant analysis to ensure consistent QA/QC, reduction of wafer defects and minimal use of expensive fabrication materials and chemicals.

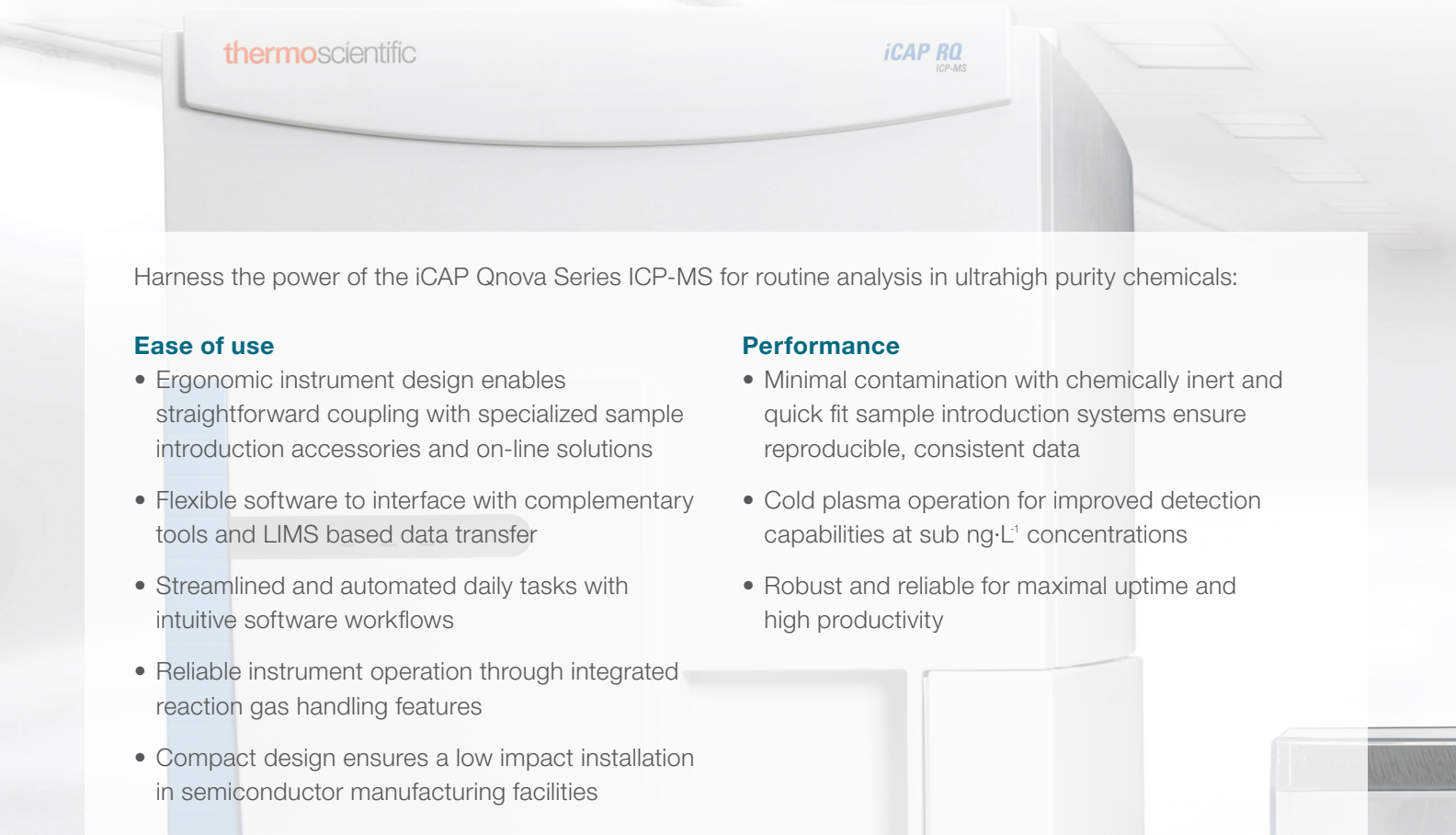
High Resolution (HR) ICP-MS

Versatility and best sensitivity delivers ultimate data confidence: the gold standard in elemental characterization

The Thermo Scientific Element 2 HR-ICP-MS is a universal reference solution for all analytical challenges in the laboratory. With ultimate sensitivity facilitating the ultralow detection of impurities, the Element 2 HR-ICP-MS produces quality data independent of the sample matrix. Visually indisputable quantification provides unequivocal levels of data confidence.

Thermo Scientific iCAP Qnova Series ICP-MS

The iCAP RQ ICP-MS and the iCAP TQs ICP-MS have shared capabilities for ease-of-use and powerful ultralow detection. Built on the same robust platform, they are ideal laboratory or real time process quality control tools in semiconductor manufacturing processes.



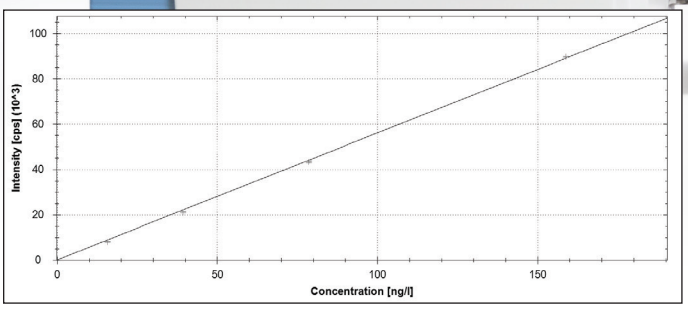
Harness the power of the iCAP Qnova Series ICP-MS for routine analysis in ultrahigh purity chemicals:

Ease of use

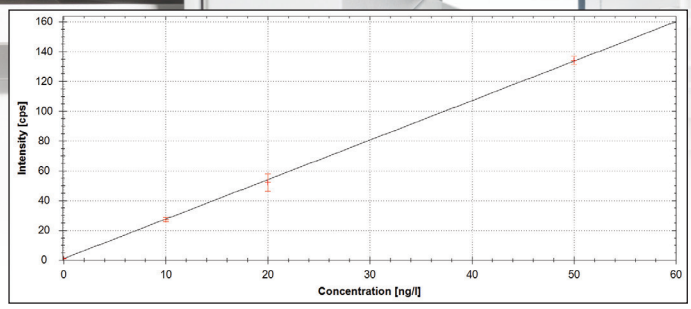
- Ergonomic instrument design enables straightforward coupling with specialized sample introduction accessories and on-line solutions
- Flexible software to interface with complementary tools and LIMS based data transfer
- Streamlined and automated daily tasks with intuitive software workflows
- Reliable instrument operation through integrated reaction gas handling features
- Compact design ensures a low impact installation in semiconductor manufacturing facilities

Performance

- Minimal contamination with chemically inert and quick fit sample introduction systems ensure reproducible, consistent data
- Cold plasma operation for improved detection capabilities at sub ng·L^{-1} concentrations
- Robust and reliable for maximal uptime and high productivity



Cold plasma performance of the iCAP Qnova Series ICP-MS enables sub ng·L^{-1} detection power for analytes such as Lithium, Sodium and Calcium (demonstrated here with a calibration of Sodium from 15 – 150 ng·L^{-1} in isopropyl alcohol).



The power of TQ-ICP-MS delivers ultralow detection of analytes with challenging interferences (demonstrated here for Titanium with a calibration from 10 – 50 ng·L^{-1} in 9.8% sulfuric acid).

Push the boundaries of detection with triple quadrupole ICP-MS performance and ease-of-use for QA/QC analysis in the wafer fabrication process with the iCAP TQs ICP-MS:

- Powerful triple quadrupole technology for improved interference removal and right first time analysis
- Combine triple quadrupole capabilities with cold plasma operation for tailored quantification
- Ultralow elemental quantification, even in challenging matrices
- Easy and fast set-up using the unique **Reaction Finder** software minimizes method development
- Dry fore-vacuum pump for compatibility in clean room environments

Automation

Compatibility with a range of autosampler and autodilution accessories. Metal free, inert materials enable the direct, prolonged analysis of aggressive high purity chemicals without long term side effects. Enclosed sample handling ensures minimal atmospheric contamination.

On-line monitoring

Real-time statistical control of semiconductor process chemicals is enabled through integration with on-line automated process monitoring tools. Remote modules connected to a central ICP-MS system enable monitoring of metal impurities at various locations in the semiconductor fabrication plant for real-time process control.

Vapor Phase Decomposition (VPD)

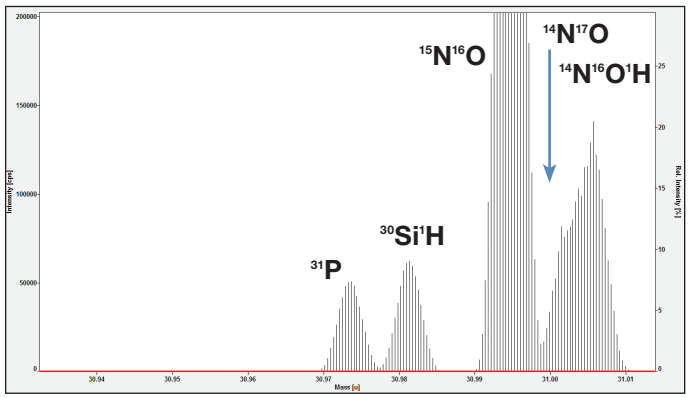
Integration with VPD systems delivers an efficient and reproducible solution for wafer contamination monitoring at ultralow levels. With a fully automated workflow, contamination is avoided and personal safety is improved by minimizing interaction with potentially hazardous chemicals.

Thermo Scientific Element 2 HR-ICP-MS

Powerful and robust interference removal delivers ultimate data confidence for all analytical challenges in chemical and material analysis

Equip your laboratory facility with the gold standard in elemental analysis

- Physical separation of interference from analyte for maximum versatility and ultimate data confidence
- Versatile interference removal with cold and hot plasma operation
- Method development is predictably and universally applicable to any matrix
- The highest sensitivity and low backgrounds ensure ultimate signal to noise ratios
- Increase sensitivity even further with the Jet interface accessory
- No requirement for reactive gas installations due to high mass resolution

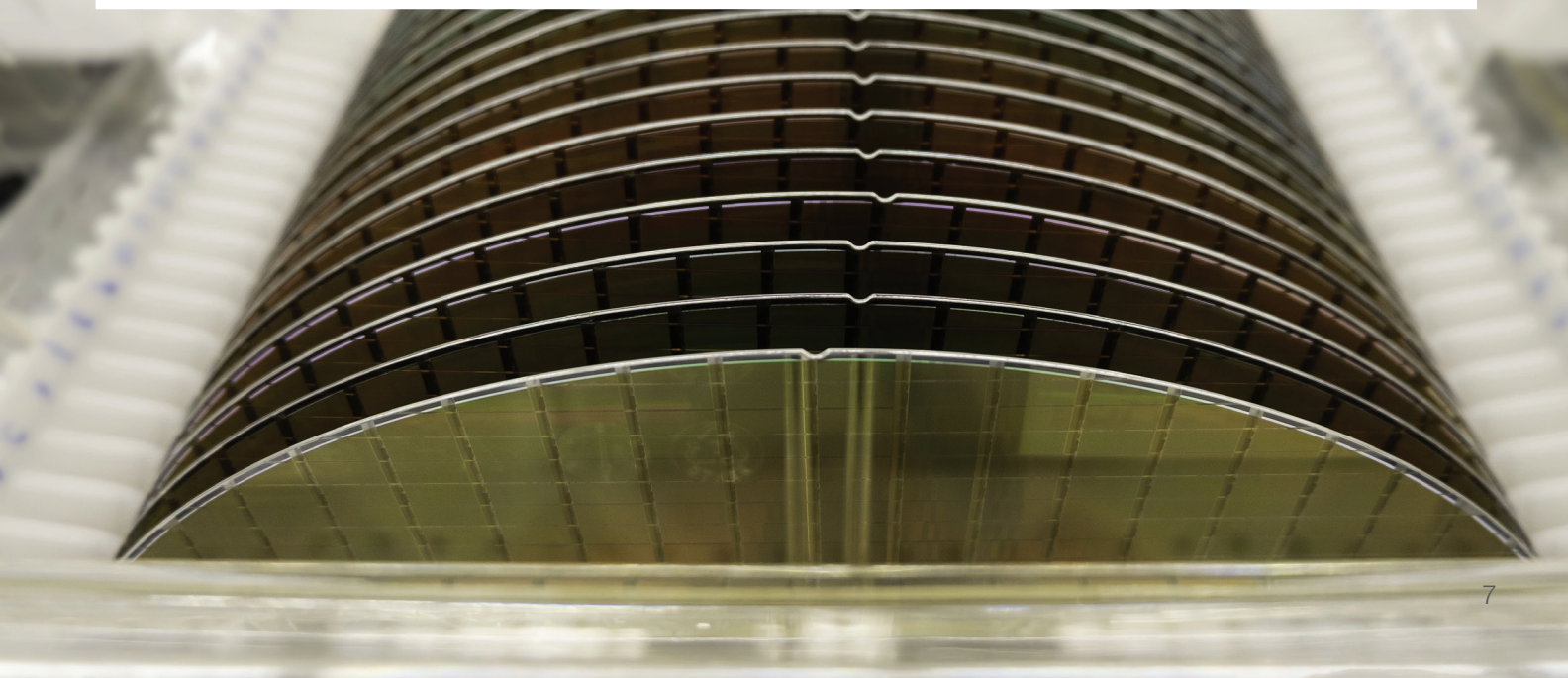


Physical separation of Phosphorus from all observed interferences through high resolution technology (demonstrated here for 2 µg·L^{-1} P in a 700 mg·L^{-1} silicon matrix)

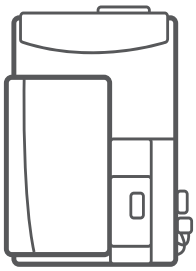
Thermo Scientific ICP-MS portfolio overview

A portfolio of robust and reliable solutions delivering ultralow detection for elemental quality control to ensure optimal yield in wafer fabrication.

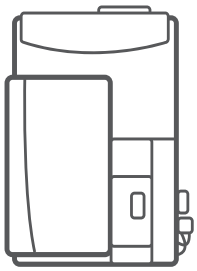
	SQ-ICP-MS	TQ-ICP-MS	HR-ICP-MS
Features	Total elemental analysis at sub-ng·L^{-1} concentrations, this compact, benchtop system quickly delivers highly sensitive ultralow detection	Advanced interference removal with triple quadrupole technology for incredible accuracy even in challenging applications, combined with unique ease-of-use	Class-leading elimination of interferences for ultrasensitive analysis with method development independent of sample matrix type
Applications	Reliable, high-throughput analysis for chemical and material inspection laboratories that require routine monitoring of ultrahigh purity chemicals and materials	Accurate, ultralow detection, even in more challenging samples for chemical and material inspection laboratories. Ideal for statistical control of the manufacturing process and optimizing wafer fabrication yield	Versatility for all sample types with the ultimate data confidence for chemical and material inspection laboratories looking for a reference technique in elemental analysis
Size	Benchtop, compact footprint	Benchtop, compact footprint	Floor-standing
Key technology	Single quadrupole, including a unique Flatapole Collision/Reaction Cell to deliver a higher level of interference removal	Triple quadrupole combined with the unique Flatapole Collision/ Reaction Cell for superior interference removal	Double focusing magnetic sector field instrument for class leading signal to noise, interference removal through high mass resolution (R_{max} = 10000). Jet interface option for increased sensitivity
Collision gas capability	He	He	None
Reactive gas capabilities	Choice of H_2, O_2 or 35% NH_3 in He	H_2, O_2 and NH_3	None
Peripheral compatibility	Compact design ideal for integration and interfacing with on-line monitoring and VPD systems		VPD integration compatible
Automation	Easily paired with a range of lab automation systems for high throughput		
Software	Thermo Scientific Qtegra Intelligent Scientific Data Solution (ISDS) Software with advanced support of 3rd party sample handling devices. Easily linked to the quality control data collection system of the fabrication plant. Windows 10 compatible		Thermo Scientific Element Software Suite. Easily linked to the quality control data collection system of the fabrication plant



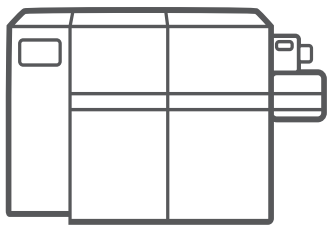
The ICP-MS portfolio at Thermo Fisher Scientific offers reliable and high performance QA/QC solutions for ultralow detection of elemental impurities in wafer fabrication.



Thermo Scientific
iCAP RQ ICP-MS
Robustness and productivity for routine inspection of process chemicals and materials.



Thermo Scientific
iCAP TQs ICP-MS
Performance and unique ease-of-use for QA/QC in the wafer fabrication process.



Thermo Scientific
Element 2 HR-ICP-MS
Versatility and highest sensitivity delivers ultimate data confidence for reliable chemical and material analysis in the laboratory.

Find out more at **thermofisher.com/ICP-MS**

ThermoFisher SCIENTIFIC