

thermoscientific



The **joy** of discovery

Your curiosity, our geosciences portfolio

ThermoFisher
SCIENTIFIC



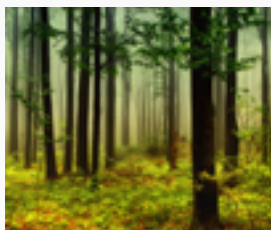
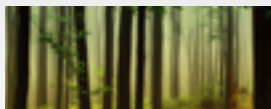
The joy of discovery

Your curiosity, our geosciences portfolio



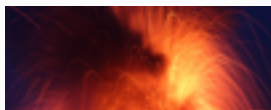
Geochemistry

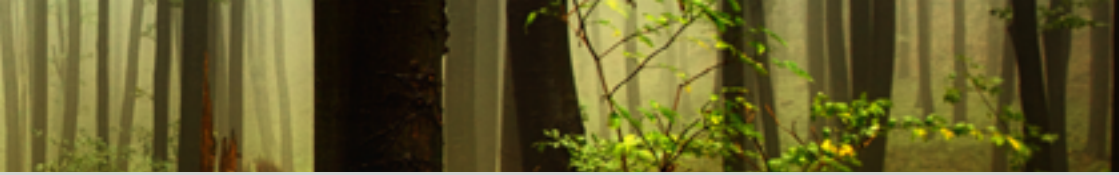
How was our planet formed and how did it evolve through time? What do we know about the formation of the solar system? What about the other planets around us? The natural variations in the relative abundances of isotopes and elements are used as tools to explain the mechanisms behind geological systems on Earth and in the cosmos. These provide insights into a variety of processes, like the evolution of the Earth surface, the evolution of the ocean chemistry and Earth climate, weathering processes on Earth, and many more.



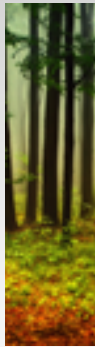
Biogeochemistry

Isotopic signatures in a wide variety of complex organic compounds reveal unique insights in biological and biogeochemical processes. This is true as chemical and physical processes lead to changes in the natural isotope composition of organic compounds. For instance, the isotopes ^{13}C , ^{18}O , ^{15}N and ^2H provide scientists with a wealth of information on the origin of compounds, pathways of metabolism, synthesis and diagenesis as well as conditions of formation, and more.



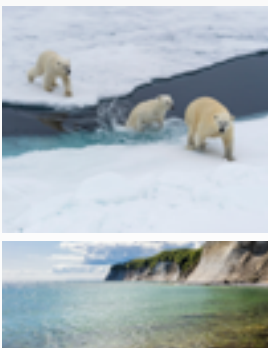


Exciting things happen when geoscientists start exploring. Whether that research takes you deeper into the earth, the fossils, the sea or the sky, our comprehensive portfolio of geoscience solutions can power your next breakthrough and enable your next moment of greatness. We proudly offer the world's largest geosciences research portfolio — ready and waiting for your next discovery.



Geochronology

Geochronology involves dating of rocks, minerals, fossils, sediments and other materials. Absolute age determination is performed by numeric dating methods, such as U-series methods, K-Ar and Ar-Ar methods, as well as Rb-Sr, Sm-Nd and Re-Os dating techniques. Relative age determination uses paleomagnetism and stable isotope ratio calculation.



Climate change research

The past climate helps us to understand climate change and how it can affect us today. Isotopic analysis of ice cores and biogenic carbonates can be linked to past temperatures and global sea level variations. Also, clumped-isotope thermometry attracts growing interest as a very powerful tool for paleotemperature reconstructions.

Multicollector Technology

Meet the ever expanding application demands of geosciences and other disciplines that require high-precision isotope ratio measurements with MC-ICP-MS instrumentation or extract high-precision isotope ratio information from your samples with the Thermal Ionization Mass Spectrometer.

MC-ICP-MS



The Thermo Scientific™ Neoma™ MC-ICP-MS is building on the strength of our multicollector technology, delivering all the advantages of high-precision isotope ratio analysis, but none of the limitations. It includes state-of-the-art software and hardware, has the most flexible and sensitive detector technology, the most sensitive ion source as well as highest mass resolving power enabling challenging isotope applications.

Designed for scientists in geosciences, who aim to performing routine isotope analysis in well-known samples as well as exploring novel isotope analysis in unknown sample materials.

www.thermofisher.com/mc-icp-ms

Thermal Ionization MS



Extract high-precision isotope ratio information from your samples. The Thermo Scientific™ Triton XT™ TIMS integrates the established field-proven technologies from the Triton Series instruments with the latest developments in technology for isotope ratio analysis from Thermo Fisher Scientific.

www.thermofisher.com/tims



10¹³ Amplifier Technology

Are you limited in sample size? One of the major challenges in geosciences is the analysis of very small ion beams. The analytical precision of your studies can be limited by the detection system of the mass spectrometer. The amplifiers, equipped with Thermo Scientific™ 10¹³ Ω Amplifier Technology™ with a new resistor design, enable you to get extremely low noise/signal characteristics and as such obtain high precise isotope ratio analysis for small samples.

www.thermofisher.com/amplifier

Noble Gas MS

Noble Gas MS

The isotopes of the noble gases He, Ne, Ar, Kr and Xe are powerful tools in geochronology, cosmochemistry and thermochronology. Discover what our noble gas static vacuum mass spectrometers can do for your research.



Take the next step in noble gas mass spectrometry. The new series of Thermo Scientific™ noble gas mass spectrometers gives you unsurpassed precision, sensitivity, dynamic range, linearity and stability. www.thermofisher.com/noblegasms

Gas Isotope Ratio MS

High Resolution IRMS



The Thermo Scientific™ Ultra™ HR-IRMS sets a new standard in advanced gas isotope ratio measurements. It overcomes the limitations of conventional gas isotope ratio mass spectrometry and enables an uncompromised view of your analytes: Ultra-high resolution uncovers the isotopic anatomy of molecules and revolutionizes the field of clumped and site-specific isotope analysis. It paves the way forward to exciting and unprecedented scientific discoveries in atmospheric sciences, climate research, petroleum geochemistry, noble gas applications and beyond. www.thermofisher.com/ultra

IRMS




The Thermo Scientific™ 253 Plus™ 10 kV IRMS redefines high performance for isotope ratio mass spectrometry. It builds on the outstanding robustness, linearity, and sensitivity only available in the Thermo Scientific 10 kV IRMS technology. Technical innovations for the 253 Plus 10 kV IRMS improve sample utilization, stability, background and signal-to-noise resulting in ultimate precision on smallest sample sizes.



Do you need the flexibility and performance of stable isotope ratio mass spectrometry (IRMS) applications in a single analyzer? The Thermo Scientific™ DELTA V™ IRMS series combines high sensitivity with excellent linearity and stability to tackle applications as diverse as $^{13}\text{C}/^{12}\text{C}$ analysis of PAHs in soil, $^2\text{H}/^1\text{H}$ of n-alkanes in sediments, or $^{15}\text{N}/^{14}\text{N}$ monitoring of chlorophyll derivatives.

www.thermofisher.com/irms



The Isotope Ratio Mass Spectrometers can be equipped with a wide range of sample preparation devices and inlets, ensuring your instrument is perfectly configured to your applications.



EA-IRMS

Discover an automated, easy-to-use solution for μg - to mg -level elemental and isotope analysis with the Thermo Scientific™ EA IsoLink™ IRMS System. EA IsoLink IRMS System provides helium saving technology and integration of temperature ramped gas chromatography delivering quick and low cost analysis alongside outstanding quality data.

www.thermofisher.com/irms



GC-IRMS

Combining the separation power of gas chromatography with IRMS, the Thermo Scientific™ GC IsoLink II™ IRMS System provides a significant step forward in the performance of compound specific isotope analysis. It is a seamless solution, which meets all the analytical challenges of today's rapidly expanding world of stable isotope applications.

www.thermofisher.com/irms



Carbonate Device

Thermo Scientific™ Kiel IV™ Carbonate Device coupled to an isotope ratio mass spectrometer enables analysis of carbonate samples for paleoclimatic reconstructions involving biogenic carbonates such as foraminifera, bivalves, brachiopods, otoliths, and corals. www.thermofisher.com/kieliv

Quantitative Elemental Analysis

Complement your isotope ratio data with a wealth of information provided by fully quantitative elemental analysis. Depending on required detection limits and sample matrix composition, there is a full suite of instruments available, starting with Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) up to High Resolution ICP-MS.

OEA

Solve more laboratory challenges, improve workflow, and minimize downtime when performing carbon, hydrogen, nitrogen, sulfur and oxygen (CHNS/O) analyses with the Thermo Scientific™ FlashSmart™ Elemental Analyzers. Based on the modified Dumas Method, the FlashSmart Elemental Analyzer is highly flexible, offering modularity that enables over 20 configurations in one instrument.



ICP-OES

The Thermo Scientific™ iCAP™ PRO Series ICP-OES combines powerful multi-element capability with flexibility to be ready for any challenge. Using state-of-the-art technology and designed for robustness, the iCAP PRO Series ICP-OES allows enhanced sample throughput, matrix tolerance and flexibility to produce results you can trust, regardless of the sample matrix.

www.thermofisher.com/icp-oes





ICP-MS

The instruments of the Thermo Scientific™ iCAP™ Qnova Series ICP-MS deliver research level trace elemental analysis combined with routine ease of use. User-inspired hardware and software combine in the Thermo Scientific™ iCAP™ RQ ICP-MS to deliver maximized productivity and robustness. Simplicity and ease-of-use work in concert to streamline workflows and achieve 'right-first-time' results; essential to all busy labs. Harness the power of Triple Quadrupole (TQ) technology for uncomplicated analysis with incredible accuracy using the Thermo Scientific™ iCAP™ TQ ICP-MS. Expand your analytical capabilities. www.thermofisher.com/icp-ms



High Resolution ICP-MS

Clean up your spectra. Make your analysis easy. High-Resolution ICP-MS is made for the most flexible and reliable analyses, for the best analytical results. Perform accurate and reliable quantitative multi-element analyses at trace level, with the highest sensitivity and without complicated sample preparation. The Thermo Scientific™ Element™ Series HR-ICP-MS Systems cover the mg/L to sub pg/L concentration range. When coupled to a laser ablation system, the sensitivity allows precise measurements of U/Pb isotopic ratios at high spatial resolution. www.thermofisher.com/hr-icp-ms



Gas Chromatography

Your laboratory is defined by the way you work, which is why Thermo Fisher Scientific gas chromatography solutions are designed to be customized to fit any laboratory workflow. These solutions allow you to drive productivity and throughput with Thermo Scientific Instant Connect Injector and Detector Modules, a unique approach designed to maximize uptime and flexibility.

Connect your gas chromatograph to the robust, performance-leading Thermo Scientific mass spectrometers to innovate your workflows even further and realize new levels of laboratory efficiency.



Gas Chromatography

Boost productivity, accelerate response times, and lower your total cost of ownership with the Thermo Scientific™ TRACE™ 1310 Gas Chromatograph. Providing versatility and exceptional GC and GC-MS performance, it's an ideal choice for larger production and QA/QC laboratories and research organizations. www.thermofisher.com/gc



High Resolution GC-MS/MS

Bring the power of the first-ever combination of high-resolution gas chromatography (GC) and high-resolution/accurate-mass (HRAM) Orbitrap mass spectrometry to your laboratory. The Thermo Scientific™ Q Exactive™ GC Orbitrap™ GC-MS/MS system provides comprehensive characterization of samples in a single analysis for the highest confidence in compound discovery, identification, and quantitation. This system offers the quantitative power of MS/MS combined with the high precision, full-scan HRAM capabilities only available in combination with Thermo Scientific™ Orbitrap™ Technology.

www.thermofisher.com/orbitrapgcms



GC-MS and GC-MS/MS



Satisfy your laboratory's current and future needs for truly unstoppable performance with GC-MS and GC-MS/MS. The Thermo Scientific™ ISQ™ 7000 Single Quadrupole GC-MS System offers extended uptime and robustness to maximize sample throughput, along with routine easy-to-use smart tools to simplify operation and speed up instrument familiarization. The Thermo Scientific™ TSQ™ 9000 Triple Quadrupole GC-MS/MS System delivers high sensitivity for the most challenging quantitative applications. Both are fully upgradeable from base to advanced configurations to boost flexibility and performance when you need it.

www.thermofisher.com/isq7000

www.thermofisher.com/tsq9000

Solutions for Ion Analysis



Ion Chromatography

For ion analysis, nothing compares to a Thermo Scientific™ Dionex™ Ion Chromatography (IC) System. Whether you have just a few samples or a heavy workload, whether your analytical task is simple or challenging, we have a solution to match your performance and requirements. Recent innovations include high pressure systems, 4 micron columns and capillary systems for precious samples, columns and more. As the technology leader in IC for 45 years, you can feel confident you're getting the best in our IC systems, consumables, service, and support. www.thermofisher.com/ic

Ion Chromatography with Mass Spectrometry

IC with MS Detection



Utilize mass detection when you need to ensure analytical confidence and dramatically improve the detection capability of your Thermo Scientific™ Dionex™ Integrion™ or ICS-6000 HPIC™ System. Ion chromatography with mass spectrometry (IC-MS) maximizes the ability to detect and quantify unexpected co-elutions of components and to confirm trace components.

www.thermofisher.com/icms

Air Monitoring



The URG 9000 Series Ambient Ion Monitor (AIM) is an advanced air sampling instrument that simultaneously measures both fine particle composition (PM_{2.5}) and precursor gases. The AIM enables the analysis of not only the atmospheric chemistry leading to the formation of PM_{2.5}, but also physical transformation and subsequent particle/gas partitioning of its constituents. AIM samplers provide time-resolved direct measurements of anions (nitrate, sulfate, nitrite, phosphate and chloride) and cation particulates (ammonium, sodium, calcium, potassium and magnesium) in PM_{2.5}. Furthermore, the AIM provides time resolved direct measurements of anion (hydrogen chloride, nitric acid, nitrous acid and sulfur dioxide) and cation (ammonia) gases.

Automated Wet Chemical Analysis



Rapid Wet Chemical Analyzer

Experience simultaneous analysis of multiple analytes with the discrete cell technology of the Thermo Scientific™ Gallery™ Plus discrete analyzer. This fully automated, high-capacity analyzer provides faster and reproducible analysis of complex samples in a geochemical laboratory for fresh water, environmental water, mine water or leachable ions from rock and soil samples. Ability to measure low concentration of analytes like nitrite, nitrate, phosphate in presence very high concentration of chloride and sulfate in unique low volume cuvette design produces cost savings in reagents and waste and improves overall productivity.

Thermo Scientific Gallery or Gallery Plus™ Systems has an integrated platform that offers two measurement techniques, photometric (colorimetric and enzymatic) and electrochemical (pH and conductivity) analysis, that can be operated in parallel for analytical efficiency and are excellent alternatives for traditional wet chemical methods like Flow Injection Analyzer (FIA). www.thermofisher.com/discreteanalysis

Automated Sample Preparation



Automate extraction, filtration and clean up of compounds from solid and semisolid samples, including soils, in minutes using the Thermo Scientific™ Dionex™ ASE™ 350 Accelerated Solvent Extractor. This system accommodates sample sizes of 1-100g, allows unattended extraction of up to 24 samples and uses 50 to 90% less solvent compared to other methods. The chemically inert pathway supports acid and alkaline sample matrices and solvents. Flexible, easy-to-operate and cost-effective, the Dionex ASE 350 is ideally suited for a wide variety of geochemical applications. www.thermofisher.com/ase

Molecular Spectroscopy

Desktop Scanning Electron Microscopy



Thermo Scientific™ Phenom™ Desktop Systems give direct access to the high-resolution and high-quality imaging and analysis required in a large variety of applications. The rapid sample loading and the incredibly fast time to image improve the effectiveness of failure analysis, quality insurance processes, or non-destructive testing of materials.

www.thermofisher.com/sem

Raman Imaging Microscope



The Thermo Scientific™ DXR™3xi Raman Imaging Microscope reveals research grade imaging faster than ever. Users gain visual information instantly thanks to enhanced software features and higher spatial resolution. Advanced imaging capabilities coupled with minimal sample prep and intuitive software give users the power of Raman at speeds researchers need.

www.thermofisher.com/raman

X-Ray Diffraction & Fluorescence

Thermo Fisher Scientific can help you understand the value of your mineralogical samples, from quantifying the economically important and undesirable compounds with XRF to interrogating their phase composition using XRD. With a choice of handheld, benchtop and floor-standing solutions available, XRF and XRD instrumentation are routinely employed in challenging environments to interrogate a wide range of elements and compounds at correspondingly wide concentration ranges, and in various sample matrices.



X-Ray Diffractometer

Get an easy-to-use X-ray diffraction (XRD) instrument for everyone. Due to its unique design, the bench-top Thermo Scientific™ ARL™ EQUINOX 100 X-Ray Diffractometer is a compact and lightweight instrument that requires no external water chilling. This XRD can turn the trunk of a car into your mobile lab for mining exploration or archaeological excavation. Results are available within minutes – from basic phase identification or advanced clay analysis to complex quantification of multi-phase geological mixtures.

www.thermofisher.com/xrd



Sequential X-Ray Fluorescence Spectrometer

The Thermo Scientific™ ARL™ PERFORM'X Sequential X-Ray Fluorescence Spectrometer for advanced materials characterization integrates elemental analysis with mapping and small spot analysis to create a solution that can evaluate up to 90 elements in nearly any solid or liquid sample. Analyze diameters from 35 mm down to 0.5 mm in case of non-homogeneous samples. This is the perfect solution for geochemical, R&D and contract labs with demanding quantitative mineral analysis. www.thermofisher.com/xrf



Handheld XRF Analyzer

Confidently perform portable elemental analysis with the Thermo Scientific™ Niton™ XL5 handheld XRF analyzer. When versatility, functionality and analytical performance are top of mind, mining operations rely on the Niton XL5 for fast results and low detection limits. Perform outcrop and soil analysis, advanced exploration and drilling, core sample measurements, mine mapping, ore trading, grade control, and much more. The Niton XL5 provides operators the ability to scan a broad range of materials in one versatile analyzer. www.thermofisher.com/niton



Exciting things happen when geoscientists start exploring. Whether that research takes you deeper into the earth, the fossils, the sea or the sky, our comprehensive portfolio of geoscience solutions can power your next breakthrough and enable your next moment of greatness. We proudly offer the world's largest geosciences research portfolio — ready and waiting for your next discovery.

Find out more at thermofisher.com/geosciences

ThermoFisher
SCIENTIFIC

For Research Use Only. Not for use in diagnostic procedures. © 2020 Thermo Fisher Scientific Inc. All rights reserved. All trademarks are the property of Thermo Fisher Scientific and its subsidiaries unless otherwise specified. BR30660-EN 1120S