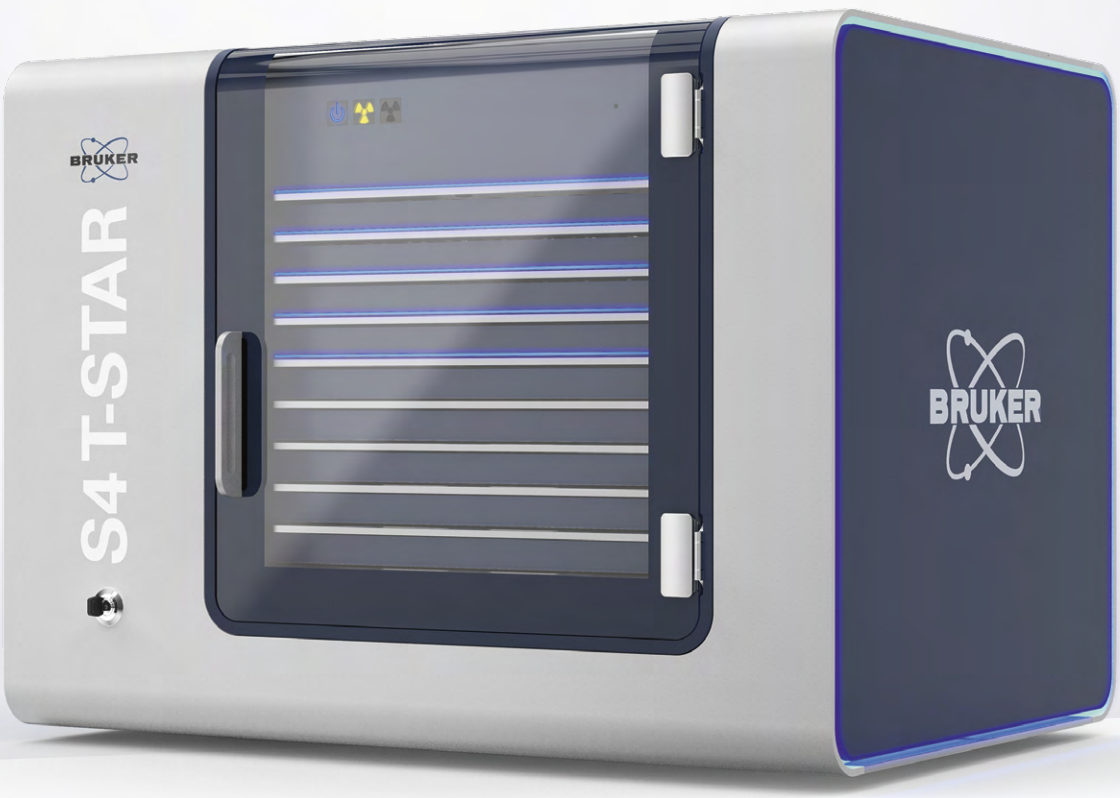


TXRF

S4 T-STAR®

Benchtop TXRF Spectrometer
for Ultra-Trace Element Analysis

Innovation with Integrity

S4 T-STAR® – Rapid and Cost-Efficient Ultra-Trace Element Analysis

Total reflection X-ray fluorescence (TXRF) spectroscopy is a wellestablished method for trace element analysis of a variety of samples. The S4 T-STAR® simplifies TXRF for 24/7 routine operation with guaranteed data quality. Significant improvements of detection limits are accompanied by automatic QC procedures, useful software routines and a unique versatility in terms of sample types and carriers.

S4 T-STAR® – The Star of TXRF

X-ray fluorescence (XRF) spectroscopy has been widely used for element analysis of solid and petrochemical samples in several industries since decades, offering detection limits in the ppm range. TXRF expands the application segment for XRF to ultra trace element analysis in liquid samples, suspensions and thin films.

TXRF is therefore an excellent alternative technique to atomic absorption spectroscopy (AAS) and inductively coupled plasma optical emission spectroscopy (ICP-OES) or mass spectroscopy (ICP-MS), respectively. At this, the S4 T-STAR® sets new standards in performance, automation and quality of benchtop TXRF spectrometry.

Outstanding Sample Versatility

The S4 T-STAR® is a very versatile tool for the analysis of a great variety of sample types on different reflective carriers. This puts it ahead of ICP, which requires fully dissolved liquid samples:

- 30 mm quartz discs: elemental analysis of liquids, solids and suspensions
- 2″ wafer: contamination analysis, depth profiling and material sciences research
- Microscopy slides: clinical and biological samples, direct analysis of cell cultures, smears and thin sections
- Rectangular carriers up to 54 mm: films, filters, nanoparticle layers
- Any customized reflective media

Figure 1
S4 T-STAR® – Portable benchtop TXRF spectrometer

Designed for Highest Performance

Your Benefits

- The high performance TXRF spectrometer S4 T-STAR® offers lowest detection limits in the sub-ppb range.
- Automatic quality control routines guarantee consistently highest data quality.
- Maximum versatility for a direct analysis of many types of samples on different carriers.
- Optimized for 24/7 operation in industrial routine analysis.
- Designed for multi-user operation with a high capacity of 90 samples.
- A selection of sample trays and other tools accelerates sample preparation and minimizes errors and contamination risks.
- High quality results for sophisticated research in material sciences.
- A dedicated application team supporting your method development and standardization processes.

Figure 2
The lid of the T-BOX can be kept on the S4 T-STAR® during the measurement.

Figure 3
Signal LEDs indicate the measurement status for the individual sample trays.

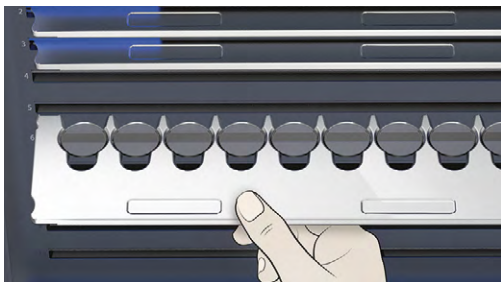


Figure 4
A sample tray is inserted into the S4 T-STAR®.

Figure 5
T-BOX with sample tray and sample carriers.

High Performance TXRF in Compliance with Regulatory Demands

Perfect Fit for Ultra-Trace Element Detection in a Broad Range of Application Fields

Pharma
Detection of catalyzer elements in active pharmaceutical ingredients (API): < 0.1/0.5 ppm Pd in liquids or pills.

Food
Food safety according to FAO/WHO standards: < 40 ppb for As in rice.

Environmental Monitoring
Detection of contaminants < 10 ppb in wastewater, slurries and effluents.

No Worries About New Pharma, Food and Environmental Regulations

- S4 T-STAR® is a powerful tool for food fraud prevention in globalized supply chains.
- S4 T-STAR® monitors catalyzer elements in pharmaceutical production according to upcoming US and EU Pharmacopeia guidelines.
- S4 T-STAR® provides a versatile solution for water, effluent, air and soil analysis for the recovery of a healthy environment.

Automatic QC Procedures

S4 T-STAR® is the first TXRF spectrometer that automatically runs QC routines for operational and performance qualification in the background.

- Integrated QA samples allow automatic stability and sensitivity checks.
- The software supports easy-to-use administration of all QC procedures and integrates process-specific validation routines.
- The status of important quality parameters are permanently displayed.

Dedicated to 24/7 Routine Operation

- Freshly prepared samples can be loaded or unloaded at any time even during running measurements.
- Crucial threshold values or confidence limits can be defined in evaluation methods. The software provides warnings, if critical limits are exceeded.
- S4 T-STAR® is designed for unattended operation, e.g. overnight.

EasyLoad™ Sample Station

- Dedicated sample trays for different sample types are available.
- The trays are automatically recognized when inserted into the spectrometer. This prevents conflicts in case of different carrier types. It also enables the automatic loading and immediate start of any open measurement job.

High Sample Capacity

- The sample changer offers a high capacity of up to 90 sample discs.
- S4 T-STAR® supports automated batch processing, e.g. for efficient measurements overnight.
- Walk-up operation supports immediate measurements.

Large Area XFlash® Technology

- Outstanding detection limits due to a new generation of large area XFlash® SD detectors.
- No disturbing artifact peaks for safe identification of target elements.

Do Not Wait – Just Load

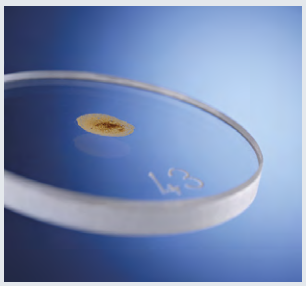
- The S4 T-STAR® is designed for multiuser operation.
- The spectrometer can be loaded with up to 10 different trays. This allows loading and unloading while the instrument is measuring another sample.

1 System – 3 Excitations

- The S4 T-STAR® offers up to three different excitation modes for optimal detection of all elements from sodium to uranium.
- The excitation change is programmable for automatic execution.

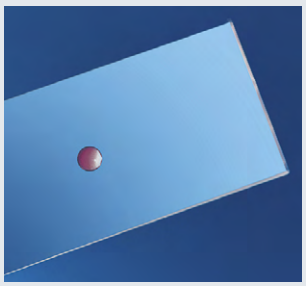
Excellent Versatility and Usability

Full Flexibility for a Variety of Reflective Sample Carriers

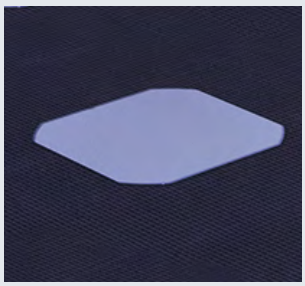


30 mm quartz discs
elemental analysis of liquids, solids and suspensions

2" wafers
contamination analysis, depth profiling and material sciences research



Microscopy slides
clinical and biological samples, direct analysis of cell cultures, smears and thin sections



Rectangular carriers
with a size of up to 54 mm for films, filters, and nano-particle layers
customized reflective media

Outstanding Versatility

The S4 T-STAR® provides maximum versatility for the analysis of different kinds of samples on a variety of reflective carriers. For certain applications, even a direct analysis without any sample preparation is possible.

TXRF with S4 T-STAR® does not require any educated operation for daily calibrations. Standard operation protocols and dedicated tools ensure best usability, which saves time and laboratory resources.

Well-Designed Storage Solution

- Trays can be stored in stackable boxes preventing contamination of the sample carriers.
- The bottom plate includes center markings, which allows direct pipetting of any sample without touching the sample carrier.

Unique SampleCare™

- SampleCare™ constantly protects your samples and improves the quality of your data.
- The reduced air flow and integrated sample housing prevents sample contamination.
- A slight stream of nitrogen shields the samples. It also removes argon from air for improved detection of palladium and silver.

Convenient Sample Control and Archiving

- Control the quality of your sample with a magnified image by a CCD camera.
- All sample images are automatically archived for subsequent review.

Latest Sensor Technology

- Sensors for ambient temperature and humidity deliver information about the laboratory condition and assure the instrument stability.
- Tube temperature sensors provide better system stability and data quality.

Final Results on the Spot

- Typically, samples are prepared multiple times. Right after measurement the software automatically reports statistical data (average, standard deviation etc.).
- The integration of user-defined functions is supported.
- Standard libraries allow the determination of recoveries. Any deviation of the admissible tolerance will be highlighted.

LEDs Signal Measurement Status

- Tray recognized
- Job identified
- Job started
- Job finished

Technical Specifications	
Element range	Mo excitation: Mg to U (with exception of Nb to Ru), W excitation: K to U
Concentration	ppb to 100 %
Detection limit	<1 pg nickel
Sample types	Liquids, suspensions, powders, particles, metals, thin layers, tissues, wafers, filters etc. (For research use only. Not for use in diagnostic procedures.)
Sample volume	Liquids and suspensions from 1 µl to 50 µl, Particles up to 100 µm in diameter, powders up to 10 µg
Sample changer	Automatic sample changer for 10 trays, Automatic tray detection for sample type identification
Capacity	Sample tray 1: 30 mm discs, max. 90 discs Sample tray 2: microscopy slides, max. 30 slides Sample tray 3: 2" wafers, max. 50 wafers Sample tray 4: rectangular, <54 mm, max. 50 samples Sample tray 5: user defined
X-ray tube	max. 50 W metal-ceramic, max. 50 kV, 1 mA, air-cooled
X-ray optics	Multilayer monochromator
Excitation modes	Mo-K, 17.5 keV W-Brems, 35 keV; W-L, 8.4 keV Cu-K, 8.0 keV Cr-K, 5.4 keV
Detector	Peltier-cooled XFlash® silicon drift detector Liquid nitrogen is not required 60 mm^2 active area, optional: 100 mm^2 active area Energy resolution <149 eV at 100 kcps (Mn Kα)
Interface	Data exchange by TCP/IP (RJ45 cable)
Mains	100/240 V, 50/60 Hz
Size	528 mm x 693 mm x 512 mm (height x width x depth)
Weight	85 kg
Accessories	Washing cassette for sample carriers, storage boxes; Starter set for TXRF (pipettes, tips, tubes, mortar, spatula)

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