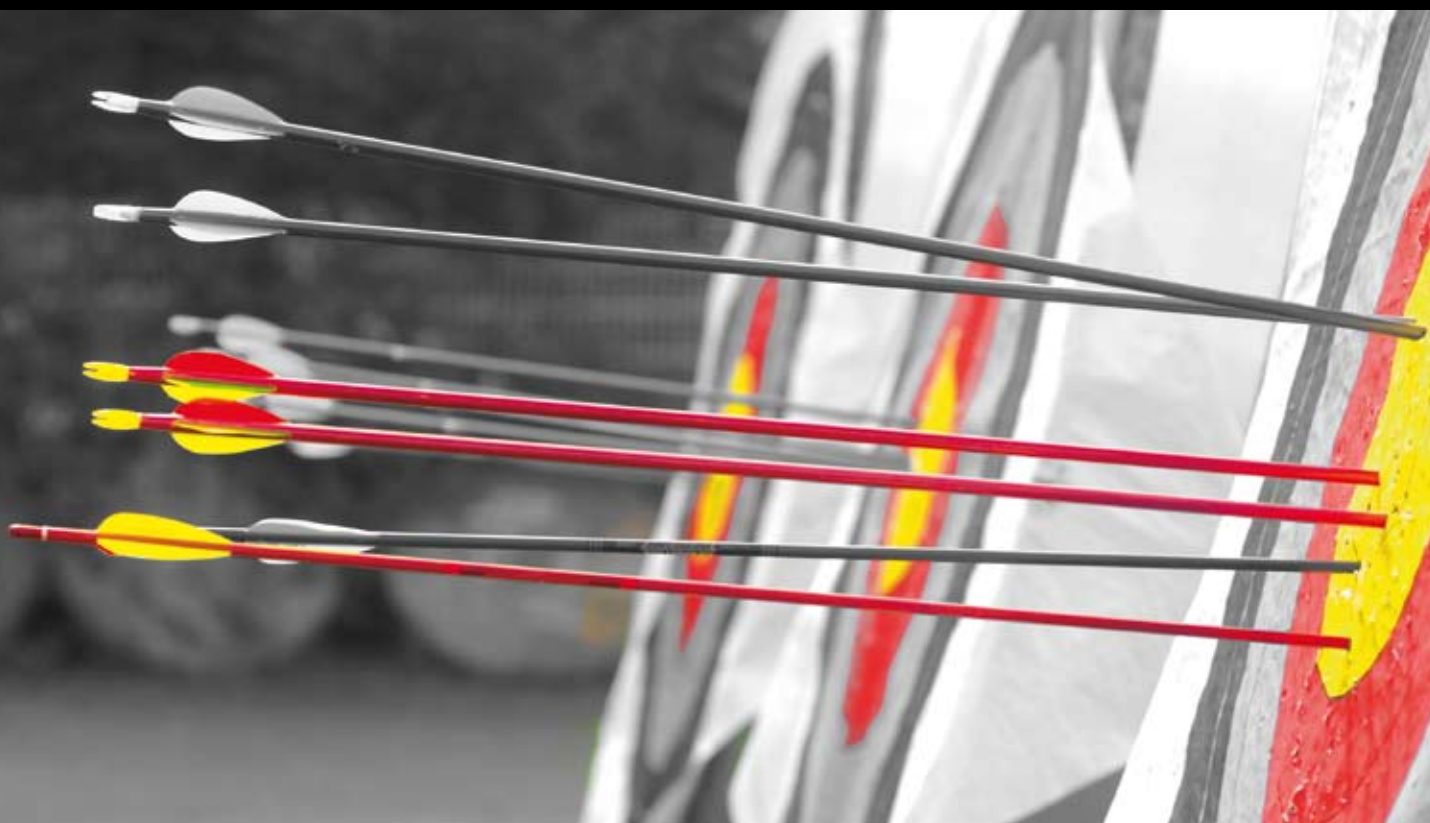


contrAA[®]

Hit the Mark!



High-Resolution Continuum Source AAS

Intelligent AAS Technology for Tomorrow's Market



Analytik Jena brings an innovation on the market – the **contrAA®** series – which exceeds the performance of conventional AA spectrometers in all parameters. This new technology – High-Resolution Continuum Source AAS – represents previously unattained effectiveness and quality of measurement results.

Following decades of experience in the development of spectrometers and graphite furnaces and in cooperation with partners from leading research institutes, a vision becomes reality – the start of a new generation in AAS, with the **contrAA®** series, which finally closes the gap between ICP-OES and AAS.

The series comprises two instruments, **contrAA® 300**, the high-resolution continuum source AAS for flame and hydride technology, and **contrAA® 700**, a compact, versatile system for flame, hydride and graphite furnace technology, capable of analyzing liquid as well as solid samples in one single instrument. Both systems combine intelligent design with premium functionality and persuasive performance characteristics:

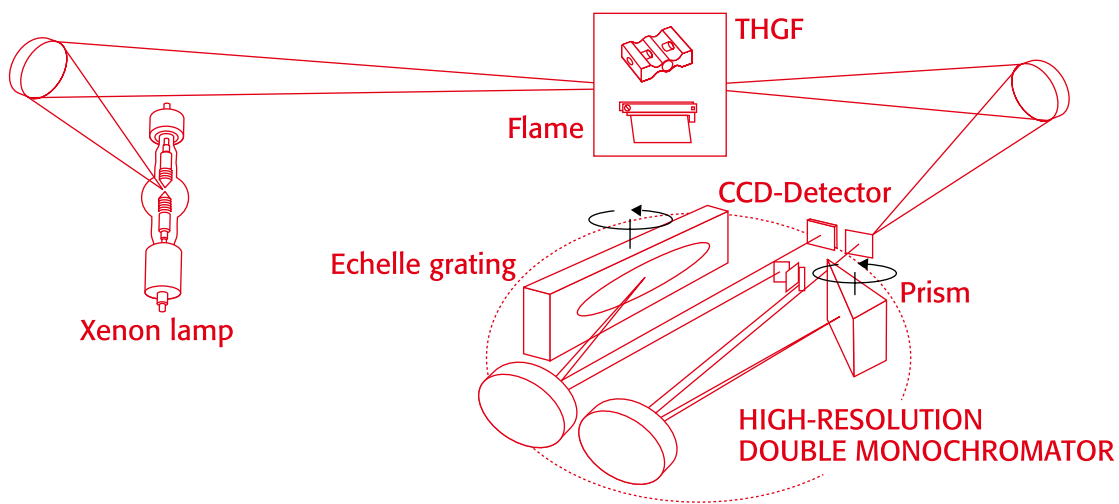
- Just one light source for all elements
- Sequential multielement routine as standard
- Unique simultaneous background correction
- High sample throughput
- Rapid readiness for measurement
- Easy to operate and robust
- New information content
- Improved analytical performance





Optimized Equipment

Unerring results call for consistent preparation and the very best equipment. The time factor is reduced to a minimum with the required expertise and sophisticated technology.



Infinite Latitude with only One Light Source

Extreme Flexibility with Minimum Workload

contrAA® reduces the preparation phase of the measuring process to a minimum. With only one light source for all elements and all available wavelengths, the instrument is ready to measure at all times. The previous dependence of the measurement on hollow cathode lamps is eliminated and the associated costly preparation time no longer applies. The protracted burn-in time of the light source, necessary for conventional line sources, is now also no longer required, since any drift phenomena are corrected simultaneously.

Expanded Application Spectrum

The use of a xenon lamp as a continuous source of radiation opens up the entire wavelength range relevant for AAS for the customer in just one step. Previously, individual methods predominated; now the sequential multielement-routine has become standard. This provides enormous savings in time and cost of materials.

The evaluation of molecular absorption bands, allowing the analysis of additional elements, such as sulfur or phosphorus, is a further innovation.

Impressive Design

Intelligent design goes beyond saving space in the laboratory and beyond convenient transportation. Today it really means readiness to operate quickly, high effectiveness and easy handling as a means of minimizing service and operating costs. Operating convenience is a top priority for the contrAA®. Thanks to the tandem principle, it is readily possible to change quickly from flame technology to graphite furnace technology and vice versa, depending on the task to be accomplished. Cumbersome installation or additional adjustment is now no longer required!



Simple Method Development for Sequential Multi-element Analysis

Method Development made easy

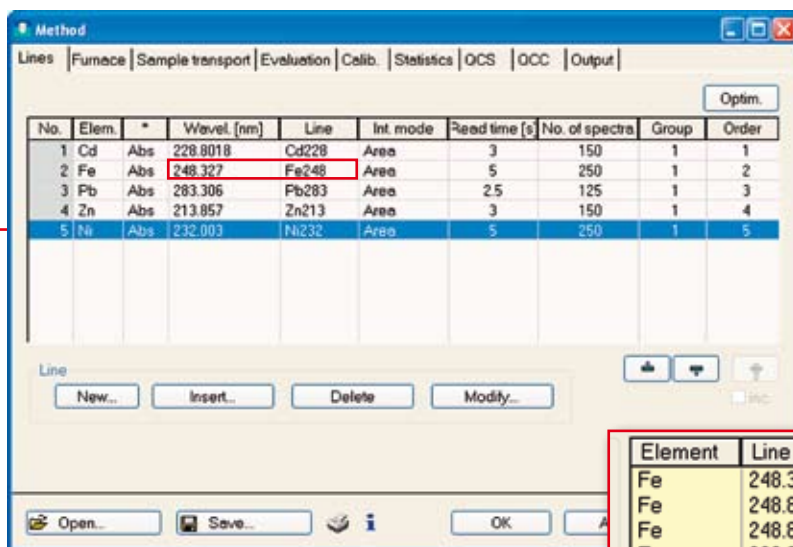
The contrAA®, with its high-resolution echelle spectrometer, makes method development conceivably simple even for complex samples. Aside from the intensity of the analysis line, the spectral environment is also recorded simultaneously. As a result, noise or interference is immediately visible. The need for optimizing or correcting the parameters is identified without additional measurement. Conventional sources of error and also the requirements placed on the operating personnel are minimized.

The Environment of the Analysis Line becomes Visible

The unique resolution with a spectral bandwidth of below 2 pm/ pixel is decisive for the new quality of the measurement results. Interference is minimized through optimum line separation. Errors, which were caused by the limits of the resolution in traditional line AAS, can be identified for the first time and thereby avoided.

All Results at a Glance

The innovative user and evaluation software, ASpect CS, optimizes the advantages of multi-element analysis and provides the user with latitude in method design. Patented technology enables the spectrometer to be changed rapidly from line to line thus minimizing measuring time and sample consumption even for long measurement sequences. All results are available within seconds in a clearly arranged worksheet. The user no longer has to wait until the end of all the measurements, but can see all the results of the selected elements of the respective sample immediately.

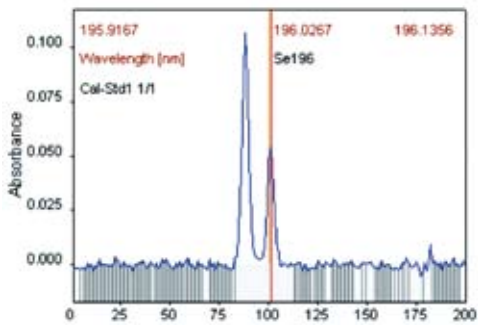


Element	Line (nm)	Type
Fe	248.327	P
Fe	248.8143	S
Fe	248.8143	S
Fe	302.0639	
Fe	302.1073	
Fe	252.7435	
Fe	371.9935	
Fe	373.7133	
Fe	352.604	

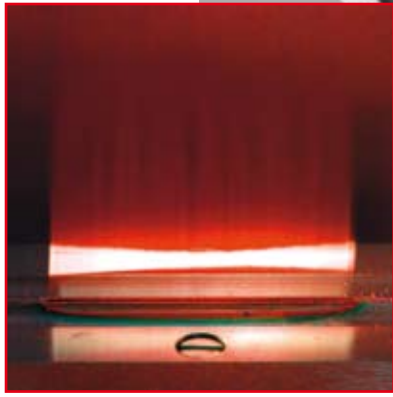


Taking Aim

In order to attain the objective precisely without deviations, it is of crucial importance to aim precisely. The selection of the method and the optimization of processes are essential criteria in the procedure aimed for.



Sequence/Results		Sequence	Results	Overview
Name		Cu220	Pb203	
Reag blank				
36403		0 µg/L	0 µg/L	
Samp-Add1		0.6 µg/L	6 µg/L	
Samp-Add2		0.9 µg/L	9 µg/L	
Samp-Add3		1.2 µg/L	12 µg/L	
Samp-Add4		1.5 µg/L	15 µg/L	
Compute addt				
36409		0.3337 µg/L	0.9377 µg/L	
Reag blank				
36471		0 µg/L	0 µg/L	
Samp-Add1		0.6 µg/L	6 µg/L	
Samp-Add2		0.9 µg/L	9 µg/L	
Samp-Add3		1.2 µg/L	12 µg/L	
Samp-Add4		1.5 µg/L	15 µg/L	
Compute addt				



The Correct Choice

The selection of the correct tool leads to the desired result.
If the method is mature and optimized,
it defines the necessary preparatory steps towards the solution.

Hydride systems



Autosampler



Short Preparation Time for High Sample Throughput

Greater Efficiency in the Laboratory

We help you to optimize the workday routine in the laboratory. From now on, the application determines line selection. For example, standardized sample preparation may now be adequate for different elements and concentration ranges in order to realize the entire measuring process. Depending on the element and the concentration range, for the first time, the user is in a position to select the line best suited for this purpose. Different dilutions are therefore avoided and the user obtains reliable and precise measurement results. This saves time and chemicals and also avoids errors. The HR-CS AAS represents essential enhancement in quality here.

Optimized Accessories

Besides minimizing sources of error, a clear enhancement in the range of applications forms the focus of our technology. In combination with optimized accessories, such as the scraper and the injection module, the analysis of complex samples with high matrix content also becomes routine.

The scraper, an optimized module for cleaning the burner slot, guarantees an interference-free and continuous sequence of measurements when the contrAA® is operated with a nitrous oxide flame. Different hydride systems also offer selective analysis of mercury and the hydride elements, depending on the application.

Automated Sample Preparation

Since most errors usually occur when preparing the sample, we have fully automated this step with regard to dosage, dilution or enrichment, the addition of modifiers or depth adjustment. This not only ensures 24-hour operation with a high sample throughput, but also accurate, error-free results.

Integrated automatic on-line dilution at the autosampler using the flame technique, as well as at the graphite furnace sampler, ensures that the sample sequences are handled without interruption even with considerable concentration changes of the elements.

Sample tray

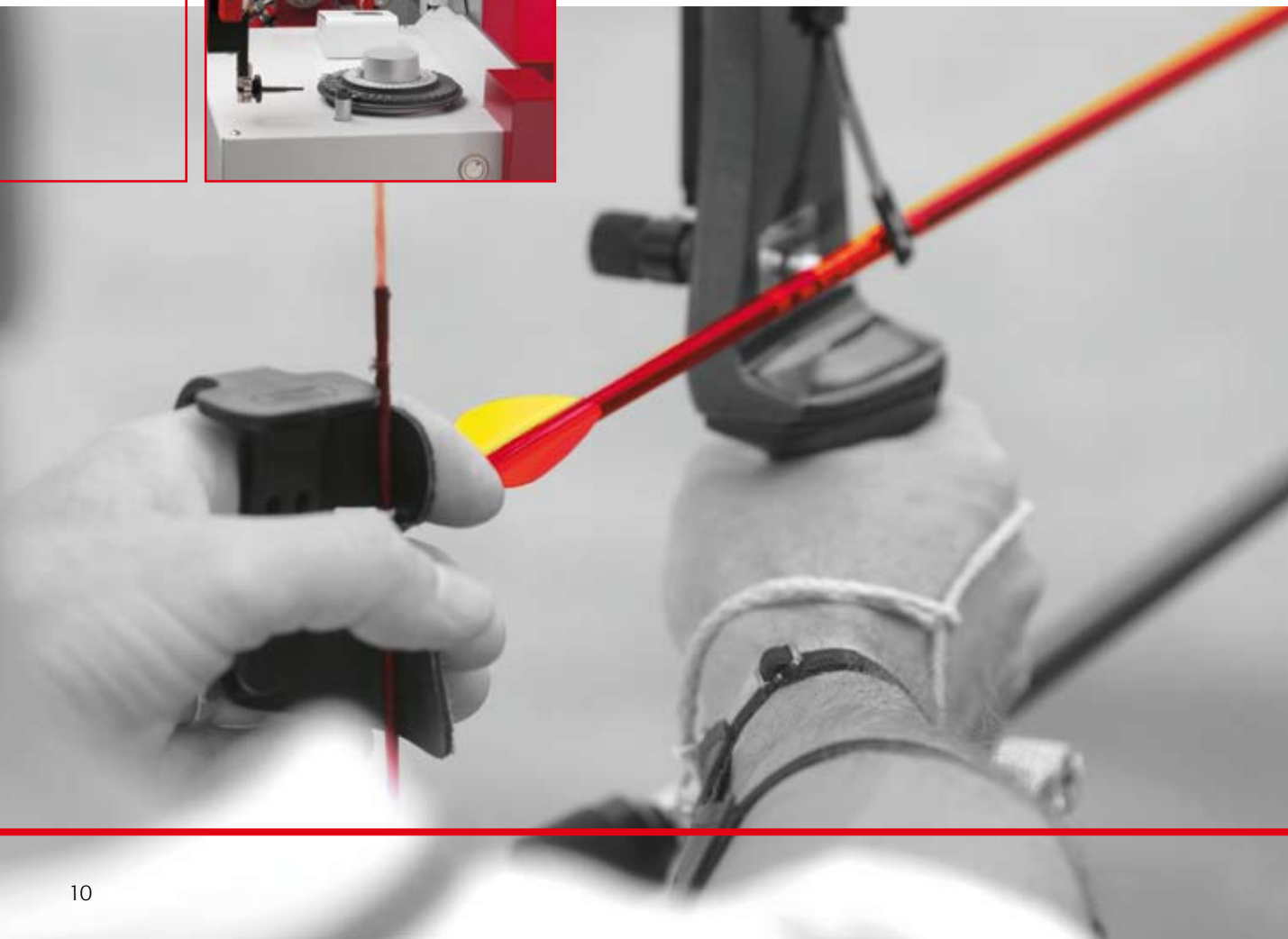


The Direct Analysis of Solids as a True Alternative in AAS



Aligning the Parameters

The suspense heightens.
The parameters are optimized and set.
Automated dosing and coordination of all the relevant factors proceeds.

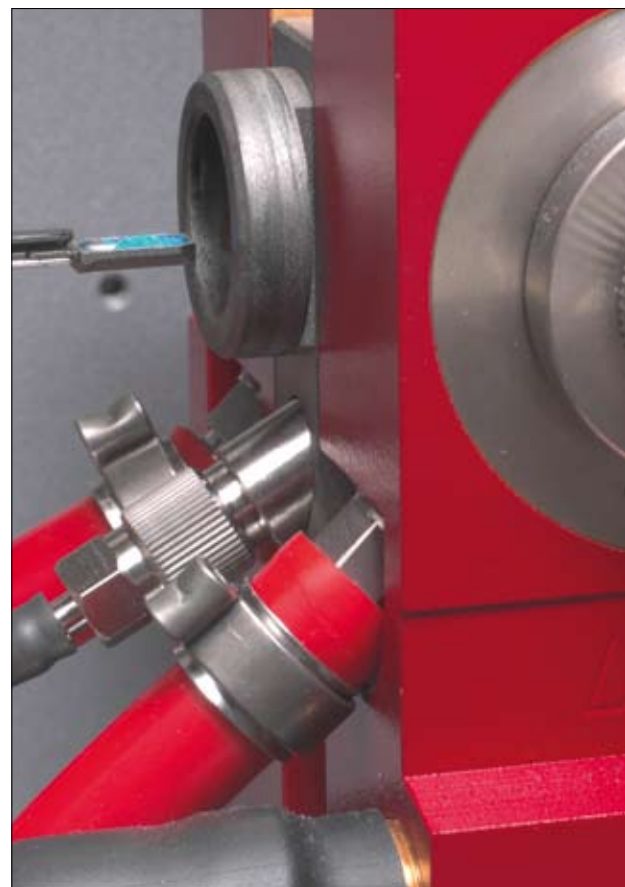


Intelligent innovation pushes back limits

With the contrAA® 700, the direct analysis of solids by AAS has now become a real alternative for many applications. HR-CS AAS is the method of choice, since it combines key advantages. The user is no longer limited to trace analysis, because insensitive lines can also be used without problems. Moreover, the method overcomes the limits of Zeeman AAS with respect to background correction.

Liquid Option for Flexible Work

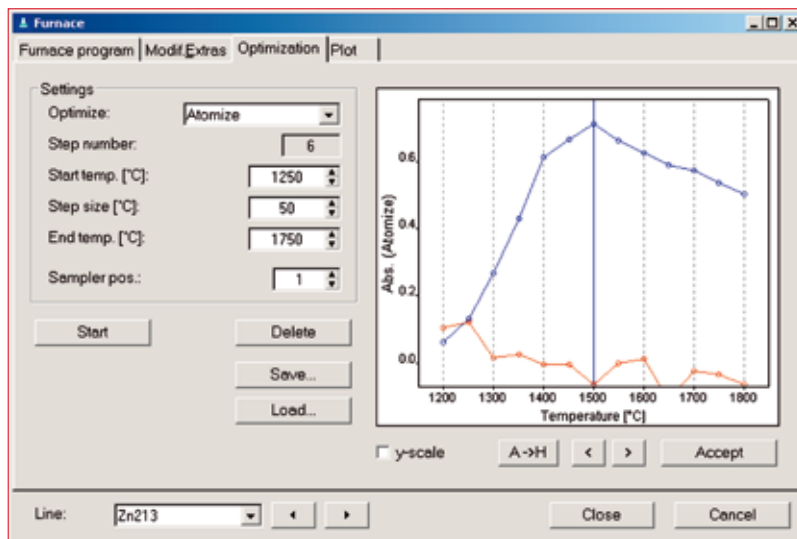
Equipped with a novel liquid dosing module, allowing automated calibration out of a stock solution and modifier addition, direct solids analysis becomes a powerful tool for research as well as routine tasks. Depending on the application, different systems are available, such as a manual or fully automated sampler with an integrated microbalance, thereby expanding the basic instrument.



Analytical Advantages

- Analysis of the unadulterated original samples
- No time-consuming sample digestion
- No dilution with environmentally-hazardous reagents
- Minimized danger of contamination
- High sensitivity
- True microquantity method

Intelligent Instrument Technology Controls the Automated Measuring



Integrated Cooling

The integration of the cooling apparatus for the graphite furnace is an innovation and an example of intelligent product development. No additional module is required here, since the software monitors and controls the cooling cycle. With this step, the user is independent of existing laboratory conditions.

Transverse Heated Graphite Furnace (THGF) and Optimized Temperature Control

The transverse heated graphite furnace is a prerequisite for optimum atomization and the highest precision of results.

This state-of-the-art concept has been used successfully for many years in our graphite furnace systems. A special optical sensor monitors the temperatures. Fluctuations are compensated immediately in order to achieve optimum sensitivity and guarantee a long service life of the graphite furnace.

Advantages of the Transverse Heated Atomizer

- Homogeneous temperature distribution
- Decreased gas phase interference
- Minimized memory effects
- Lower atomizing temperatures
- Linear, rapid heating rates

Automated Optimizing Routines

In developing instruments, we place great emphasis on innovative functionality.

Fully automatic optimization routines help the user to select the appropriate method parameters. This applies to pyrolysis and atomization temperatures in the graphite furnace mode in terms of minimizing broadband background absorption and yielding maximum sensitivity.

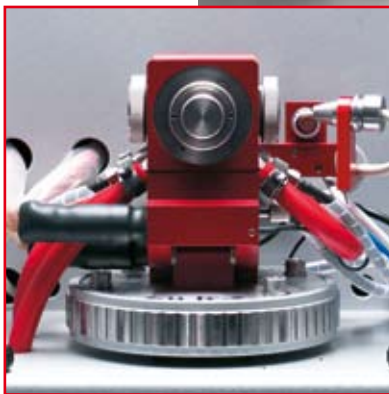
At the same time, an integrated camera observes the deposition of droplets and the drying phase in the graphite furnace and sends information in a unique image quality. The parameters for the flame stoichiometry and the observation height for the flame technique are automatically optimized iteratively.

Sequences of the integrated camera in the graphite furnace



The Concentration Phase

The objective is defined and the aim is precise.
Efforts are focused. Optimized routines
now initiate the measuring process.



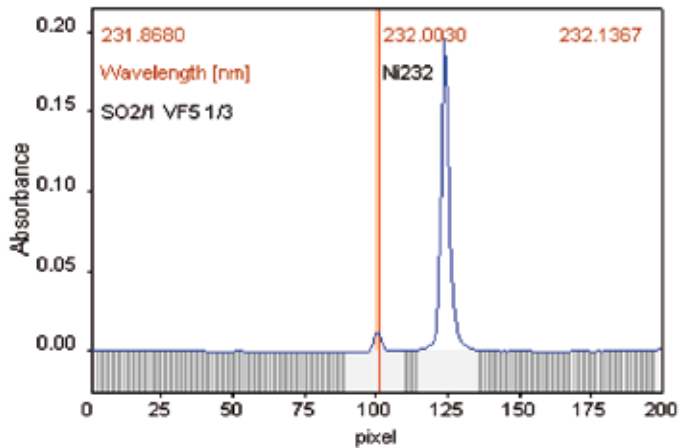
The Path into the Third Dimension

The Starting Shot for Interaction

Within a fraction of a second, the interaction of all decisive parameters commences. The different processes proceed simultaneously, oriented towards the objective.



Two-dimensional signal plot of the absorbance subject to wavelength



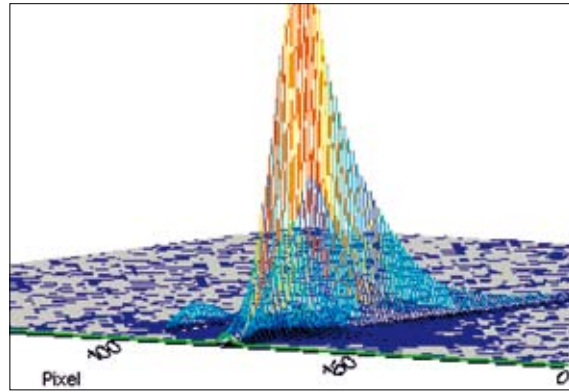
Novel Detector Technology

Our detector technology is based on a CCD chip, which is used for the first time in AAS and offers distinct advantages. This chip uses approximately 200 of 588 pixels for the analytical function. The pixels are illuminated and read out simultaneously and act as independent detectors. All corrections necessary in AAS are performed by reference pixels – including the correction of broadband effects, absorption or emission phenomena and the elimination of lamp intensity alterations.

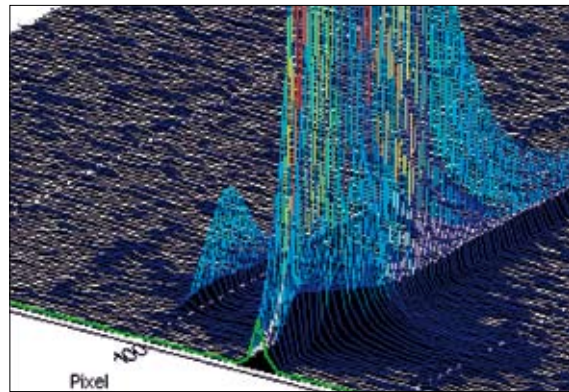
3D Spectroscopy for more Information Content

The entire environment of the analysis line can be observed in high resolution using this technique. Conventional measurement of absorbance over time is supplemented by a third dimension – wavelength. This three-dimensional spectroscopy offers unimagined possibilities for optimizing parameters, during method development and for identifying and preventing spectral interference. Until now, only the results of any spectral interference became visible. Now however, with HR-CS AAS, the user can identify the cause of this interference and eliminate it, as required.

Ni/ Fe interference, three-dimensional signal plot of the absorbance subject to time and wavelength



Ni/ Fe interference, three-dimensional signal plot of the absorbance subject to time and wavelength

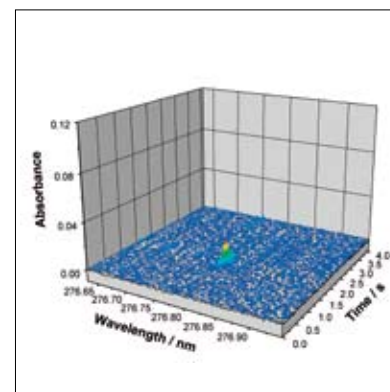
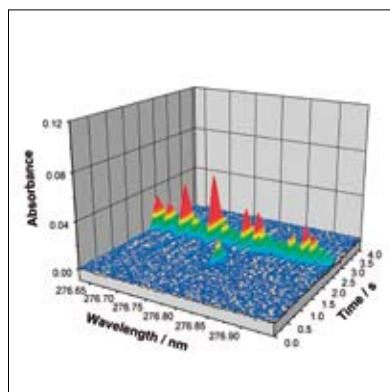
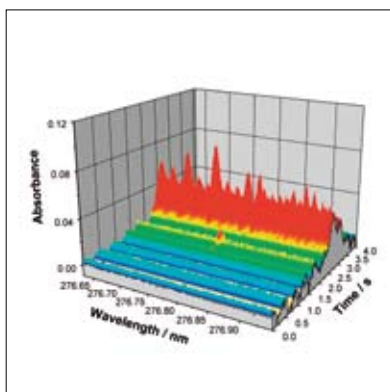


Number of evaluation pixels as a New Parameter

In HR-CS AAS with a CCD detector, the center of the absorption line is focused on the center evaluation pixel. The evaluation width acts as a new variable here and offers optimizing options. With the help of the absorbance, measured at several pixels, the sensitivity, reproducibility and the linear working range can be influenced as a function of the absorption line width.

Patented Wavelength Correction

Aside from these corrections, the wavelength stability is also a novel parameter for AAS. The use of an integrated neon correction during wavelength setting offers a unique wavelength stability. The use of an integrated neon correction during wavelength setting offers a unique wavelength stability. The precision of this correction is less than 0.3 pm/ pixel thus excluding drift problems. Previously, this type of wavelength correction was only available in ICP-OES applications so its use in AAS represents a breakthrough.



Reference Pixels for a Realtime Correction

Effective and rapid background correction is a basic prerequisite for correct measurement results in AAS and especially in the graphite furnace technique. The limits of the methods previously used can be seen here and the quality of the HR-CS AAS also excels here. Fully automatic background routines use the available reference pixels and, for the first time, enable realtime simultaneous correction.

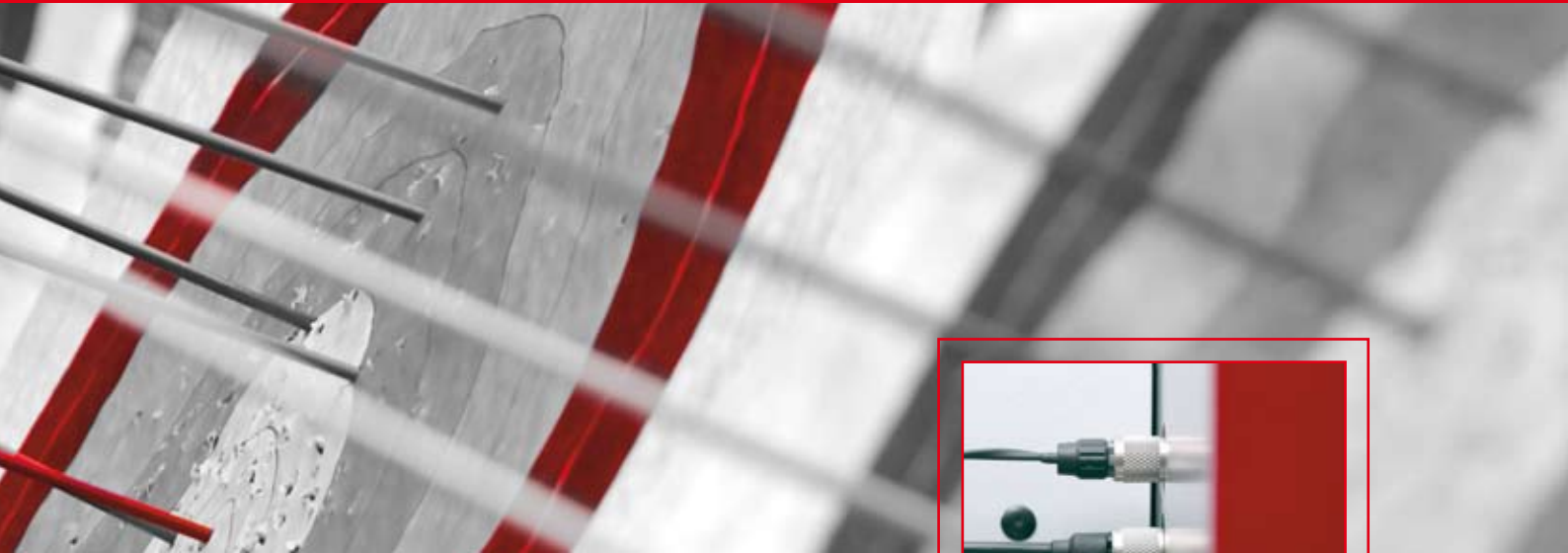
Advantages of simultaneous background correction

- Large dynamic linear working range
- Expanded detection limits
- Elimination of artifacts
- Correction of direct line superposition
- Unambiguous measurement results

Automatic Background Separation

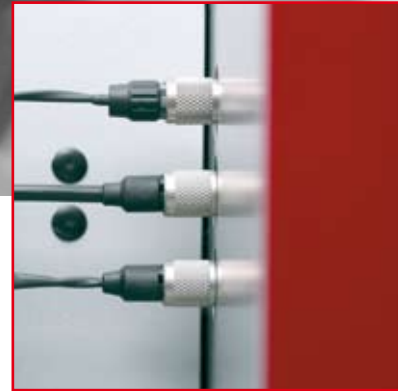
The contrAA® is the first AAS capable of separating broadband and spectral background effects. The former are corrected automatically over the reference pixels and the latter are rendered visible and can be evaluated. In most cases of spectral interferences, however, the outstanding resolution is sufficient, so that the analysis line can be used for the evaluation without modification. We aim to contrAA® users an unmatched background correction, thus enormously improving the measurement quality.

Especially for the user with very diverse requirements, such as environmental laboratories, the advantages are obvious, since the contrAA® greatly simplifies the working process, especially in the case of unknown and varying samples. However, the measurement process is simplified also for routine measurements with a known matrix, since spectral interferences no longer have to be laboriously corrected.



On the Home Straight

Different influences define the procedure.
It now becomes apparent that process optimization takes effect
and heads straight towards the objective.



Simultaneous Background Correction for Unambiguous Measurement

Convenient Data Storage

The storage of true raw data is a decisive advantage of contrAA®. Accordingly, all measurement information is available in its original state. As a result, recalculations and new calculations are possible at any time without great effort, even if errors have been made in the calibration or in the data input. Even the decision as to which and how many pixels are to be used for the evaluation can be made after the measurement.

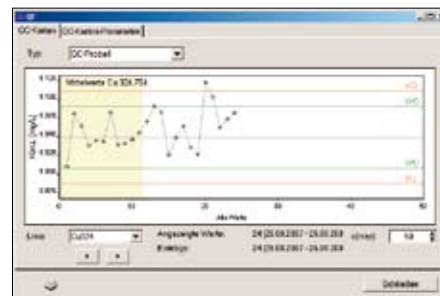
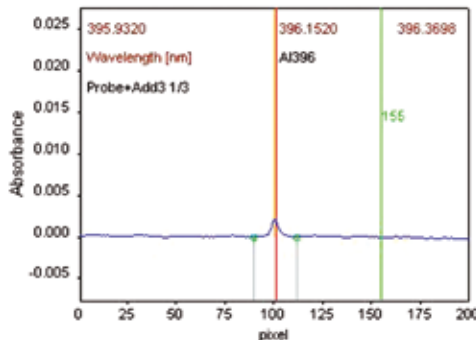
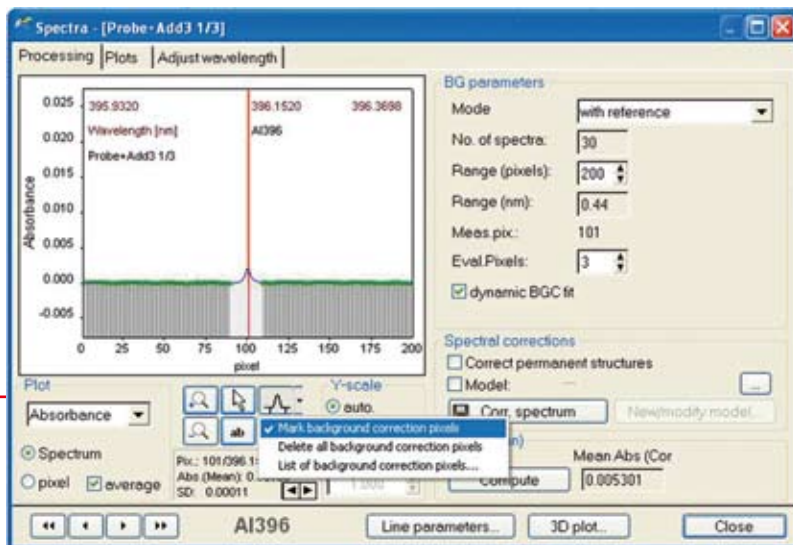
Efficiency through the Expandable Measuring Range

The expandability of the measuring range is an innovation for AAS. If several lines of an element with different sensitivities or lines from two different elements are in the detected wavelength window, they can be measured and evaluated simultaneously by the software. This provides unique flexibility in case of varying concentrations, as well as the possibility of achieving several results with one measurement.

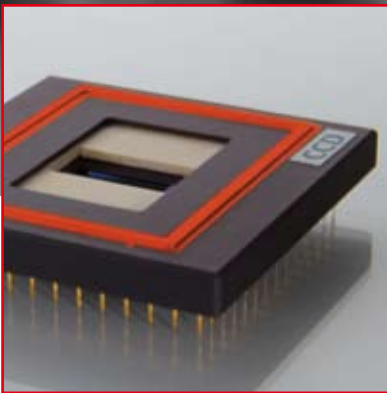
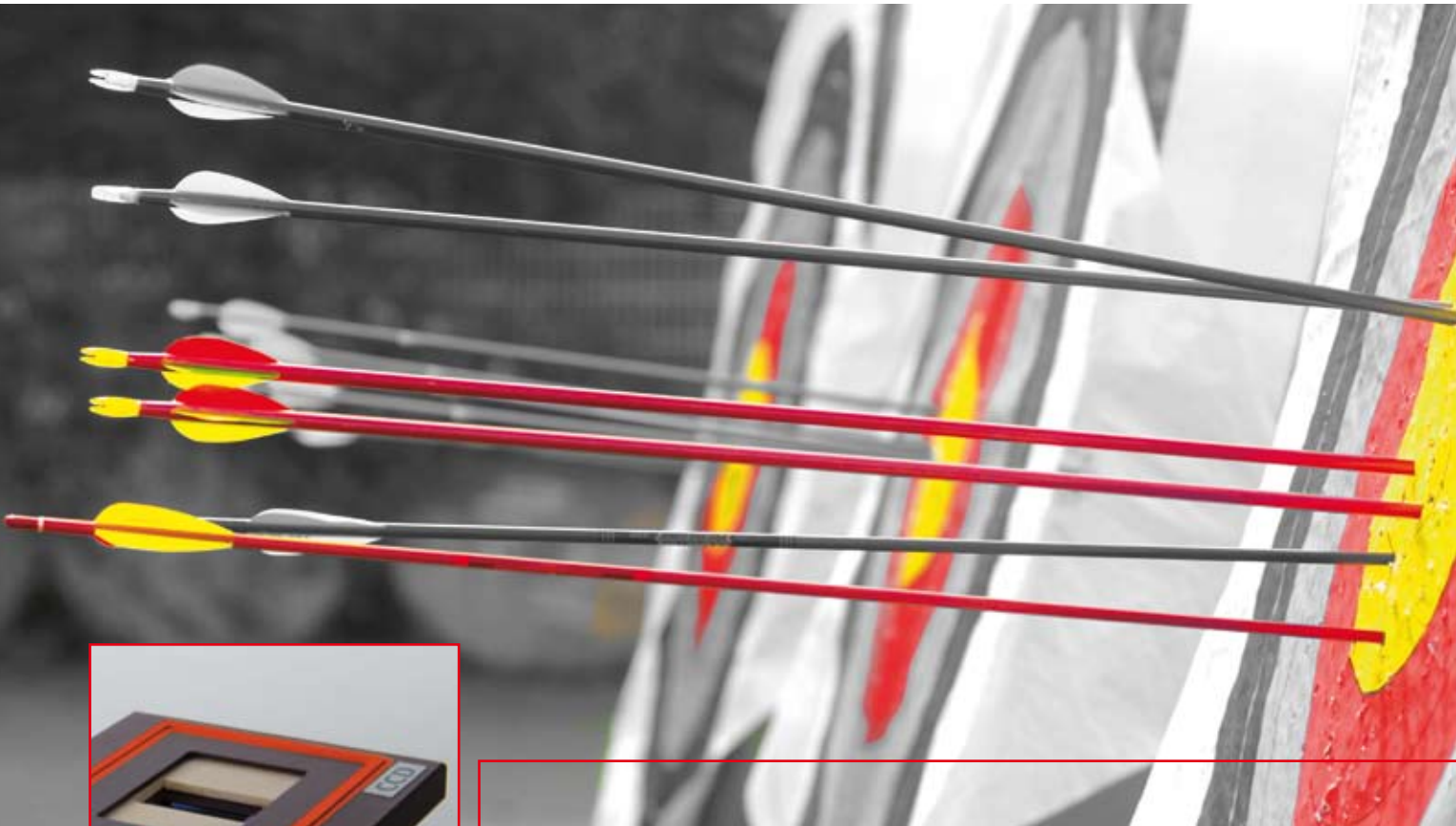
Intelligent Software Functions for the Highest Efficiency

Our software concept, Aspect CS, perfects innovative contrAA® technology and was developed especially for routine laboratory processes. AQA and validation are important parameters here. Accordingly, the sequence used for the multi-element method is optimized automatically for the fastest measurements possible. In addition, the software sorts the elements according to wavelength and flame type so as to avoid a time consuming change of parameters. Optimized cookbook methods facilitate rapid entry into the process and form the basis for simple method development.

For the user in research and development, the scientific mode offers a wealth of optimizing options for utilizing all the specific features and advantages of HR-CS AAS. The possibility exists of specifically defining the reference pixels, the lines or the variation in pixel number. The individual configuration of the three-dimensional spectra makes the ASpect CS a unique platform for precise analysis.



Reliable Data for Successful Laboratory



Precision Landing Accomplished

The objective is attained. Precision landing.
Clear results are in hand.
The interpretation of the data commences and delivers new insights.

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Subject to changes in design and scope of delivery as well as further technical development!