

**contrAA<sup>®</sup>**

Hit the Mark!



High-Resolution Continuum Source AAS

# Intelligent AAS Technology for Tomorrow's Market



The contrAA® series of Analytik Jena exceeds the performance of conventional AA spectrometers in all parameters. The High-Resolution Continuum Source AAS represents a 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, with the contrAA® series a vision has become reality – a new generation in AAS, which finally closes the gap between ICP-OES and AAS.

The series comprises three instruments:

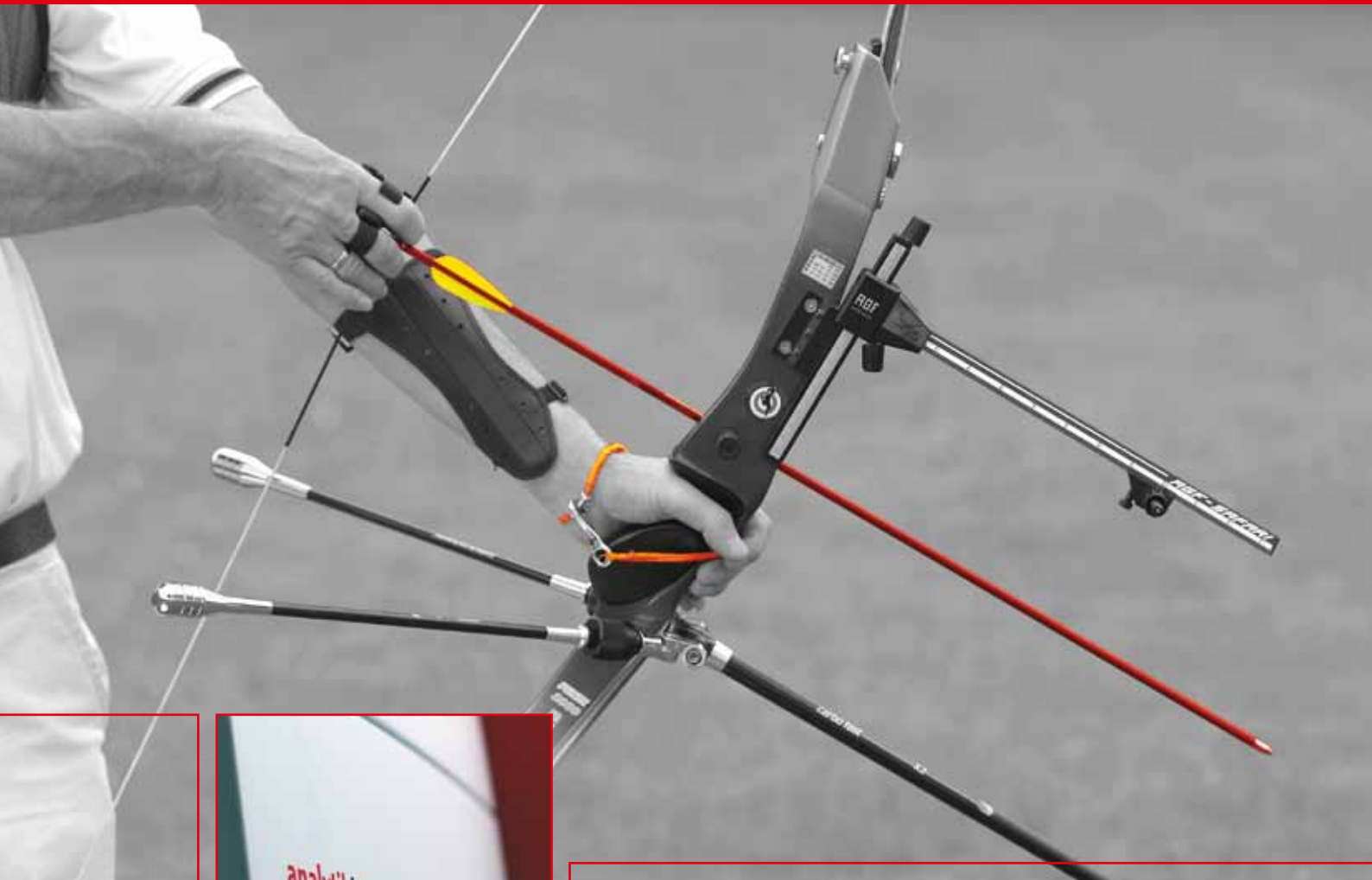
- contrAA® 300 for flame and hydride technology,
- contrAA® 600 for graphite furnace technology,
- contrAA® 700, a compact, versatile system for flame, hydride and graphite furnace technology.

contrAA® 600 and contrAA® 700 are capable of analyzing liquid as well as solid samples in one single instrument.

All systems combine intelligent design with premium functionality and persuasive performance characteristics:

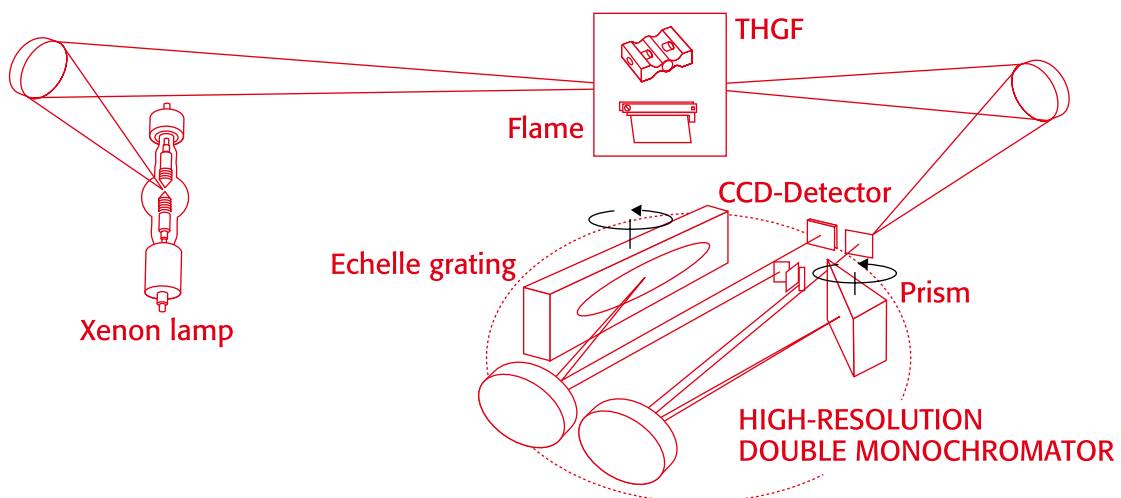
- Just one light source for all elements
- Unique simultaneous background correction
- High sample throughput
- Rapid readiness for measurement
- Easy to operate and robust
- New information content
- Impressive analytical performance





## 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 not required.

## **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. Thus the sequential multielement-routine becomes standard in flame analysis. This provides enormous savings in time and cost of materials.

The evaluation of molecular absorption bands, allowing the analysis of additional elements, is a further innovation.

## **Impressive Design**

Intelligent design 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®.

Moreover the contrAA® 700 offers unique flexibility. Thanks to the tandem principle, it is readily possible to change quickly from flame technology to graphite furnace technology and vice versa, with only one mouse click!





# Simple Method Development for Sequential Multi-Element Analysis

## The Environment of the Analysis Line becomes Visible

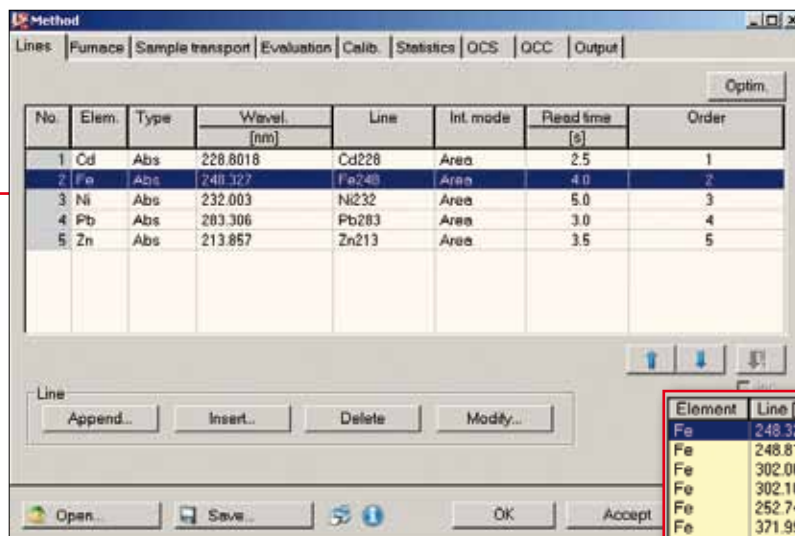
The contrAA®, with its high-resolution echelle spectrometer, makes method development conceivably simple even for complex samples. Aside from the intensity of the analysis line, the spectral environment is also recorded simultaneously. As a result, noise or interference are immediately visible. The need 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.

## Unique Resolution

The excellent high resolution 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 can see all the results of the selected elements of the respective sample immediately.

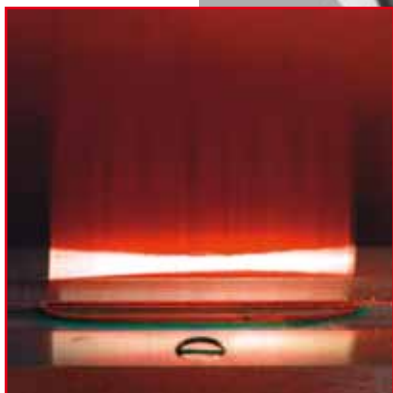


Element	Line (nm)	Type	Rel. sens. (%)
Fe	248.327	P	100
Fe	248.8143	S	67
Fe	302.0639		26
Fe	302.1073		9.1
Fe	252.7435		21
Fe	371.9935		3.8
Fe	373.7133		3.8
Fe	352.604		0.11
Fe	344.0606		3.8
Fe	344.0989		1.9
Fe	305.9086		4
Fe	346.586		0.77
Fe	392.0258		0.4

## 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.





## 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 with online dilution*





# Short Preparation Time for High Sample Throughput

## Greater Efficiency in the Laboratory

We help you to optimize the workday routine in the laboratory. Now the application determines line selection. Standardized sample preparation may now be adequate for different elements and concentration ranges in order to realize the entire measuring process.

You are able to select the line best suited for the element to be analyzed and the concentration range. Different dilutions are therefore avoided. The user obtains reliable and precise measurement results. This saves time and chemicals and also avoids errors.

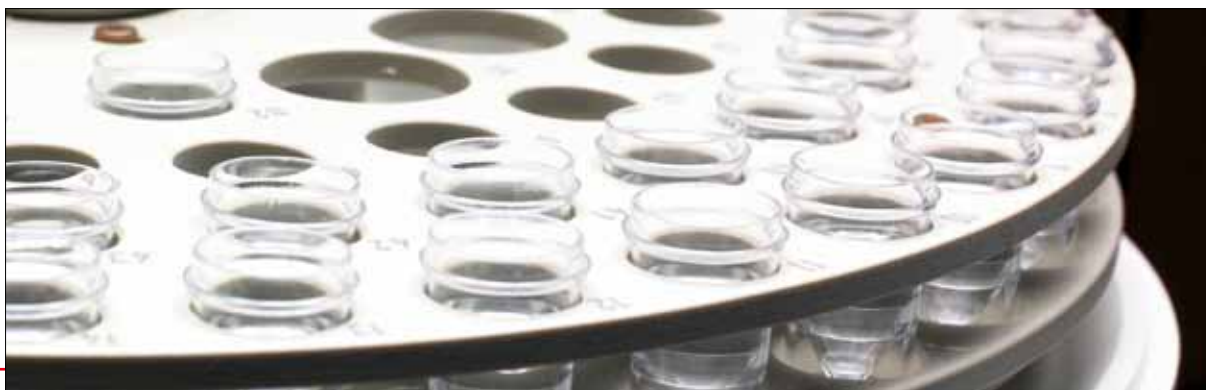
## Optimized Accessories

Besides minimizing sources of error, a clear enhancement in the range of applications forms the focus of our technology. In combination with unique 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. Various hydride systems also offer selective analysis of mercury and the hydride forming elements, depending on the application.

## Automated Sample Preparation

The fully automated dosage, dilution or enrichment of the sample, the addition of modifiers or depth adjustment guarantee an easy and reliable measuring process. 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, enable a continuous workflow even with considerable changes in the concentration of the elements.

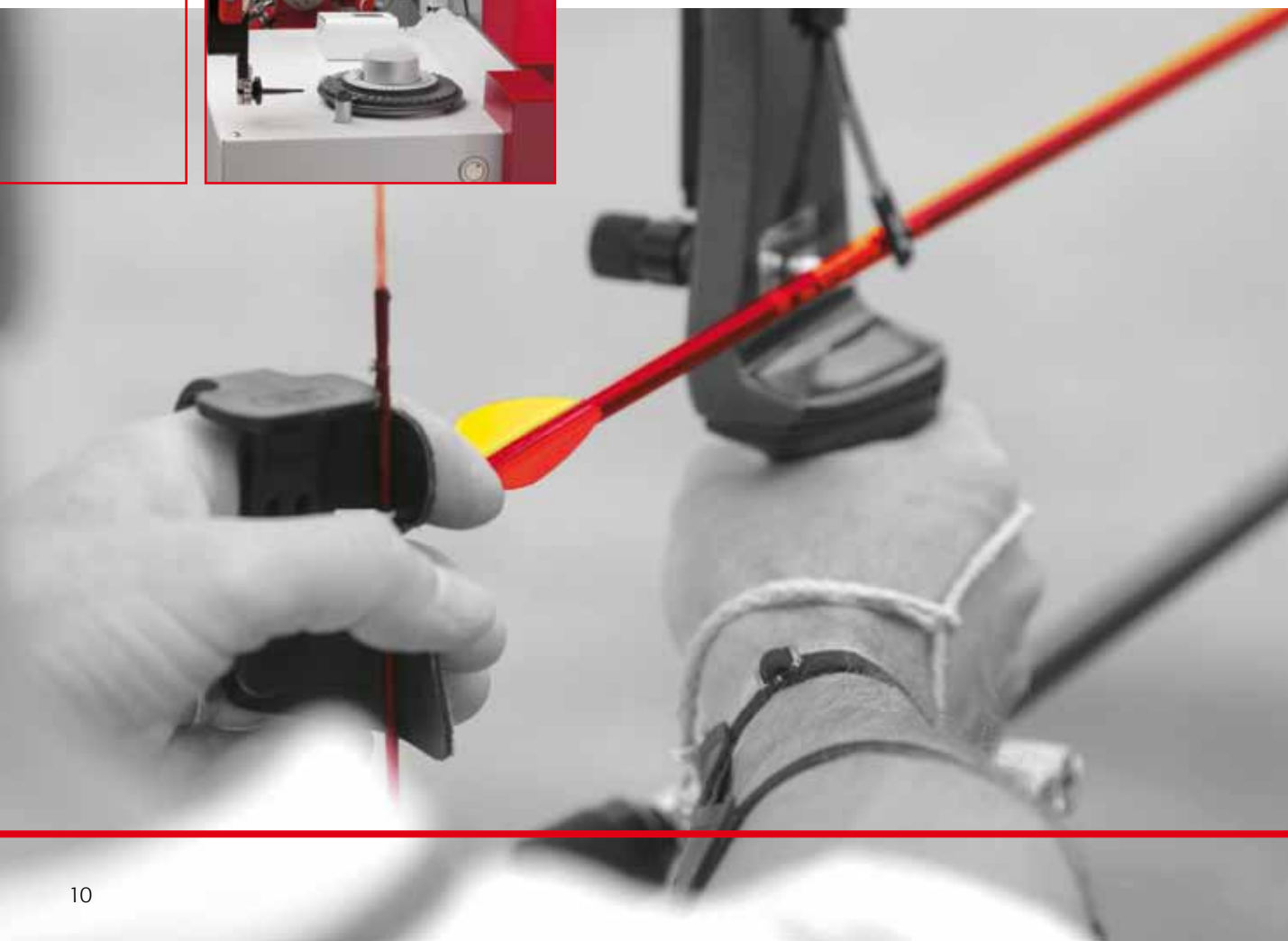


# **The Direct Analysis of Solids as a True Alternative in AAS**



## **Aligning the Parameters**

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

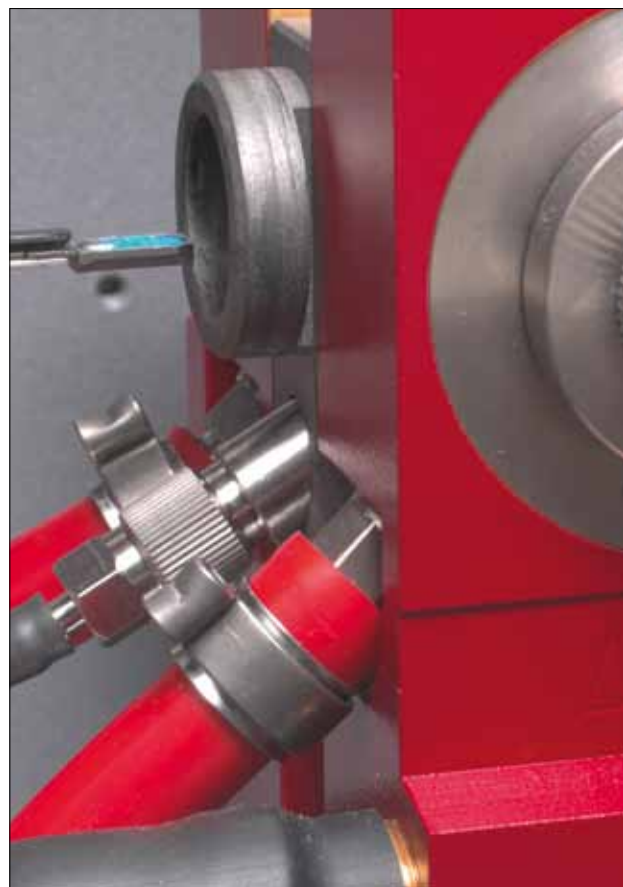


### **Intelligent Innovation pushes back Limits**

With the contrAA® 600 and 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.

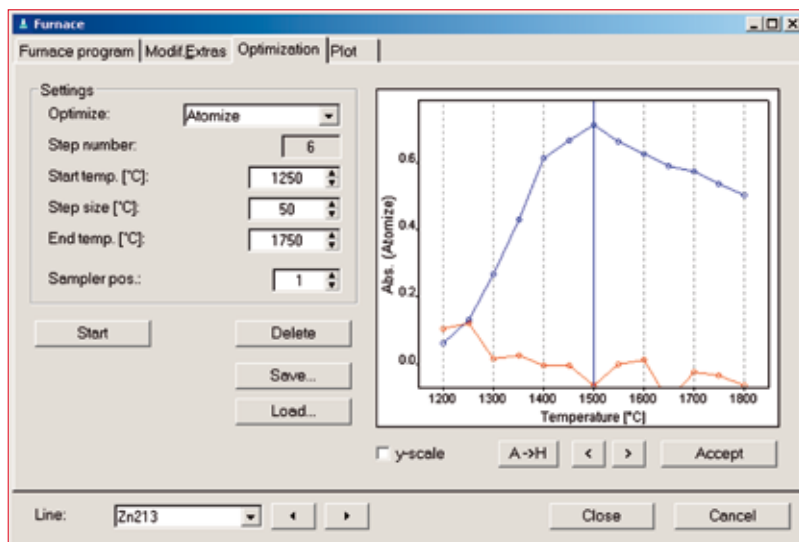


### **Analytical Advantages**

- Analysis of the original samples
- Easy handling
- Immediate results
- No time-consuming sample digestion
- Minimized danger of contamination
- Avoiding hazardous reagents
- High sensitivity
- True microquantity method

# Intelligent Instrument Technology Controls the Automated Measuring Process

*Automatic optimization of the furnace program*



## Transverse Heated Graphite Furnace (THGF) and Optimized Temperature Control

The transverse heated graphite furnace guarantees 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. That ensures optimum sensitivity and guarantees a long service life of the graphite furnace.

## 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. The integrated color camera enables a detailed observation of all processes in the graphite tube starting with the sample introduction up to the drying and pyrolysis. The parameters for the flame stoichiometry and the observation height for the flame technique are automatically optimized iteratively.

## Integrated Cooling

Thanks to the integration of the cooling apparatus for the graphite furnace, no additional module is required. The software monitors and controls the cooling cycle. With this step, the user is independent of existing laboratory conditions.

## Advantages of the Transverse Heated Atomizer

- Homogeneous temperature distribution
- Lower atomizing temperatures
- Linear, rapid heating rates
- Minimized memory effects

Analytik Jena successfully uses the STPF (Stabilized Temperature Platform Furnace) concept and thus ensures highest accuracy and precision.

The STPF concept requires:

- Integrated platform
- Gas stop during the atomization
- Matrix modifier
- Evaluation of the signal area

*Sequences of the integrated color 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.





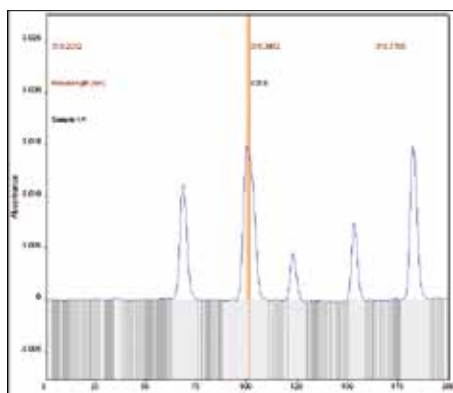
# The Path into the Third Dimension

## The Starting Shot for Interaction

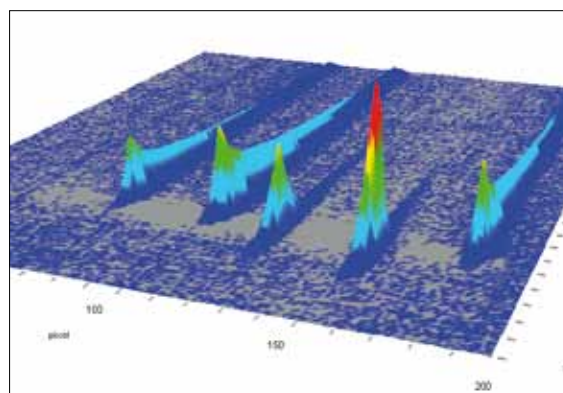
Within a fraction of a second, the interaction of all decisive parameters commences. The different processes proceed simultaneously, oriented towards the objective.



Two-dimensional signal plot  
of the absorbance subject to wavelength

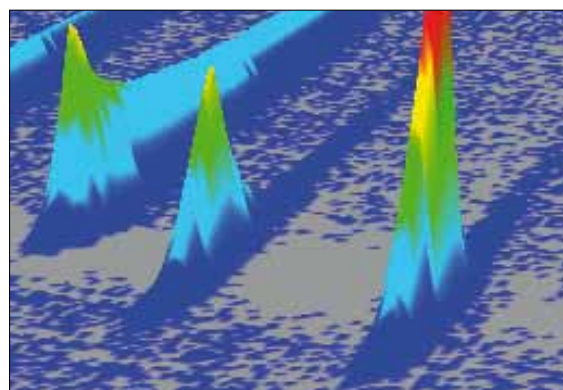


Three-dimensional signal plot of the absorbance subject  
to time and wavelength



### Novel Detector Technology

Our detector technology is based on a CCD chip, which is used for the first time in AAS. The pixels are illuminated and read out simultaneously and act as independent detectors. 200 pixels of the chip are used for the analytical function. All corrections necessary in AAS are performed by reference pixels.



### 3D Spectroscopy for more Information Content

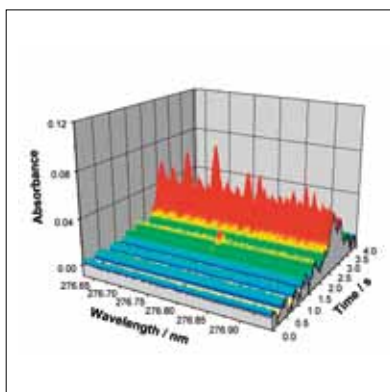
Conventional measurement of absorbance over time is supplemented by a third dimension – wavelength. This three-dimensional spectroscopy offers unimagined possibilities for optimizing parameters, during method development and for identifying and preventing spectral interference. Until now, only the results 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. The entire environment of the analysis line can be observed in high resolution.

### Number of Evaluation Pixels as a New Parameter

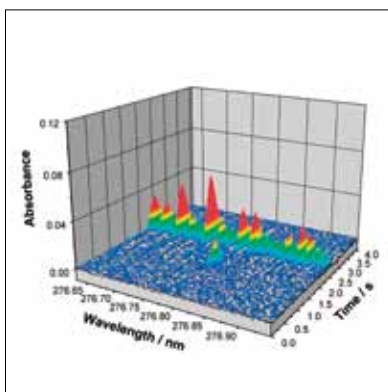
In HR-CS AAS with a CCD detector, the center of the absorption line is focused on the center evaluation pixel. The evaluation width acts as a new variable here and offers optimizing options. With the help of the absorbance, measured at several pixels, the sensitivity, reproducibility and the linear working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

### Patented Wavelength Correction

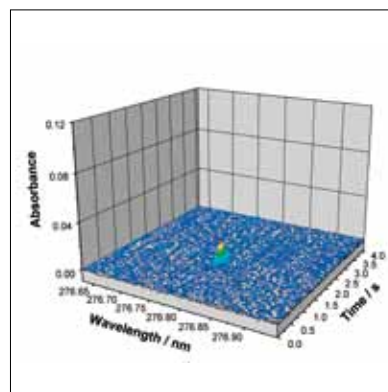
Aside from these corrections, the wavelength stability is also a novel parameter for AAS. The use of an integrated neon correction during wavelength setting offers a unique wavelength stability. Previously, this type of wavelength correction was only available in ICP-OES applications.



*Spectrum of the raw data*



*Spectrum after broadband background correction*



*Spectrum after correction of the structured background*

## 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. In HR-CS AAS fully automatic background routines use the available reference pixels for background correction. That enables realtime simultaneous correction, for the first time.

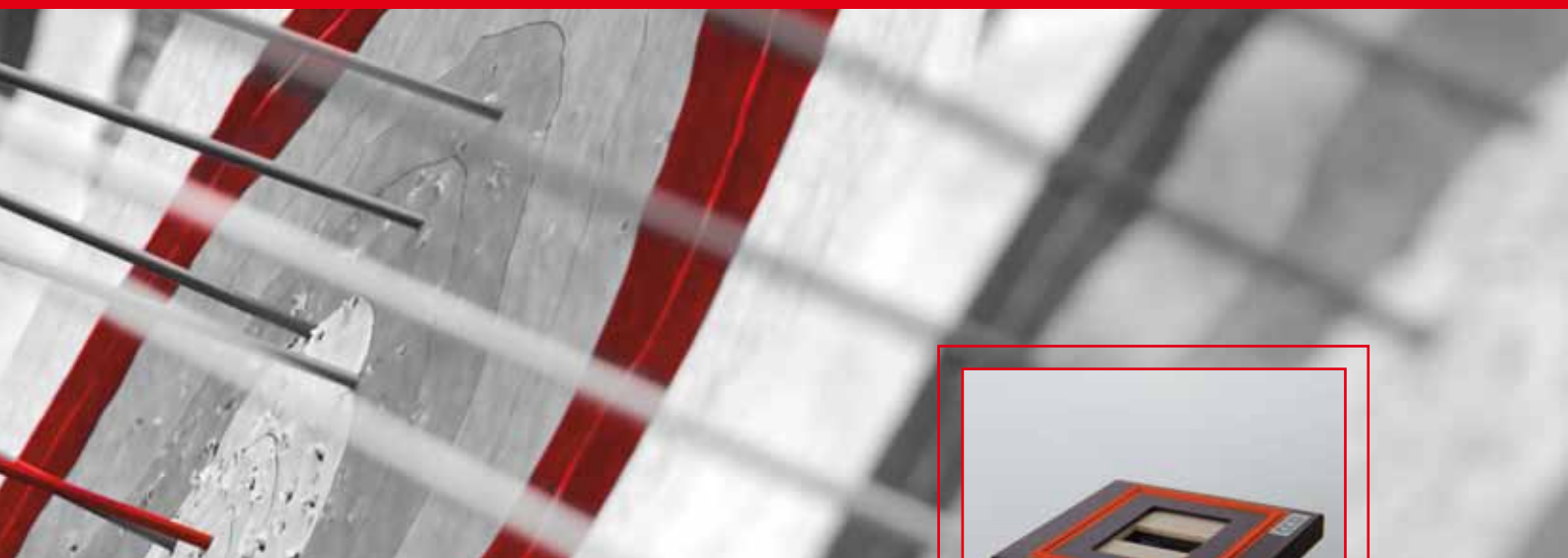
## Advantages of simultaneous background correction

- Expanded dynamic linear range
- Best detection limits
- Elimination of artifacts
- Correction of direct line overlapping
- Unambiguous measurement results

## Automatic Background Separation

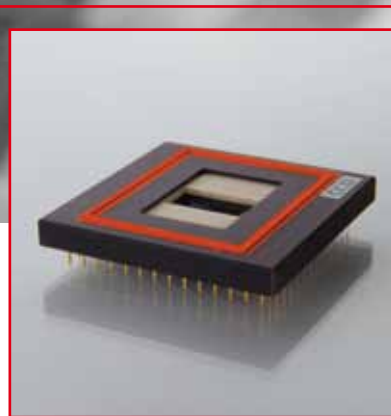
The contrAA® is the first AAS capable of separating broadband and spectral background effects. The former are corrected automatically over the reference pixels. The latter are rendered visible and can be evaluated. In most cases of spectral interferences, however, the outstanding resolution is sufficient, so that the analysis line can be used for the evaluation without modification.

The unmatched background correction of contrAA® offers the user the best 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 Results**



## Convenient Data Storage

The storage of true raw data is a decisive advantage of contrAA®. 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 the decision as to which and how many pixels are to be used for the evaluation can be made after the measurement.

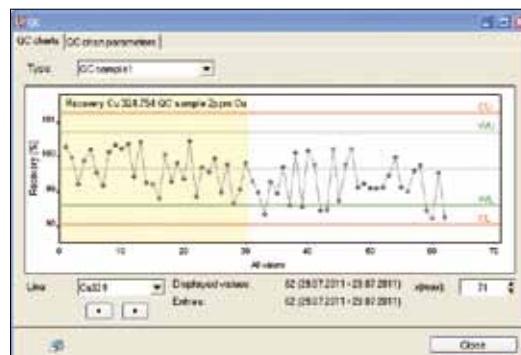
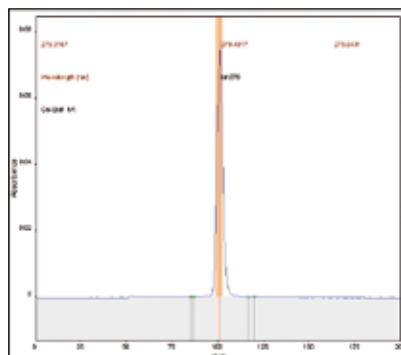
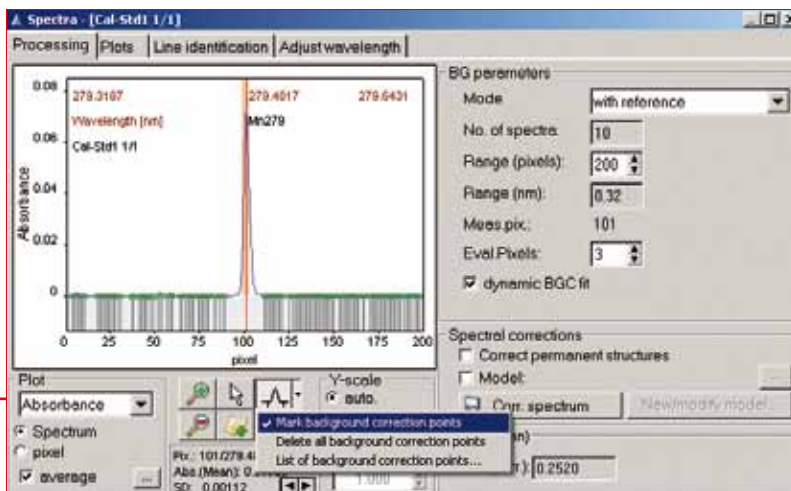
## Efficiency through the Expandable Measuring Range

The expandability of the measuring range is an innovation for AAS. If several lines of an element with different sensitivities 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.

## Aspect CS – Software that Inspires

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. The method library facilitates rapid entry into the process and forms the basis for simple method development. For the user in research and development, the software 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 Work



## Precision Landing Accomplished

The objective is attained. Precision landing.

Clear results are in hand.

The interpretation of the data commences and delivers new insights.

- **Analytik Jena Austria**  
info@analytik-jena.at
- **Analytik Jena China**  
info@analytik-jena.com.cn
- **Analytik Jena Far East**  
ajfareast@analytik-jena.co.th
- **Analytik Jena India**  
info@ajindia.com
- **Analytik Jena Japan Co., Ltd.**  
info@analytik-jena.co.jp

- **Analytik Jena Korea Co. Ltd.**  
jskim@analytik-jena.co.kr
- **Analytik Jena Middle East**  
ajmena@analytik-jena.ae
- **Analytik Jena Romania srl**  
office@analytikjenaromania.ro
- **Analytik Jena Russia**  
info@analytik-jena.ru
- **Analytik Jena Thailand Ltd.**  
sales@analytik-jena.co.th

- **Analytik Jena Taiwan Co. Ltd.**  
sales@analytik-jena.com.tw
- **Analytik Jena UK**  
sales@aj-uk.co.uk
- **Analytik Jena Vietnam Co., Ltd.**  
ajvietnam@viettel.vn

For a complete listing of our global offices and partners, visit our website: [www.analytik-jena.com](http://www.analytik-jena.com)

**Analytik Jena AG**  
Konrad-Zuse-Str. 1  
07745 Jena/Germany

Phone +49 (0) 36 41 77-70  
Fax +49 (0) 36 41 77-92 79

info@analytik-jena.com  
[www.analytik-jena.com](http://www.analytik-jena.com)



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