FISCHERSCOPE X-RAY Product Line

X-Ray Fluorescence Spectrometers for
Coating Thickness Measurement and Material Analysis


Ni
Cu
Zn
8,05
8,64
1,01
9,25
8,90
9,57
1,03
10,26
106,4
47
107,9
48
112,4
49
114,8
Palladium
Silver
Cadmium
Indium
Pd
Ag
Cd
In
2,84
22,16
2,98
23,17
24,21
2,99
24,94
3,15
3,33
78
195,1
79
Platinum
Pt
START
STOP
1953
1981

Knowledge, Competency, Experience that you can rely on

Based on this principle, FISCHER has developed innovative measuring technology for coating thickness measurement, material analysis, micro-hardness measurement and material testing since 1953. Today, measuring technology from FISCHER is employed around the world, where accuracy, precision and quality is required.

The development of powerful X-ray fluorescence spectrometers began back in 1981, when this technology was still largely unknown in the manufacturing industry. Very early, Fischer recognized the tremendous potential of this method for coating thickness measurement and material analysis and started to develop and manufacture industrial-strength measuring instruments.
The brand name FISCHERSCOPE® X-RAY was born.

With innovative solutions and numerous patents, FISCHER has shaped this technology with its reliable products to what it is today – an extremely powerful and sophisticated method for coating and material analysis. Today, after more than 10,000 X-ray spectrometers sold, the name FISCHERSCOPE® X-RAY has become synonymous with advanced X-ray fluorescence spectrometers.

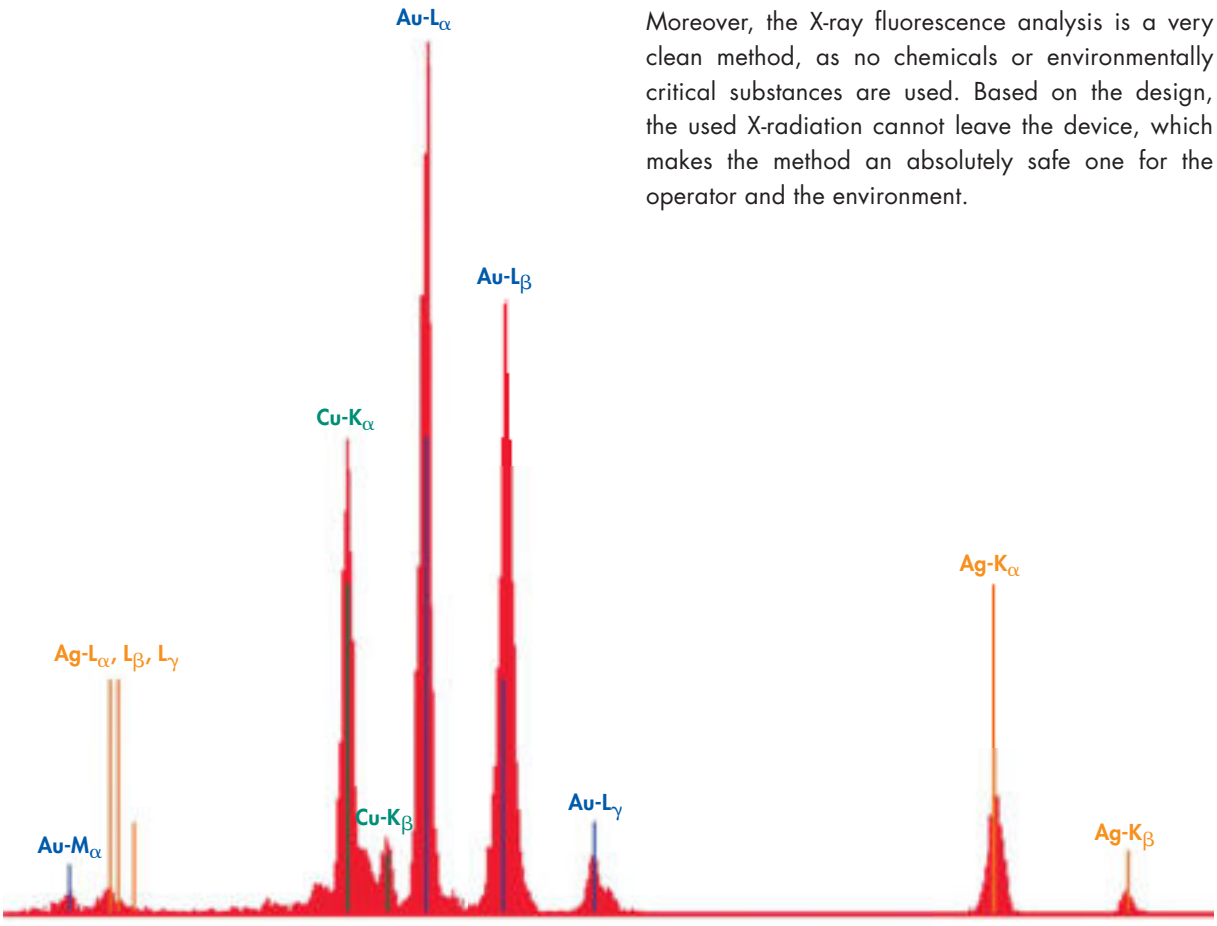
Industry, research and science worldwide rely on the reliability and accuracy of the equipment. FISCHER rises to this challenge with consequent development, modern equipment and innovative software. Only what has been designed carefully and built perfectly can ultimately function optimally.
And only then does it deserve the name FISCHER. You can rely on that.

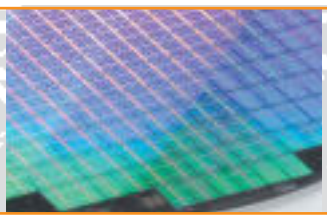
X-Ray Fluorescence

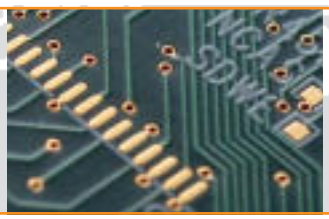
Energy Dispersive X-Ray Fluorescence Spectroscopy (EDXRF) is a measuring method for coating thickness measurement and material analysis. It is often used for the qualitative and quantitative determination of the elemental composition of a material sample and for measuring coatings and coating systems. In industrial environments, this process is now established and can be utilized optimally using modern equipment.

The EDXRF is a very universal method that offers some outstanding advantages. For example, it is a non-destructive method that can analyze even sensitive materials without adverse effects. Measurements can be made quickly and usually without extensive sample preparation. The method is particularly suited for the analysis of unknown materials and compositions as well as for the measurement of coating thicknesses and systems. In addition, the method is able to detect traces of harmful substances in materials and finished products.

Moreover, the X-ray fluorescence analysis is a very clean method, as no chemicals or environmentally critical substances are used. Based on the design, the used X-radiation cannot leave the device, which makes the method an absolutely safe one for the operator and the environment.

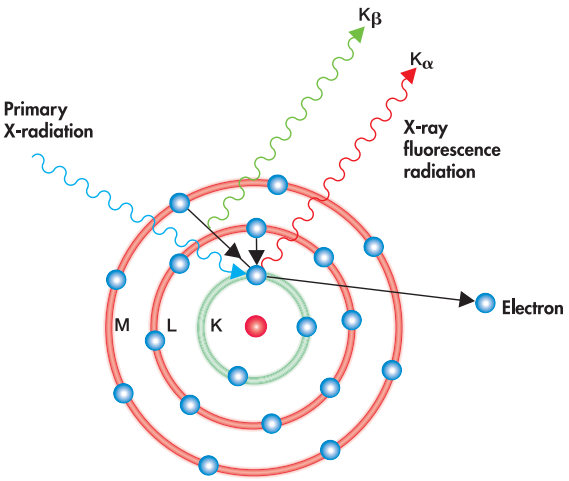






The Principle

X-ray fluorescence analysis is based on the fact that the atoms in a material sample are excited by the primary X-radiation. This removes electrons close to the core from the inner shells of the atom.



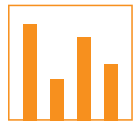
The resultant vacancies are filled by electrons from the outer shells. In the process, a fluorescence radiation is generated that is characteristic for each element. This fluorescence radiation is detected by the detector and provides information on the elemental composition of the sample.

Applications

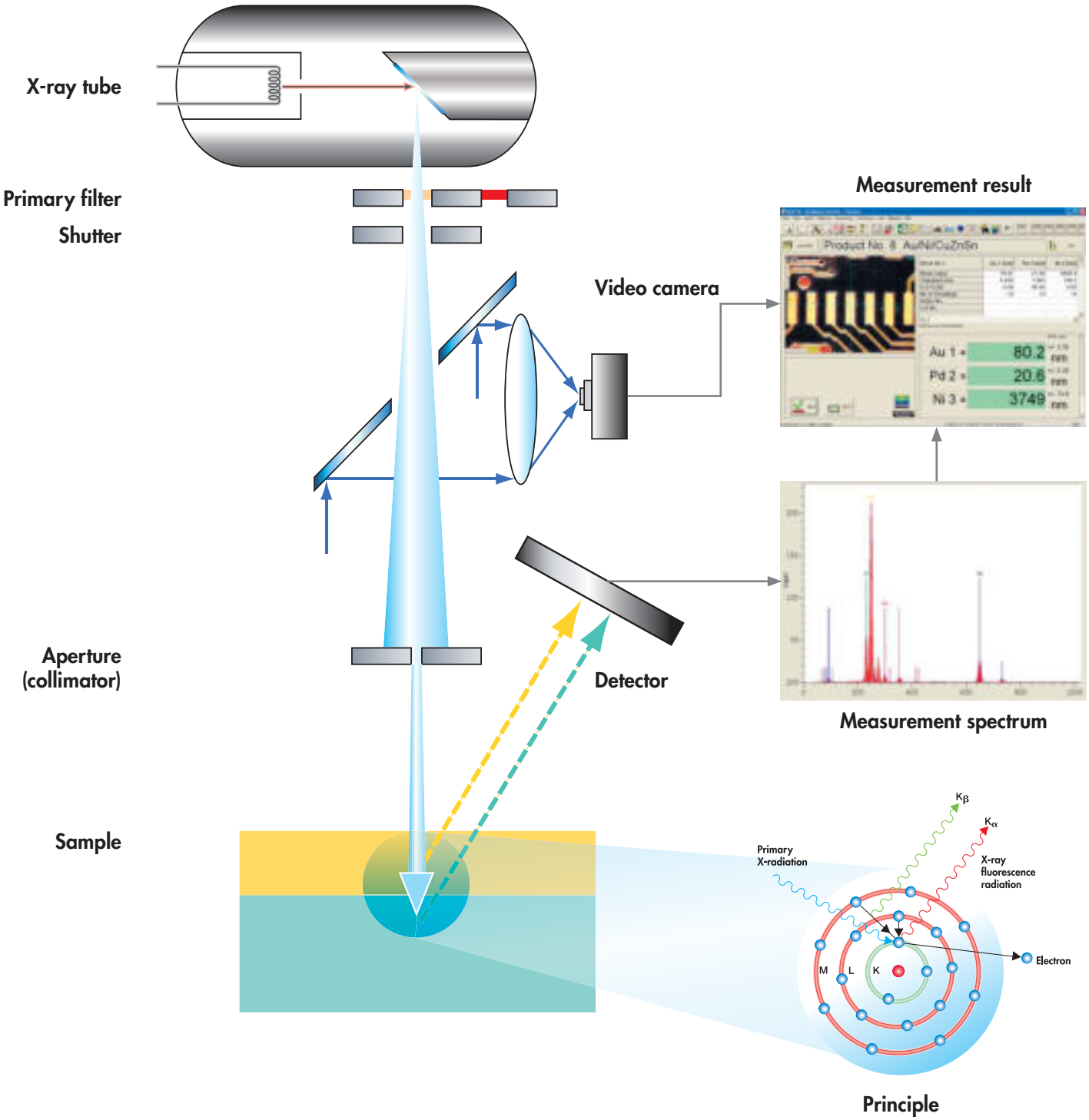
Because the energy dispersive X-ray fluorescence spectroscopy is capable of analyzing materials and measuring thin coatings and coating systems, there are a variety of applications for this technology. For example, in the electronics and semiconductor industries very thin gold coatings must be determined on contacts, printed circuits or bond wires. In the watch and jewelry industry and in refineries precise knowledge about the composition of alloys is required. When inspecting photoactive layers in the photovoltaic industry or in quality control and incoming goods inspections exact compliance with material specifications is important. In the electroplating industry when measuring the coating of mass-produced parts. Or for trace analysis according to RoHS, e.g., in everyday objects and toys. FISCHERSCOPE X-RAY Spectrometers are optimally suited for these tasks.

Advantages of the EDXRF method

- Fast and non-destructive coating thickness measurements
- Analysis of solids, powders and liquids
- Trace analysis of harmful substances according to RoHS
- No adverse effects on sensitive materials
- High precision and trueness
- Very broad range of applications
- Little to no sample preparation
- Safe method without environmentally hazardous chemicals
- Inexpensive because no consumables
- Standard-free and calibrated analyses
- Determination of sample homogeneity
- Microanalysis of complex structures



FISCHERSCOPE® X-RAY Spectrometer



It takes inventive ingenuity and continuous development to turn the scientific measurement principle of X-ray fluorescence into robust and high-precision measuring instruments that work reliably in both laboratory and everyday industrial applications. At FISCHER, we have committed ourselves to this task with passion. This is reflected in the broad and varied FISCHERSCOPE X-RAY selection of instruments.

For example, spectrometers that measure bottom to top are ideal for measuring mass-produced parts quickly and easily.

On the other hand, if a specimen such as silicon wafers should not come in contact with the measuring stage, then the correct choice is an instrument that measures from top to bottom.

For automated measurements on wafer-thin bond wires or individual pins of lead frames, an instrument with an extremely small measurement spot and a precise programmable XY-stage is needed.

And for the rigorous demands of in-line measurements in a running production line, an entirely different configuration is necessary.

To meet all these requirements, the building blocks described here in principle are being used in different combinations. Perfectly matched to each other, this provides the optimal FISCHERSCOPE X-RAY spectrometer for the respective purpose.

X-ray source

The X-radiation required for the X-ray fluorescence analysis is generated using a special X-ray tube. In this X-ray tube, a heated, glowing filament emits electrons, which are accelerated to a very high speed by an applied high voltage field.

The primary X-radiation is created when these electrons strike the target material of the tube – typically tungsten or molybdenum. In order for this radiation to be generated in a consistent and reliable manner, the X-ray tube of the FISCHER X-ray fluorescence spectrometers is cooled and kept thermally stable.

Primary filter

Special filters are employed to optimize the energy distribution of the primary X-radiation. These filters suppress undesired portions of the radiation and thus permit for an optimization of the sample excitation. Depending on the instrument type, individual filters, or fixed or removable multi-filters are used.

COATING THICKNESS

MATERIAL ANALYSIS

FISCHERSCOPE® X-RAY Spectrometer

Shutter
The shutter is located in the beam path and is open for the duration of the measurement. It is monitored by the safety system and can be opened only when the housing is closed such that there is no risk for the operator.

Video camera
FISCHERSCOPE X-RAY spectrometers are equipped with high-magnification camera systems to determine the exact measurement location. This allows for precise positioning to take place on very small parts. To achieve this without parallax, the camera looks through a complex optical system along the primary X-ray beam exactly perpendicular to the sample. Only then can one measure correctly what is seen.

Aperture
Using the aperture (collimator), the cross-section of the primary X-ray beam is restricted, thus creating a measurement spot with a defined size. In this manner, size and shape of the X-ray beam can be adjusted precisely for the respective measuring application using different apertures. Depending on the spectrometer, individual apertures or exchangeable multi-apertures are used.

For measurements on very small objects such as bond wires, special X-ray optics with mirrors or polycapillaries replace the aperture. They allow for a very small measurement spot and at the same time for proper excitation intensity.

Detector
The X-ray detector measures the energy distribution of the X-ray fluorescence radiation that is radiated back by the sample. Detector types that are optimal for the respective purpose are available for different applications.

- *Proportional counter tube*
  Typically used for routine measurements of known coating systems and alloys.
- *Silicon PIN detector (PIN)*
  Ideal for the analysis of unknown samples, e.g., in the analysis of gold or in the incoming inspection.
- *Silicon drift detector (SDD)*
  Ideal when a highly selective analysis of light elements is required, e.g., in the analysis of unknown samples and in trace analysis.

Spectrum
With its lines, the measured spectrum shows the characteristic element distribution of a sample. From this spectrum, the FISCHER WinFTM Software computes the desired parameters such as coating thickness or element concentration.

Software WinFTM®
The entire operation, the evaluation of the measurement, as well as the clear presentation of the individual measured values is done using a PC with the innovative and user-friendly Software WinFTM. All FISCHERSCOPE X-RAY spectrometers operate with this software.

Sample support and stages
Depending on whether simply a sample shall be placed and measured quickly or complex components shall be measured automatically, based on the application, FISCHERSCOPE X-RAY spectrometers are equipped with a simple, plane probe support, a manually operable XY-stage or a high-precision, programmable XY-stage.

Positioning aids
Simple and fast sample positioning saves time and money. For this reason, all units with an XY-stage feature a laser pointer as a positioning aid, which simplifies the quick localization of the measurement location. Stops, rulers and sample supports additionally facilitate the placement of specimens.

Housing
The respective instruments for measuring large, flat components, e.g., printed circuit boards, feature a slot on the side such that these parts can be measured with the hood closed.

Calibration standards
High-quality calibration standards are the basis for accurate measurements. For this reason, FISCHER operates its own calibration lab and creates its own, traceable calibration standards to the highest quality standards.

As the first institution in Germany, FISCHER has been admitted and accredited as a DKD Calibration Laboratory for the measurand "mass per unit area" according to DIN EN ISO/IEC 17025.

This accreditation entitles FISCHER to issue Calibration Certificates in the name of the German Accreditation Service (DKD/DAkkS) for mass per unit area calibration standards that are used for calibrating X-ray fluorescence instruments for coating thickness measurements.

Safety
FISCHERSCOPE X-RAY X-ray fluorescence spectrometers are designed such that neither operators nor the environment are at risk. The design ensures that the X-radiation is restricted to certain areas inside the instrument. Solid materials and metal housings make sure that no harmful radiation can escape to the outside. Extensive security features ensure that any X-radiation is stopped immediately when the device is opened.

All FISCHERSCOPE X-RAY instruments are developed according to the most recent standards and are tested in accordance with the German X-ray ordinance.

COATING THICKNESS

MATERIAL ANALYSIS

WinFTM® Software

Every X-ray fluorescence spectrometer requires powerful software to become a true measuring instrument. Thus, the power of the FISCHERSCOPE X-RAY can only truly unfold and provide optimal analysis results with the innovative WinFTM Software.

For this reason, the WinFTM Software is the mathematical heart of all FISCHERSCOPE X-RAY spectrometers. Because of it, the information regarding material composition, coating thickness and coating structure is obtained from the X-ray spectrum. FISCHER leads in this regard and implements in WinFTM innovative algorithms and methods that make this software unique.

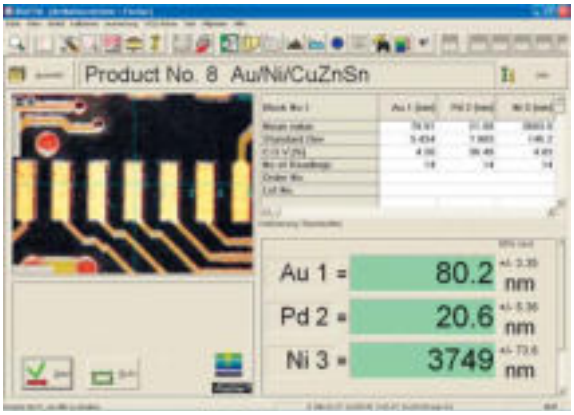
But WinFTM is more. It is also the command center for user-friendly operation of the FISCHERSCOPE X-RAY spectrometer as well as its optimal utilization. This is utilized not only in the laboratory but also in daily industrial work.

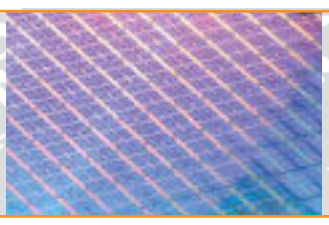
User-friendly

Easy and intuitive operation of a complex instrument is the key to optimal results. For this reason, FISCHER designed the WinFTM Software such that one can start without extensive training. It is based on the well-known Windows™ standard. Graphic controls and a context-sensitive guidance make work easy. All functions are easily accessible and displayed only if they are actually needed. This ensures that the screen is always clear and reduced to the essentials.

Multi-functional

From applications in the electroplating industry, such as zinc on iron, to bath analyses and sophisticated trace analyses according to RoHS, one software is sufficient for all measuring applications: WinFTM.





WinFTM employs the fundamental parameter method in a more advanced form in order to determine the material composition and coating thickness with one single measurement. Thus, up to 24 properties – for example coating thickness, concentration, elements – can be determined simultaneously with one measurement. Even complex coating systems as well as solid and liquid samples can be analyzed either calibrated or standard-free.

Adaptable
Whether in the incoming inspection, in quality control in manufacturing, or in the material testing laboratory in governmental institutions, the requirements for the operation of the WinFTM are as diverse as the range of uses of the instruments.

For this reason, the WinFTM interface can be adapted to these diverse needs. From complete access to all functions to the functionality reduced to a minimum for pass/fail tests.

Calibrating
Quality standards require that the measuring equipment can be calibrated based on calibration standards that are traceable to international or national calibration standards. Thus, each measurement application of the FISCHERSCOPE X-RAY spectrometers can be calibrated. The WinFTM Software stores and manages all calibration data. In this manner, each calibration can be documented and proven conveniently.

Error calculation / Calculation of uncertainty
The WinFTM Software provides a complete error computation. The entire measurement uncertainty of a reading can be computed by considering the uncertainty of the standards, of the calibration procedure and of the measurement itself. True traceability of a reading is possible by taking into account this measurement uncertainty.

Easy sample placement
To make reliable measurements on even the smallest locations, WinFTM shows the measurement location on the sample greatly magnified in a separate video window. A superimposed scaled crosshairs that adapts automatically to the respective image magnification shows the real size and position of the measurement spot on the surface of the sample.

The special autofocus function allows for easy accurate and reproducible optical focusing. A laser pointer acts as a positioning aid to quickly define the measurement location.

DCM – Distance Controlled Method
To measure on geometrically irregular parts or in indentations, FISCHERSCOPE X-RAY spectrometers are equipped with a special feature for a distance-based measurement correction, the DCM Method. This feature also allows for automated testing of complex surface shapes and for measurements in indentations. With this method, WinFTM automatically takes the measuring distance into account when computing the coating thickness value in a certain area.

COATING THICKNESS

MATERIAL ANALYSIS

WinFTM® Software

Automated Measurements
Recurring measuring applications can be automated easily. This greatly simplifies even very complex measurement sequences. For example, when using instruments with a programmable XY-measuring stage, numerous measurement spots can be defined on one sample and can be measured in an automated fashion. Also complex test plans with instructions for the operator, e.g., for quality control in manufacturing, can be created quickly using WinFTM.

Moreover, the WinFTM Software can recognize regular structures via image processing and can track deviations in automated measurements. For specimens with shape tolerances, this can ensure that measurements are always made at the correct location.

Substrate Material Recognition
In certain applications, WinFTM can analyze the substrate material automatically. This eliminates the need for normalization when making measurements on different materials. In addition, the reliability of the measurement results is increased because the coating thickness is measured correctly even with fluctuating compositions of the substrate material.

Classes of Materials (COM)
Using the COM function, unknown samples can be assigned automatically to a material class. These classes can characterize different types of materials, e.g., different metals – or can distinguish the same materials using certain coating thickness or concentration ranges – e.g., gold alloys of high, medium or low gold content. Unique to WinFTM is that the materials spectra necessary for defining the classes are computed theoretically. This eliminates the time-consuming calibration using many material samples, and the system can be adapted or expanded to the specific needs of the customer.

If samples of unknown or different material compositions and coating thicknesses are to be measured, WinFTM can automatically select the appropriate application and use it for the measurement.

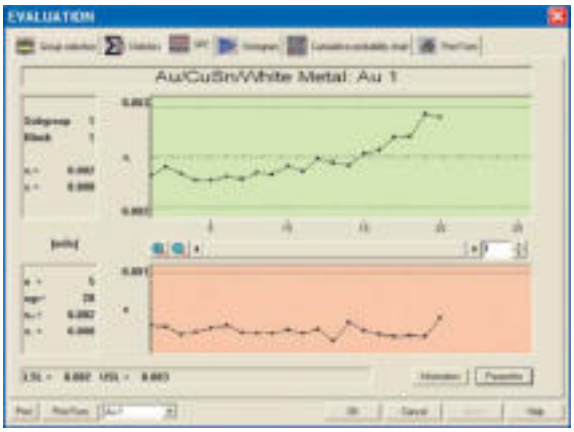
Example gold analysis: First, WinFTM determines the alloy and then selects the appropriate measuring application in order to determine the gold content with high precision.

Multiple Excitation
The excitation parameters high voltage and primary filters are selected for each application such that the best possible results can be achieved. For some applications, it may be necessary to work with different excitations to measure all the parameters optimally. In the WinFTM Software, it is possible to use several excitations for one product. In this manner, the user can measure all parameters under the best conditions and receive the results presented in one combined evaluation.

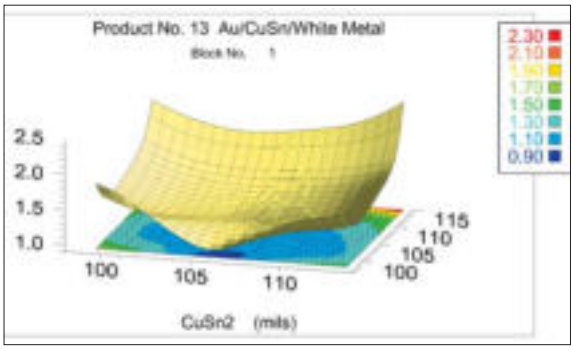
Reliable
Nothing is worse than to measure incorrectly unwittingly. For this reason, the WinFTM Software can check if the selected measuring application matches the sample being measured and can warn the operator in case of deviations. Automatically running long-term tests monitor the instrument and ensure a long-term stability.

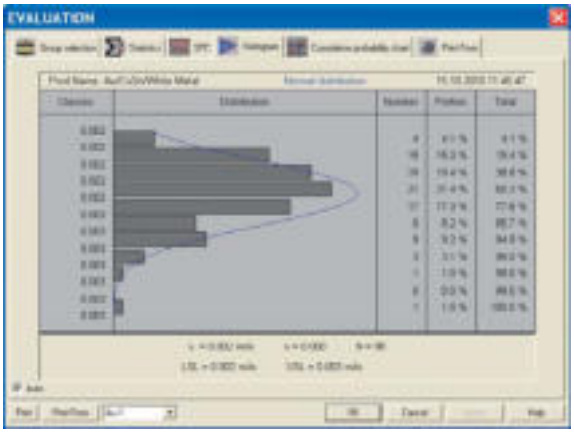
Statistics Functions

Integrated statistics functions of WinFTM compute from the measurement results the mean value, the standard deviation and the coefficient of variation and display these values immediately following the measurement. The measurement results can be displayed individually, in a list or as an SPC chart and can be documented.



Furthermore, at the push of a button WinFTM computes histograms, probability charts, statistical process control charts (SPC), cp and cpk values as well as the measurement uncertainty with random and systematic portions. Measurement results and the statistical characteristics computed from them can be exported and evaluated by using quality management systems.





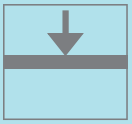
Documenting Measurement Results

The integrated report generator allows for the generation of individual result reports and the creation of custom templates. For example, the contents of the protocol can be specified freely: A photo of the sample with measurement spots, the measurement results, characteristic statistical values, histogram, probability chart, etc.

WinFTM Features

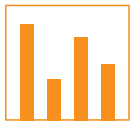
- Universal Software
- Coating thickness measurement and analysis
- One package with all functions
- User-friendly intuitive operation
- Designable user interface
- Fundamental Parameter Method
- Class of Materials Method
- Automated Measurements
- Multiple Excitation
- Video image with zoom and crosshairs
- Automatic material recognition
- Substrate material recognition
- DCM – Distance Controlled Method
- Statistics functions
- Report generator
- Documentation of calibration and settings

X-RAY Instruments at One Glance

	Product Family	Best for			Appli
		Coatings	Universal	Analysis	Best
 BOTTOM-UP MEASUREMENT	XAN Gold				Jewellery Gold Alloys
	XAN				Analytics
	XUL				Electroplating
	XULM				PCB Small structures Connectors
 TOP DOWN MEASUREMENT	XDL				Electroplating
	XDLM				PCB Small structures Connectors
	XDAL				Analytics High Reliability
	XDV-SDD				RoHS Traces-analytics Thin Coatings
	XDV-μ				Coatings Tiny Parts Wafers
	XUV Vacuum				Light elements analytics
 PROCESS	Process 4000				Strip electroplating
	Process 5000				PV industry CIGS, CIS

cation	X-Ray Technology				Handling
Also	Tube	Detector	Filters	Aperture	Probe placing
	Standard	PC PIN	None	1	Place and shot
Coatings	Micro	PIN SDD	3/6	4	Place and shot
	Standard	PC	None	1	Place and shot
Electroplating	Micro	PC	3	4	Place and shot
	Standard	PC	None	1	XYZ
Electroplating	Micro	PC	3	4	XYZ
Coatings	Micro	PIN	3	4	XYZ
PCB	Micro	SDD	6	4	XYZ
	Micro	PC PIN	1/4	Polycapillaries or Mirror optics	XYZ
Traces-analytics	Micro	SDD	6	4	XYZ
Bulk parts Contacts	Standard or Micro	PC PIN SDD	Customized	Customized	Process
Strip electroplating	Standard or Micro	PC PIN SDD	Customized	Customized	Process

COATING THICKNESS



MATERIAL ANALYSIS

FISCHERSCOPE® X-RAY XAN®

BOTTOM-UP MEASUREMENT

The spectrometers of the FISCHERSCOPE X-RAY XAN family are universal X-ray fluorescence spectrometers for material analysis and coating thickness measurements. In their various configurations, they cover a wide range of applications. Focus of the applications is a fast and precise material analysis with user-friendly handling such as the analysis of precious metal and gold alloys. The instruments also have their place in the analysis of thin coatings in the electronics and printed-circuit-board industries. With modern detectors and fast digital signal processing, they deliver optimum analysis results with short measuring times.

With these instruments, the X-ray source and the detector are located underneath the measurement chamber. This allows for fast and easy positioning of the specimens. A high-resolution video camera simplifies this further by displaying the measurement location with high magnification and the measurement spot shown on the screen.

The XAN spectrometers are ideal for fast, repetitive measurements due to easy accessibility and simple sample placement. The wide-opening hood facilitates fast positioning and large controls simplify handling, which is especially helpful and saves time and money when measuring many parts.

In addition to the instruments of the XAN family, which are designed for the analysis of the most diverse, even unknown samples, this line also includes special versions oriented on the requirements of the jewelry industry and the gold trade. Their hardware and software are designed for the requirements of these industries and they offer a practically unbeatable price-performance ratio.

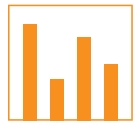
Features

- Universal spectrometer for material analysis and coating thickness measurement
- State-of-the-art detectors PC/PIN/SDD
- Digital signal processing
- Fast, simple operation and measurement
- For flat and easy to place parts
- Easy-access measurement chamber
- Compact design, large controls
- Operator support through video image
- Special versions for gold and jewelry and precious metals

Typical fields of application

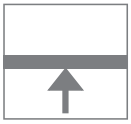
- Analysis of unknown materials
- Gold and precious metal analysis
- Jewelry and watch industries
- Measurement of thin coatings on printed-circuit-boards and in the electronics industry
- Quality assurance and production monitoring
- Trace analysis RoHS

COATING THICKNESS



MATERIAL ANALYSIS

FISCHERSCOPE® X-RAY XUL®/XULM®

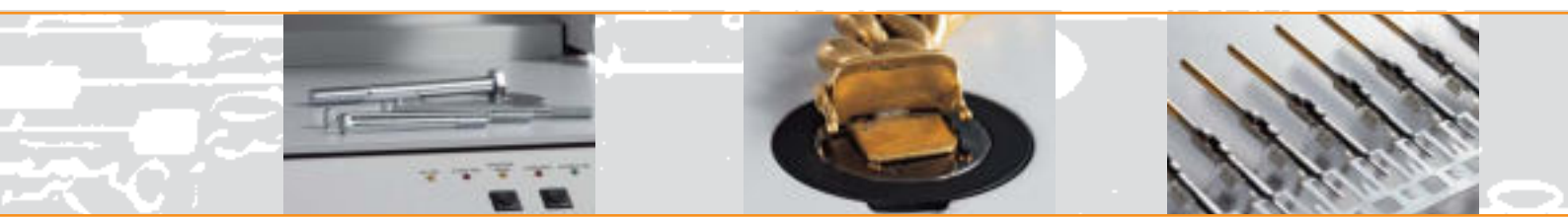


BOTTOM-UP MEASUREMENT

The instruments of the FISCHERSCOPE X-RAY XUL and XULM series are universal X-ray fluorescence spectrometers for coating thickness measurement and material analysis. They are ideal for fast, repetitive measurements in quality assurance and production control due to easy accessibility and simple sample placement. The wide-opening hood with a large viewing window facilitates fast positioning, and large controls simplify handling, which is especially helpful and saves time and money when measuring many parts in the daily production.

With these instruments, the X-ray source and the detector are located underneath the measurement chamber. This allows for fast and easy positioning and measurement of the specimens. A high-resolution video camera simplifies this further by displaying the measurement location with high magnification and the measurement spot shown on the screen.

The XUL and XULM instruments are equipped with proportional counter tube detectors and achieve a high repeatability precision even with short measuring times.



Despite their compact dimensions, these X-ray fluorescence spectrometers feature a large-volume measurement chamber, so that even larger parts can be measured. An opening in the housing allows for measurements on large, flat samples such as printed-circuit-boards that would otherwise not fit in the measurement space. The sample can be placed either on the flat support or on an optionally available XY-stage for even more precise sample orientation.

The XUL series is universal and is therefore well suited for the measurement of mass-produced parts such as screws, bolts or nuts, as well as for various electronics components. The determination of the metal content of electroplating baths can be performed quickly and easily.

The XULM series is based on the XUL family and shares with it the housing and the entire mechanical design. With the XULM, the X-ray source is a micro focus tube that offers particular advantages on small structures. Additionally, the XULM instruments feature electrically interchangeable apertures and filters to create flexible optimum excitation conditions for different measuring applications.

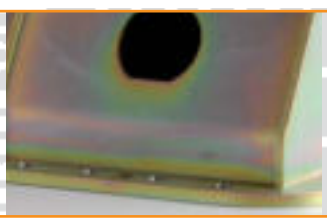
Thus XULM spectrometers are very well suited for measurements on delicate parts such as connector contacts and wires as well as for the analysis of galvanic coatings on printed circuit boards. The XULM is also used in the watch and jewelry industry, where small parts must be controlled very precisely.

Features

- XUL: Precise measurements with high count rates on larger parts
- XULM: Very good measurement results even on smaller structures
- Proportional counter tube detector
- For flat and easy to place parts
- Fast measurement
- Large easy-access measurement chamber
- Compact design, large controls
- Operator support through video image

Typical fields of application

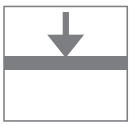
- Quality assurance and production monitoring
- Galvanized mass-produced parts, e.g., screws, nuts, etc.
- Coatings on plugs and connectors
- Measurements on smaller parts and PCBs
- Galvanic corrosion protection
- Jewelry and watch industries
- Printed-circuit-board manufacturing



COATING THICKNESS

MATERIAL ANALYSIS

FISCHERSCOPE® X-RAY XDL®/XDLM®



TOP DOWN MEASUREMENT

The FISCHERSCOPE X-RAY XDL and XDLM series are particularly well suited for non-destructive coating thickness measurements and material analysis, for measurements on mass-produced parts and printed-circuit-boards as well as for the bath analysis.

Both the XDL as well as the XDLM series uses a proportional counter tube as their detector, which achieves good count rates due to its large detector surface and thus achieves a high repeatability precision.

The XDL series is equipped with an X-ray tube and an aperture that are suited for measurements on larger parts. Typical applications for the XDL spectrometers are measurements of electroplated coatings on mass-produced parts as well as functional coatings in the electronics and semiconductor industries. XDL instruments can also measure corrosion protection coatings and decorative coatings such as chrome on nickel/copper quickly and precisely.

With the XDLM spectrometers, the X-ray source is a micro focus tube that offers particular advantages with small structures and low material concentrations. Additionally, the XDLM instruments feature electrically interchangeable apertures and filters to create flexible optimum excitation conditions for different measuring applications.

Typical applications for the XDLM spectrometers are measurements of fine structures, e.g., of printed-circuit-boards, connectors and electronic components or the measurement of thin gold, palladium or nickel coatings on printed-circuit- boards. Due to their design and user-friendly operation, these instruments are ideally suited for quality assurance, incoming inspection and production monitoring. However, these spectrometers are also used in laboratories and in research and development.

The FISCHERSCOPE X-RAY XDL/XDLM spectrometers are designed as user-friendly desktop units with a modular structure. Thanks to this design, they can be equipped with a simple support, various XY-stages and Z-axes to accommodate different requirements.

With the easily accessible measurement chamber, they are suitable for measurements on flat, plane parts as well as for larger specimens with complex shapes. In the design with a programmable XY-stage, the XDL series can be used for automated series testing. The user-friendly operation and ergonomic design facilitate your daily work with the XDL spectrometers. For this reason, the precise definition of the measurement location is facilitated by a high-resolution color video camera with high magnification and the current measurement process is shown in the video image.

A laser pointer acting as a positioning aid supports the quick orientation of the samples to be measured in the models that feature an XY-stage. For large, flat samples such as PCBs, the housing has openings on the side. The wide-opening hood and the large control facilitate fast positioning and measuring, which is especially helpful in the daily production or when measuring many parts.

Features

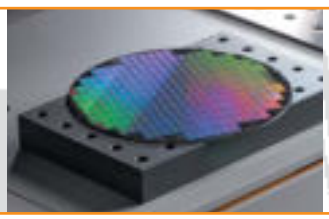
- Precise measurements with high count rates, proportional counter tube detector
- XDLM: Precise measurements even on small structures and on small parts
- Models with flat supports, XY-stages and movable Z-axis
- Ergonomic design and large control element
- Operator support through video image and laser pointer

Typical fields of application

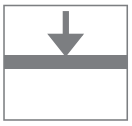
- Quality assurance and production monitoring
- Measurements of mass-produced electroplated parts
- Inspection of thin coatings
- Analysis of functional coatings
- Automated measurement
- Bath analysis in the electroplating industry
- Electroplating
- Gold, jewelry and watch industries
- Printed-circuit-board manufacturing
- Connectors and contacts

COATING THICKNESS

MATERIAL ANALYSIS



FISCHERSCOPE® X-RAY XDAL®



TOP DOWN MEASUREMENT

The FISCHERSCOPE X-RAY XDAL is the universal spectrometer in the XDL series. It is the right tool for the fast, non-destructive material and coating analysis with a small measurement locations and/or thin coatings. This makes it ideal to examine unknown materials, such as in the incoming inspection or for material analysis. It also finds a permanent place in the laboratory, in quality assurance as well as in research and development.

The X-ray source is a micro focus tube that offers a high excitation of the material sample even with a small measurement spot. With the XDAL, apertures and filters can be changed with a click of the mouse via the operating software in order to create the optimum excitation conditions for different measuring applications.

For a high resolution combined with a short measuring time, a Peltier-cooled silicon PIN detector is used. With it, elements from aluminum to uranium can be detected even with very low material concentrations and very thin coatings.

The FISCHERSCOPE X-RAY XDAL has a voluminous measurement chamber and is easy to use. For large, flat samples such as PCBs, the housing has openings on the side. But the instrument is also suitable for large specimens with complex shapes. For this purpose, it is equipped with a motorized Z-axis that can be adjusted by 140 mm.

The wide-opening hood allows for easy access to the measurement chamber. Because the XY-stage travels automatically to the loading position when the hood is opened, quickly placing the sample is extremely easy. A laser pointer shows the exact measuring position on the specimen.

A high-resolution and high-magnification color video camera with auto-focus zooms at the measuring spot with a magnification of up to 180x and thus enables the precise definition of the measurement spot.

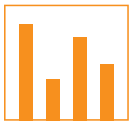
With the fast, programmable XY-stage, surfaces can be examined easily in the mapping mode. Also, serial measurements of components, e.g., lead frames, or the measurement of several, even different components can be programmed and executed automatically with ease.

Features

- Universal, non-destructive element analysis
- Ideal for small structures and thin coatings
- Very good analysis results even with low element concentrations
- Silicon PIN detector
- Large easy-access measurement chamber
- Quickly programmable XY-stage and moveable Z-axis
- Operator support through video image and laser pointer

Typical fields of application

- Incoming inspection, quality assurance and production monitoring
- Research and development
- Electronics industry
- Gold, jewelry and watch industries
- Printed-circuit-board manufacturing
- Measurement of unknown materials
- Trace analysis, e.g., lead (Pb) with a high reliability
- Inspection of thin coatings, even at low concentrations
- Analysis of hard material coatings
- Automated measurements in mapping or array mode



FISCHERSCOPE® X-RAY XDV®-SDD

TOP DOWN MEASUREMENT

The FISCHERSCOPE X-RAY XDV-SDD is the universally useable energy dispersive X-ray spectrometer for precise trace analysis and for non-destructive measurements and analyses of very thin coatings. This spectrometer achieves high count rates and deep detection limits due to high excitation intensity.

The universal design with changeable filters and apertures makes this instrument ideal, even if coatings of only a few nanometers are to be measured or the smallest concentrations in materials are to be determined precisely.

For example, in the photovoltaic industry, where the accurate maintenance of the coating composition and structure determines the efficiency of thin film cells, the XDV-SDD can be utilized to its full potential. Whether sputtered on glass or plastic, on copper or precious metal, the analysis will succeed with the XDV-SDD.

But also in the printed-circuit-board, semiconductor and electronics industries, where modern technologies, rising commodity prices and cost pressure lead to ever thinner and more complex layers, the XDV-SDD aids in pushing the boundaries of what is possible – and to inspect it reliably.

In trace analysis and the search for hazardous materials, whether in the consumer sector or in electronics manufacturing, according to RoHS, WEEE, or other requirements, the XDV-SDD analyzes even low concentration levels reliably and precisely.



In order to create ideal excitation conditions with maximum intensity for every measurement, the XDV-SDD features electrically interchangeable apertures and primary filters. Using a modern silicon drift detector, high count rates are achieved for a high accuracy of the analysis with very low detection limits. The latest SDD detectors with ultra-thin beryllium windows also allow for the analysis of elements such as phosphorus or aluminum in air.

With the large and easily accessible measurement chamber, the XDV-SDD is suitable for measurements on flat, plane parts as well as for larger specimens with complex shapes. Serial tests or array measurements can be realized in a simple manner with the fast, programmable XY-stage.

User-friendly operation, a wide-opening hood and the control element on the front of the instrument make daily work easy with this instrument.

The precise definition of the measurement location is facilitated by a high-resolution color video camera with high magnification and the current measurement process is shown in the video image. A laser pointer acting as a positioning aid additionally supports the quick orientation of the samples to be measured.

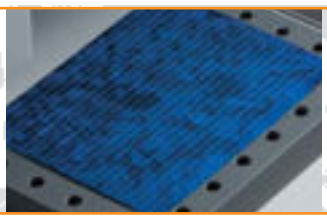
The performance capabilities and the universal design make the XDV-SDD ideal for research and development, process qualifying and laboratories. It also has a permanent place in quality assurance and in production monitoring due to its design and the user-friendliness.

Features

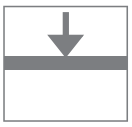
- Universal for analysis and trace detection
- Lowest detection limits
- Powerful silicon drift detector and digital signal processing for high resolution
- Precise measurements of low concentrations
- Analysis of thin and very thin coatings
- Determination of complex multi-coating systems
- Ergonomic design and large control elements
- Operator support through video image and laser pointer
- Automated measurements, array measurements

Typical fields of application

- Analysis of unknown materials and low concentrations
- Inspection of thin coatings, even at low concentrations
- Trace analysis according to RoHS and WEEE requirements
- Electronics and semiconductor industries
- Photovoltaic industries
- Gold and precious metal analysis with highest precision
- Research, development, quality assurance
- Process qualification and production monitoring



FISCHERSCOPE® X-RAY XDV-µ®

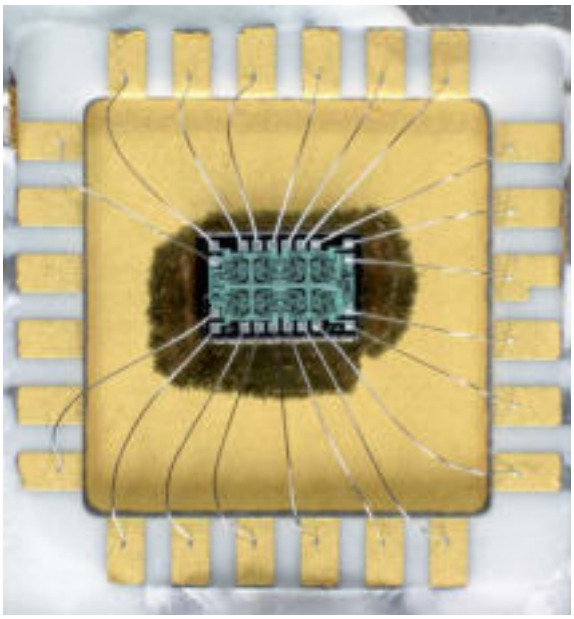


TOP DOWN MEASUREMENT

The spectrometers of the FISCHERSCOPE X-RAY XDV-µ series are designed for the highest demands in coating thickness measurement and material analysis in the micro-range. The innovative X-ray optics such as polycapillaries and X-ray mirror optics allows them to measure on very small components and structures with the smallest of measurement spots, yet with high excitation intensity. In order to create ideal excitation conditions for every measurement, the XDV-µ series features electrically interchangeable primary filters.

The spectrometers of the XDV-µ family are, therefore, ideal for the semiconductor and electronics industries, where there is a need to measure micro-structures on wafers, components or printed-circuit-boards. Typical fields of applications are, for example, analyses on thin bond wires or on contact locations of semiconductor chips. In addition the coating analysis on very small connectors or the measurement of thin gold/palladium/nickel coatings on PCBs is the domain of the XDV-µ series.

With the large and easily accessible measurement chamber, the XDV-µ spectrometers are well suited for measurements on flat, plane parts as well as for specimens with complex shapes. For large, flat samples such as printed-circuit-board, the housing has openings on the side. Serial tests or array measurements can be realized in a simple manner with the fast, programmable XY-stage.



User-friendly operation, a wide-opening hood with a large viewing window and a control element on the front of the instrument make daily work easy with these instruments.

The precise definition of the measurement location is facilitated by a high-resolution color video camera with extremely high magnification. Even the thinnest bond wires or small contact points are displayed razor-sharp and the measurement spot appears exactly at the target position. A laser pointer acting as a positioning aid additionally supports easy orientation of the samples to be measured.

The performance capabilities and the specialization on the smallest structures the XDV-µ spectrometers are ideal for research and development, process qualifying and for laboratories. They also have a permanent place in quality assurance and in production monitoring.

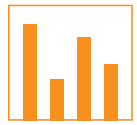
Features

- Coating thickness measurement and materials analysis on the smallest of components and structures
- Polycapillaries or X-ray mirrors for high excitation intensities
- High detection sensitivity
- Proportional counter tube or semiconductor detector
- Measurements of thin coatings on small components
- Determination of complex multi-coating systems
- Ergonomic design and large control elements
- Operator support through video image and laser pointer
- Automated measurements, array measurements

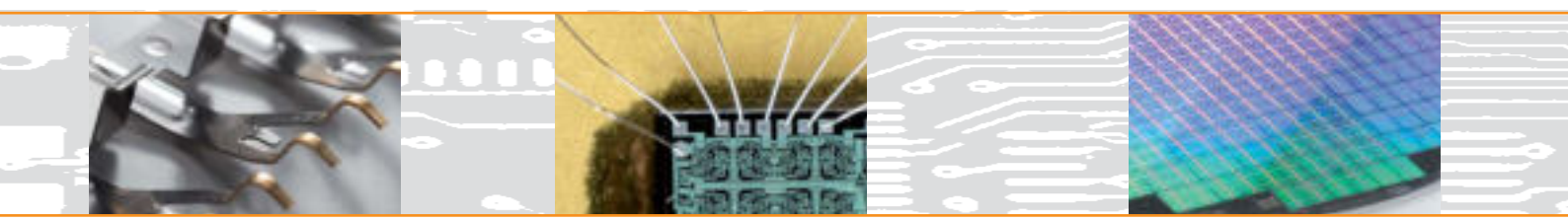
Typical fields of application

- Measurements on connectors, contacts, lead frames, printed-circuit-boards
- Semiconductors and wafers
- Bond wires and bond spots
- Measurement of Au/Pd/Ni/Cu coatings
- Electronics and semiconductor industries
- Research, development, quality assurance
- Process qualification and production monitoring

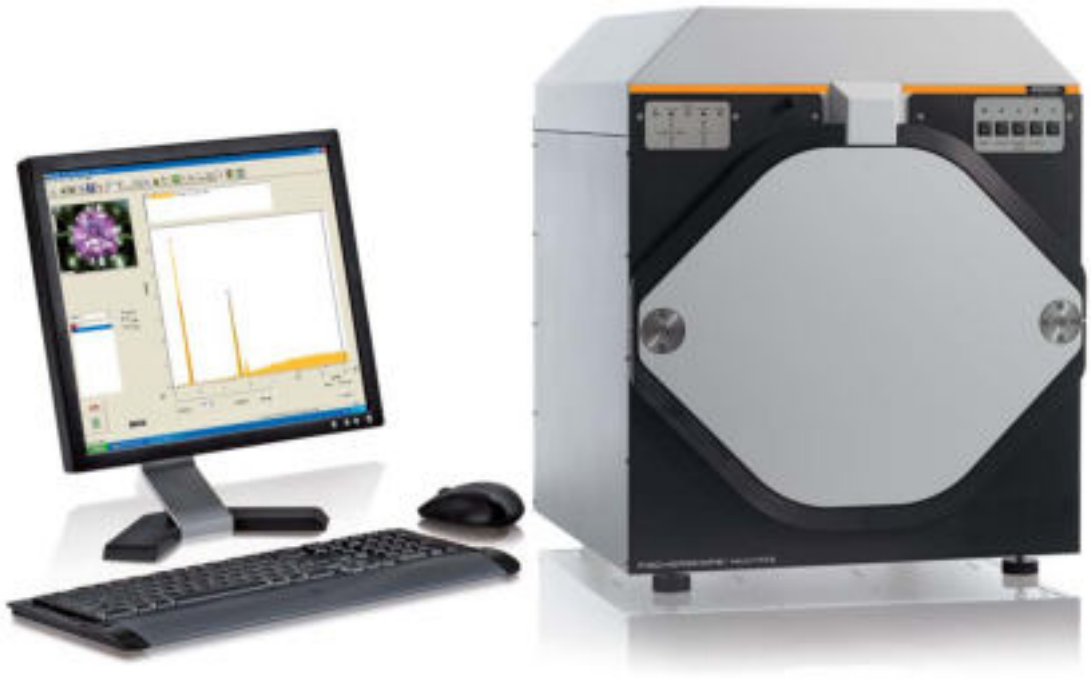
COATING THICKNESS

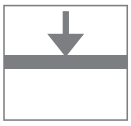


MATERIAL ANALYSIS



FISCHERSCOPE® X-RAY XUV®





TOP DOWN MEASUREMENT

The FISCHERSCOPE X-RAY XUV is a universal X-ray spectrometer for non-destructive coating thickness measurements and material analysis. It is particularly well suited for the analysis of very thin coatings, traces and light elements. It is equipped with a large measurement chamber for measuring larger samples under vacuum; thus, the chamber can be evacuated or flushed with helium for better detectability of light elements. Elements in the range from sodium (11) to uranium (92) can thus be detected.

With interchangeable apertures and primary filters, the XUV is equipped to create the ideal excitation conditions for any type of measurement. A modern silicon drift detector with a high energy resolution ensures a high accuracy of the analysis as well as very good detection sensitivity even with short measuring times.

The FISCHERSCOPE X-RAY XUV is universally suitable for both coating thickness measurements and materials analysis. Typical areas of application are the analysis of functional coatings in the electronics and semiconductor industries such as the thinnest gold/palladium/nickel coatings. In the photovoltaic industry, photo-active coating systems such as CiGS or CdTe can be analyzed together with their base coat and top coat on various carrier materials.

Another important application is the analysis of gemstones in order to determine origin and genuineness. The XUV is also well suited for general analyses due to its universal approach.

With its large and wide-opening measurement chamber and the big travel range of the programmable XYZ-stage, this spectrometer is well suited for measurements on flat, plane parts as well as for specimens with complex shapes. Serial tests or array measurements can be obtained with it, in a simple fashion, as well.

The precise definition of the measurement location is facilitated by a high-resolution color video camera with high magnification. A laser pointer acting as a positioning aid additionally supports the quick orientation of the samples to be measured.

Due to the universal design and the expanded measurement capabilities through the vacuum chamber, the FISCHERSCOPE X-RAY XUV spectrometer is the ideal instrument for research and development but in addition to process qualifying and laboratory applications.

COATING THICKNESS

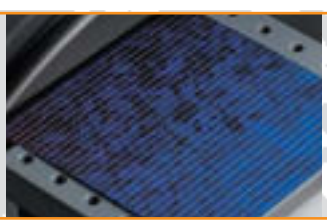
MATERIAL ANALYSIS

Features

- Coating thickness measurement and analysis even for light elements
- Measurements in air, vacuum or under helium
- High resolution and detection sensitivity
- Silicon drift detector
- Determination of complex multi-coating systems
- Operator support through video image and laser pointer
- Automated measurements, array measurements

Typical fields of application

- Analysis of thin coatings, traces and light elements
- General material analysis and forensics
- Non-destructive gemstone analysis
- Analysis of Au/Pd/Ni/Cu coatings
- Electronics and semiconductor industries
- Photovoltaic industry
- Research and development, process qualification

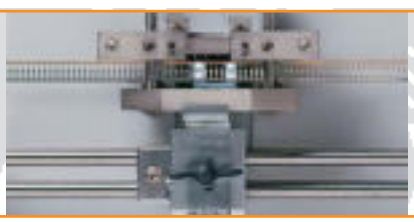


FISCHERSCOPE® X-RAY 4000

PROCESS

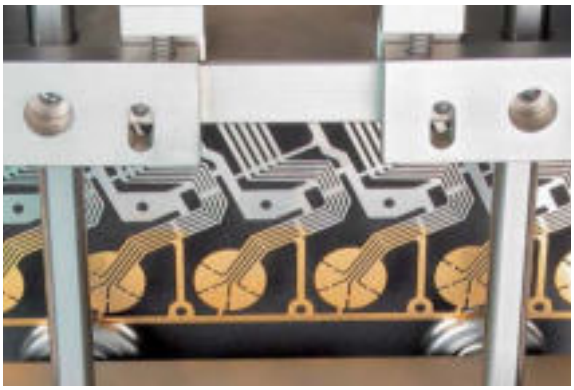
With the FISCHERSCOPE X-RAY inline spectrometers, FISCHER created a product line for continuous measurements during industrial production. These high-precision X-ray fluorescence spectrometers are designed specifically for the high demands of industrial environments. They are particularly robust while at the same time very precise. For this product line, a particular focus was placed on exceptional reliability and serviceability.

The FISCHERSCOPE X-RAY 4000 instruments are inline X-ray fluorescence spectrometers for non-destructive coating thickness measurements and material analyses during the production process. They are particularly well suited for measuring thin coatings in continuous processes on mass-produced or stamped parts, strips and foils. Typical applications include roll-to-roll strip electroplating or selective coating. Both solid and already stamped strip can be measured.



The X-RAY 4000 instruments include a travel device that can position the measuring head exactly at various locations. Thus, measurements can be made on a passing strip at various positions or the measuring head can track the strip with excellent positioning accuracy.

FISCHERSCOPE X-RAY 4000 spectrometers can be customized to optimally meet the respective production requirements. Whether measurements are to be made on the top side, the bottom side or on both sides of a strip, the modular structure allows for any of these options. Temperature-controlled measuring heads are used when measurements are to be made on hot surfaces such as hot-galvanized strip. And depending on the need, the entire unit can be installed horizontally or vertically.



As a true inline measuring instrument, the FISCHERSCOPE X-RAY 4000 is designed for user-friendliness and minimal setup times. For example, quick conversions between various productions are possible due to the easily adjustable strip guides. Calibration is also automated and thus carried out quickly and easily.

The data interface according to industry standards allows for an easy integration in quality management systems or controls. The production process can also be measured directly at the measurement location thus directly signaling the violation of specification limits.

Features

- Coating thickness measurements in the running production process
- Determination of complex multi-coating systems
- Measurements on top, bottom or both sides
- Positioning device, measurements at several positions
- Large measurement spot for integral measurements
- Small measurement spot for fine structures
- Customer-specific layout
- Automated calibration
- Continuous operation, low maintenance
- Integration in QMS and controls

Typical fields of application

- Strip electroplating, e.g., contacts, stamped components
- Measurement on hot-galvanized strip
- Photovoltaic industry
- Strip, stamped components and foils
- Electronics industry, suppliers
- Process monitoring

COATING THICKNESS

MATERIAL ANALYSIS

FISCHERSCOPE® X-RAY 5000

PROCESS

The FISCHERSCOPE X-RAY 5000 series is specifically designed as a flange measuring head for integration into a production line. It is ideally suited for continuous, non-destructive inline analyses of alloys and the measurement of the thinnest coatings and coating systems directly during the production process. The FISCHERSCOPE X-RAY 5000 instruments determine, for example in the solar industry, the thickness and the composition of CIGS, CIS, or CdTe coatings on different substrate materials such as glass, metal or plastic. Roll-to-roll strip electroplating is another continuous process for which the X-RAY 5000 spectrometer is well suited.

The X-RAY 5000 can be customized for optimization to the respective requirement. Both X-ray source and semiconductor detector can be adapted optimally to the respective application. They are placed such that they can measure precisely at measuring distances from 20 mm to 150 mm, depending on the application. They are even capable of compensating for distance fluctuations, e.g., due to wavy specimens, during the running measurement.

Using the powerful semiconductor detectors, elements can be determined reliably in a range from sodium (11) to uranium (92). The calibration is done with a work piece master very quickly and easily directly in the production process. The repeatability precision of the X-RAY 5000 instruments is excellent due to the large apertures, state-of-the-art semiconductor detectors and the digital pulse processors. The need for re-calibration is also reduced drastically, which saves time and expenditures.

These robust spectrometers measure in vacuum or in ambient air. Even measurements on very hot substrate materials with surface temperatures up to 500°C are possible without a problem.

The FISCHERSCOPE X-RAY 5000 measuring head has a very compact design and can be integrated directly in production lines using a standardized flange. The entire mechanical design is focused on maximum robustness and serviceability. For example, the spectrometer can be serviced during operation at a production line under vacuum, without the need to remove the vacuum.

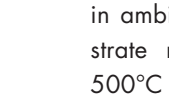
To integrate the X-RAY 5000 spectrometers into a superordinate process control system, open interfaces according to industry standards, e.g., OPC are available.

Feature

- Coating thickness measurements and analyses in the running production process
- Very simple calibration
- Measurements in ambient air or vacuum
- Measurement also on very hot substrate materials up to 500°C
- Semiconductor detector
- Determination of complex multi-coating systems
- Continuous operation, low maintenance

Typical fields of application

- Photovoltaic, CIGS, CIS, CdTe analysis
- Analysis of thin coatings
- Continuous production
- Process monitoring
- Area measurement



Fischer worldwide

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