

ZSX Primus



X-ray Fluorescence Spectroscopy

**The #1 Answer to ALL
Your X-ray Needs!**

Rigaku

The #1 Answer ...

As technology advances in the 21st century, analysts are called upon to expand the scope of their work and to develop new methods for old and new needs. These analysts are also expected to wear hats of many colors - expected to easily switch from one type of analysis to another, with a wider variety of samples. These challenges draw out the best in people and, hopefully, their instruments. Dedicated analysts require their instruments to be reliable, flexible, dependable, and from a trustworthy company that will fulfill their promises. Rigaku, a proven industry leader, has developed an instrument to meet these challenges. It is with great pleasure that Rigaku proudly introduces the ...

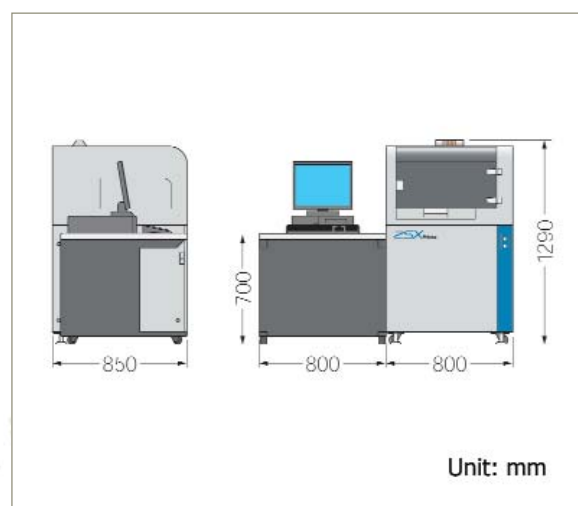


... to ALL Your X-ray Needs!

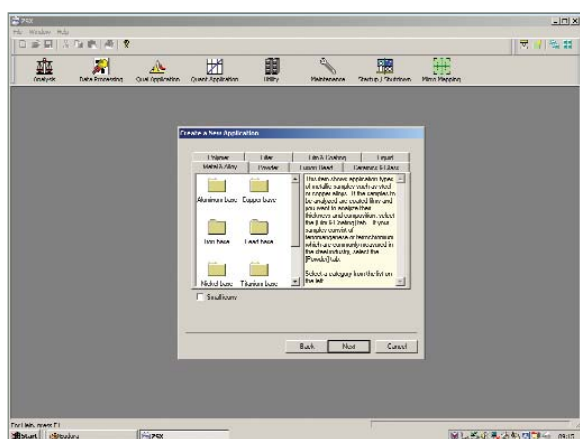
ZSX® PRIMUS

The latest instrument in Rigaku's ZSX series, the **ZSX Primus** continues the tradition of delivering accurate results in a timely and seamless manner, with unsurpassed reliability, flexibility, and ease of use to meet any challenges in today's laboratory. With Rigaku's experience in anticipating and exceeding customer expectations, the **ZSX Primus** is the #1 answer to ALL your X-ray needs!

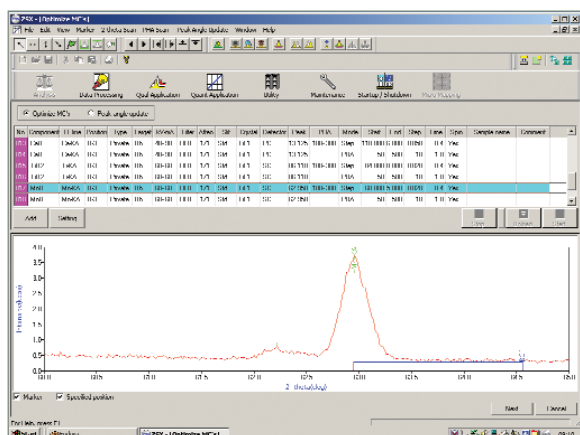
The **ZSX Primus** provides aggressive performance with the flexibility for analyzing the most complex samples. The 30 micron tube, the thinnest end-window tube available in the industry, guarantees that light elements are easy and clear to interpret. Combined with the most advanced mapping package to detect homogeneity and inclusions, the **ZSX Primus** is heads above the competition. With a smaller footprint than other full size XRF instruments, the **ZSX Primus** is the #1 answer to meet the challenges facing your lab in the 21st century.



The Future is Here -



Templates for Qualitative and Quantitative Applications guide you through each set-up. Flow bars direct step-by-step application development.



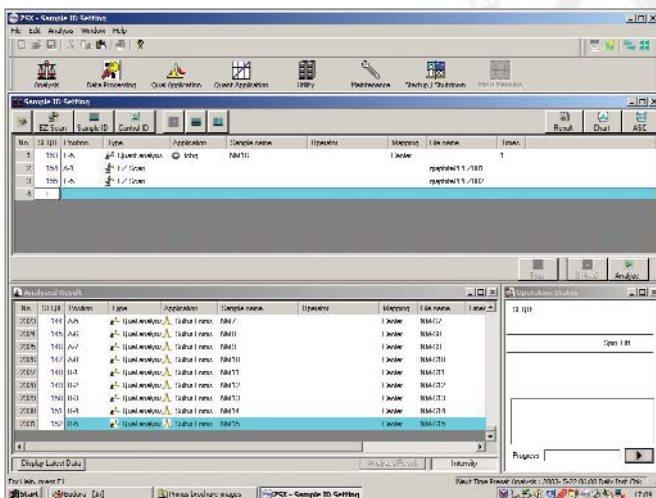
Optimize Screen allows you to adjust a variety of conditions, ensuring the best response possible.

With an eye toward the future, Rigaku has combined extensive experience in applications development and unsurpassed technical knowledge to create the best analytical software package in the world. With a firm belief that knowledge is power, Rigaku has developed software that is not only user-friendly, but sophisticated and powerful enough for the most complex analysis.

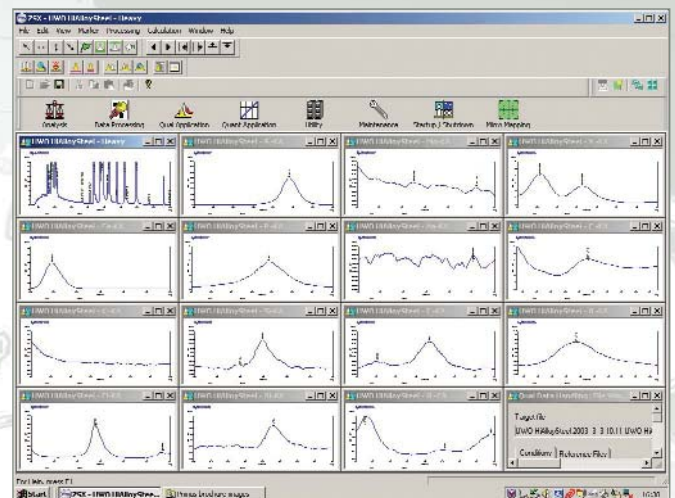
The ZSX software was conceived and built with the end-user's needs and requirements in mind. From its earliest version, the ZSX software has grown and changed based on suggestions and ideas from users throughout the world. It has evolved into the most sought after instrument control package available today. Why use inferior software when the future is here? Rely on Rigaku Software!

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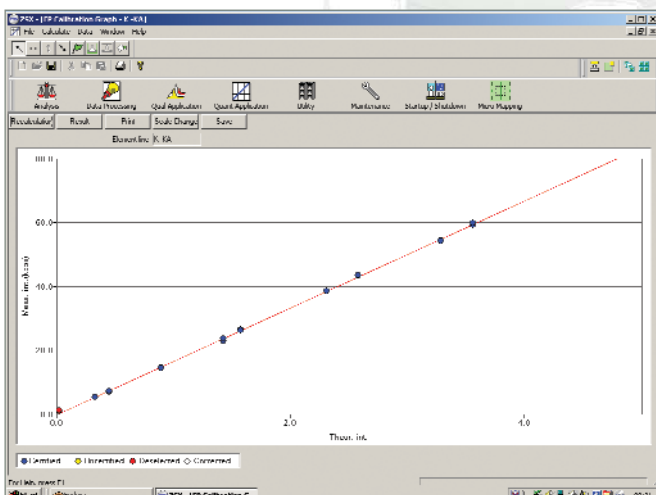
Rigaku Software



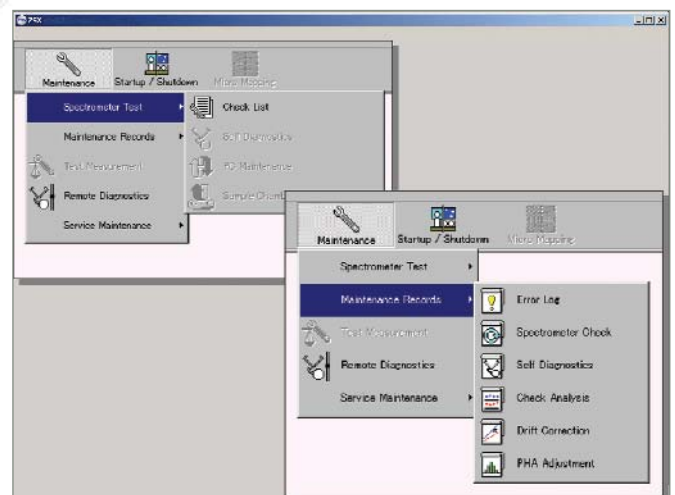
Analysis Screen displays for sample entry and data retrieval.



Qualitative Scans are organized for easy interpretation and automatically list potential interfering elements.

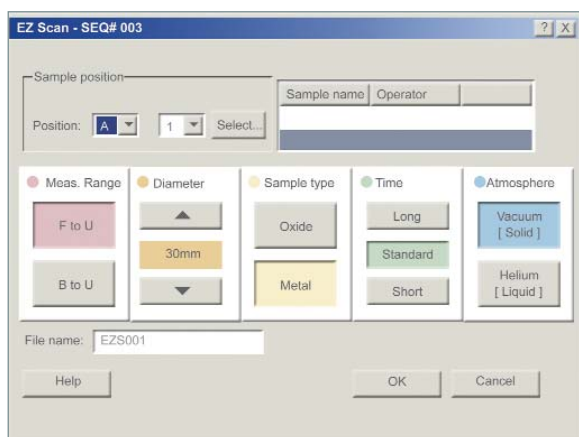


Calibration Screens are clear and easy to understand.

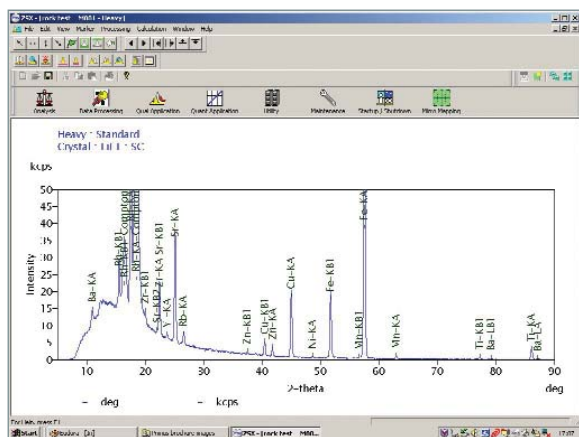


Diagnostics for complete user control.

Semi-quant for the Total Unknown



EZ Scan provides quick Semi-quantitative set-up to determine intensities.



SQX data treatment uses FP-based software to calculate unknown concentrations.

In today's modern labs, analysts are often called upon to make determinations on unknown samples, a challenge when no standards are available. This is not a problem when Rigaku's state-of-the-art Semi-quantitative (SQX) Programs are used for the analysis. Look for and analyze ALL elements involved, not just the ones that are thought to be present. Accurately analyze unknown samples for guaranteed peace-of-mind.

With Rigaku Semi-quantitative Programs, the analyst is in control. Each SQX program can be customized for the analyst's specific samples and application and can be modified any number of times for each unique sample type. Fine tune the sensitivity and scan speed to allow more flexibility in filtering out background and peak noise. Add fixed peaks to the scanned programs to improve trace element analysis.

Matching Libraries

Rigaku's user-friendly Semi-quantitative Programs can be used for incoming screening, certification of raw materials, analysis of materials in process streams, and any place where standards are not available.

With unparalleled flexibility and reliability, Rigaku's Semi-quantitative Programs produce incredible results for all of your Total Unknowns!

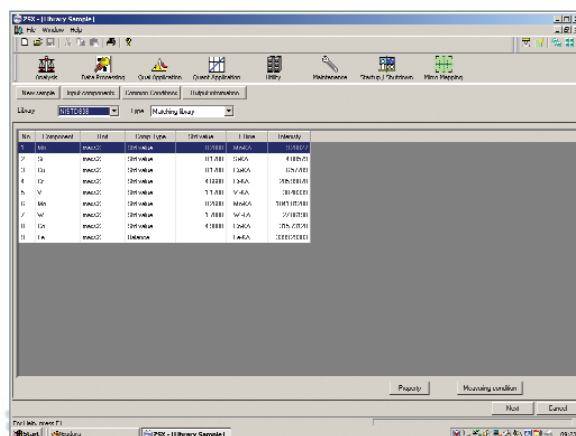
Matching Libraries

Rigaku's Matching Libraries can be created to match your sample type. By integrating standards of a similar matrix to the samples and creating a semi-quantitative library for each, far greater accuracy can be realized for the unknowns. Analysts can create as many matching libraries as needed to provide turn-key, accurate semi-quantitative results for their materials.

NIST 1633a				
Component	Unit	Std Value	Master Matching Library	Common Library
N	mass%	0.17	0.155	0.201
Na	mass%	0.455	0.471	0.481
Al	mass%	14.3	14.8	15.7
Si	mass%	22.8	23.1	22.4
S	mass%	[0.18]	0.308	0.306
K	mass%	1.88	1.92	2.11
Ca	mass%	1.11	1.23	1.27
Ti	mass%	[0.8]	0.880	0.943
V	mass%	0.030	0.046	0.046
Cr	mass%	0.020	0.026	0.026
Mn	mass%	0.018	0.021	0.021
Fe	mass%	9.4	9.32	8.44
Ni	mass%	0.013	0.017	0.016
Cu	mass%	0.012	0.015	0.015
As	mass%	0.015	0.016	0.015
Se	mass%	0.001	0.001	0.001
Pb	mass%	0.007	0.008	0.007

Oxygen is calculated as balance

Rigaku's Master Matching Library.



Scan using Matching Library.

Hardware for the 21st Century!

Following Rigaku's tradition of excellence, the **ZSX Primus** contains the hardware to help fulfill your dreams. Our research has led Rigaku to develop the ultimate 4 kW WDXRF with a smaller footprint than other full-size

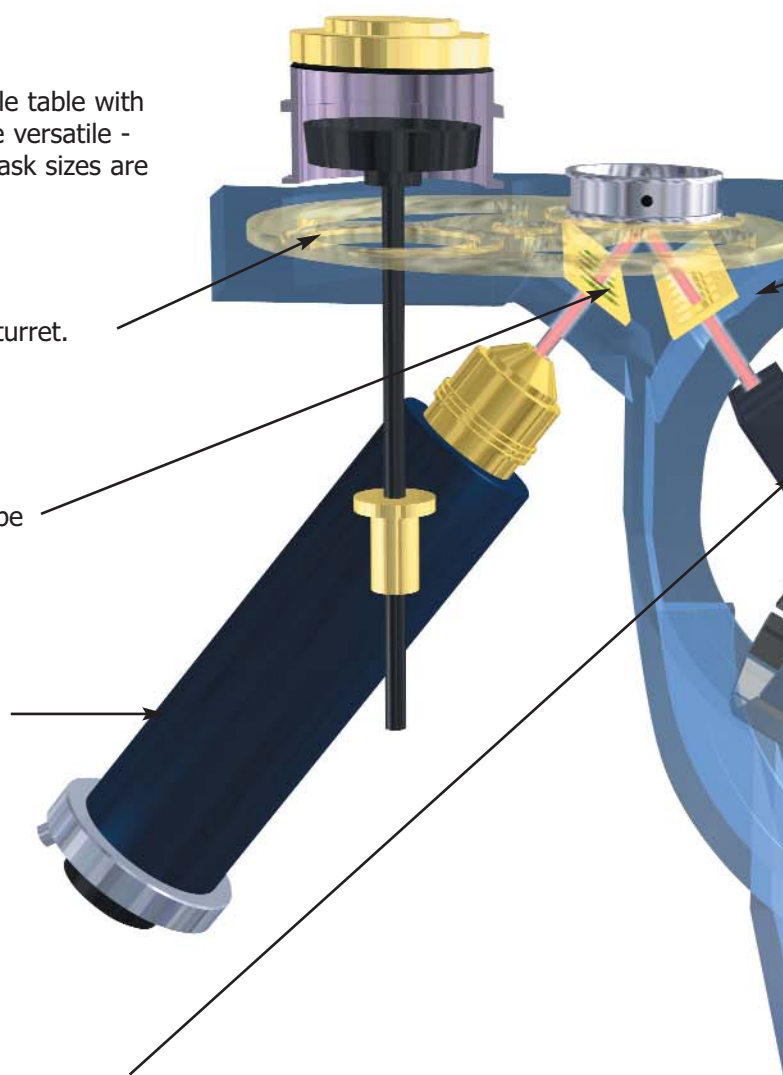
Sample Table and Holders - The 12 to 48 position sample table with movable tray is ideal for any lab. Rigaku sample holders are versatile - easily used for liquids, solids and loose powders. Various mask sizes are available, ranging from 5 mm to 38 mm.

PHA - Pulse height reference sample is located on sample turret.

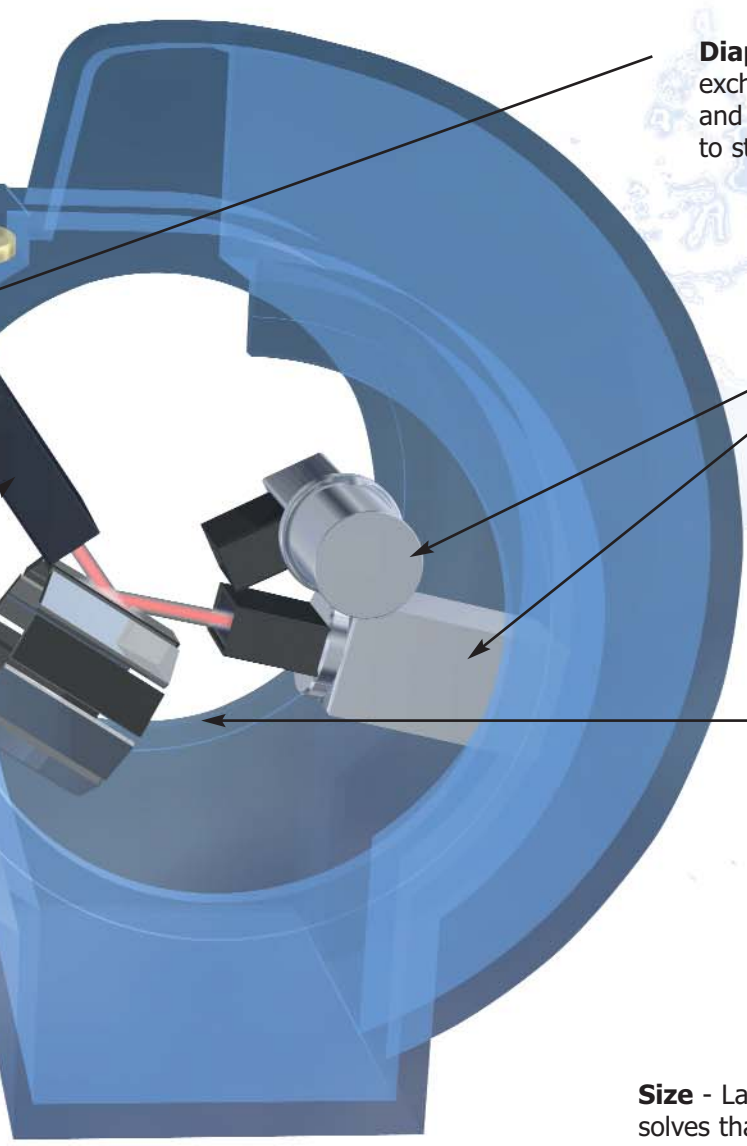
Beam Filters - Choose filters to eliminate characteristic tube lines or enhance the signal-to-noise ratio.

X-ray Tube - The 4 kW tube, with the thinnest window in the industry ($30\ \mu$), has been proven to be reliable with no loss of tube life for the enhanced performance of light elements and mapping. The **ZSX Primus**, with its tube-below optics and 4 kW tube, will allow you years of trouble-free power.

Collimators - Collimators range from extra coarse (for B-O), coarse (for F-U) and fine (for greater resolution).



ams and expectations and to answer ALL your X-ray needs! Meticulous attention to detail and intensive
e XRF instruments. See for yourself!

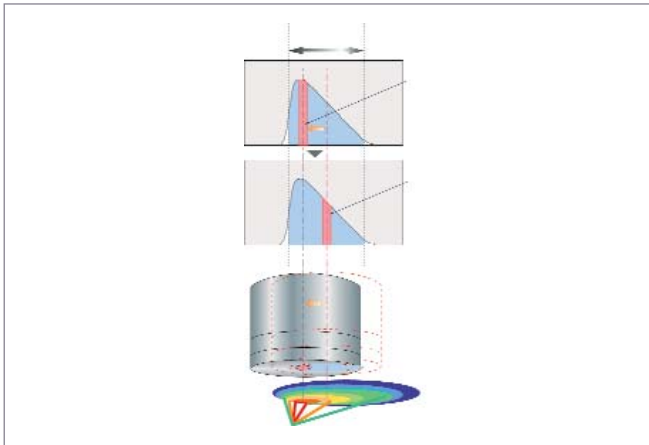
A detailed 3D cutaway diagram of the ZSX Primus XRF instrument. The diagram shows the internal components, including the goniometer chamber, detectors, and crystal changer. Three callout lines point from text boxes to specific parts: one to the diaphragm exchanger, one to the detectors, and one to the crystal changer.

Diaphragm Exchanger - With the 6-position diaphragm exchanger, choose from 35 mm, 28 mm, 20 mm, 10 mm, 1 mm, and 500 μ . The He/vacuum seal allows the goniometer chamber to stay under constant vacuum.

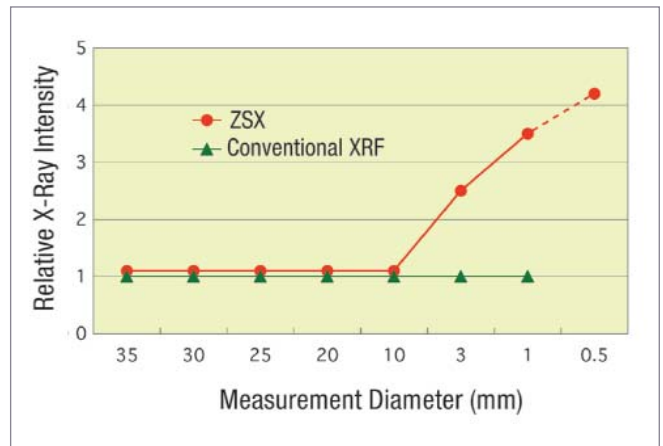
Detectors - Rigaku's patented wire cleaner on the F-PC reduces maintenance time. Both detectors are inside the goniometer chamber, allowing for enhanced stability and precision.

Crystal Changer - Rigaku offers a crystal changer with a total of 10 positions for you to select a variety of crystals to meet your analytical needs.

Size - Lab space today is always at a premium. The **ZSX Primus** solves that problem with an internal chiller, a built-in computer desk, and a smaller footprint.



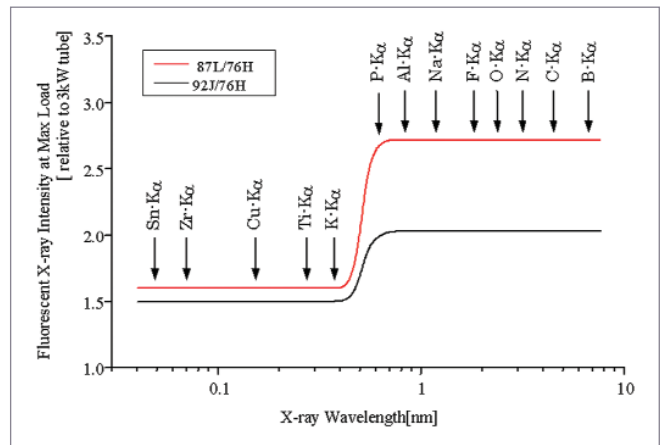
r-theta Spatial Distribution - The r-theta sample stage eliminates the effects of spatial distribution of the primary X-rays for small spot sizes.



0.5 mm Chart - X-ray sensitivity for micro area analysis.



The sample changer with slide-out tray provides easy access to all sample positions utilizing the same sample holder for all sample types. The changer is upgradeable from 12 positions to 24, 36, or 48 positions.



Enhanced sensitivity from 30 μ tube for enhanced light element analysis.

Application Packages

When application problems arise, let Rigaku provide the answers you need with Rigaku Application Packages. These turn-key solutions do the work for you. Setting up standards, running standards, optimizing calibration curves, and programming check standards are at your fingers. All you have to do is prepare a few recalibration standards in the same manner the unknowns will be prepared. It's that easy!

Rigaku Application Packages offer standard samples, drift correction samples, software to integrate with your ZSX, and step-by-step instruction manuals. These packages can be purchased at the same time as the **ZSX Primus**, or separately as your needs change.

Application Packages:

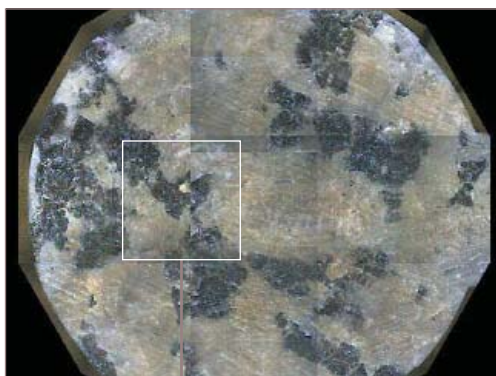
1. Low alloy steel
2. Special steel, Nickel alloy
3. Brass, Lead brass
4. Refractory (Clay)
5. Refractory (Silica)
6. Refractory (High-Alumina)
7. Refractory (Magnesia)
8. Refractory (Chrome-magnesia)
9. Refractory (Zircon-Zirconia)



Application Packages offer standard samples, drift correction samples, software, and step-by-step instruction manuals.

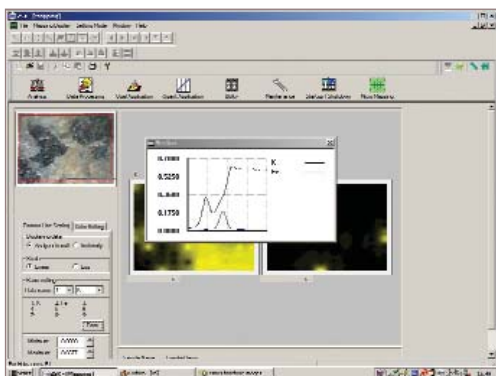
Application Package Standard Sample List				
Inspected Target	Standard Samples for Setup	Total	Analysis Range of the Content (mass%)	
Special Steel	Special Steel etc. JIS 650-11, 651-13, 652-13, 653-12, 654-13, 655-13, BS86F, BS33D, BS600C, BS718A, BA199A	11	Mn	0.082 - 2.13
			Si	0.075 - 1.42
			Cr	1.29 - 25.6
			Ni	0.11 - 74.2
			Co	0.011 - 13.5
			Mo	0.012 - 4.5
			W	0.04 - 2.94
			Nb	0.001 - 5.38
			Ti	0.001 - 3.09
			Al	0.005 - 1.39
			Fe	1.0 - 85.5
			P	0.001 - 0.035
			Cu	0.0031 - 0.39
			Ta	0.001 - 0.048

The Future is Clear with Mapping



In the past, determining elemental distributions across a sample surface or performing a homogeneity test, has been difficult, if not impossible, to do with a standard XRF unit. The need for determining such distributions has become increasingly common. Rigaku has heard from the analysts all over the world, demanding the ability to "map" samples. Rigaku has perfected the ZSX Series Mapping Application, making mapping sample distributions as easy as 1-2-3. Combining a CCD camera with a multi-directional sample stage, any portion of a sample surface is now available for mapping analysis, utilizing spot sizes down to 500 μ .

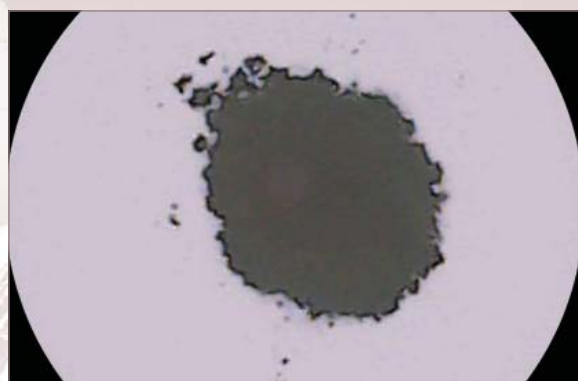
30 mm sample enhanced to 6 X 8 mm area.



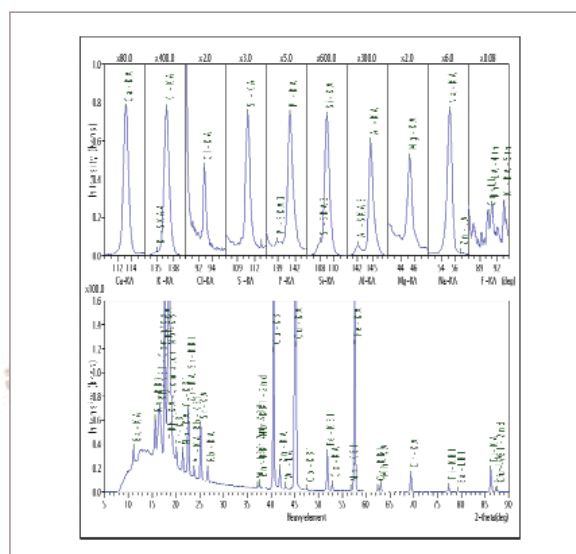
Line profile.

and Micro Analysis

Identifying unknown inclusions, contaminants on a sample surface, or attempting an analysis with very little sample, has been a constant problem for XRF analysts. So have pinpointing and accurately detailing small portions of sample and analyzing samples too small for routine analytical procedures. Rigaku understood the frustrations these challenges pose and has developed the solution. Rigaku's ZSX Series Micro Analysis Application has the ability to provide qualitative, semi-quantitative, and quantitative results of analyzing areas down to $500\ \mu$. The CCD camera can image a surface and focus on an area of interest, allowing the ZSX software to perform complete and accurate analysis for the specified area. The ZSX software utilizes Micro Analysis to expand the typical applications standard for a WD-XRF system.



The CCD image above shows an example of a small sample analysis. The sample (the dark center measuring approximately 11 mm) was imbedded into boric acid and pressed into a 30 mm pressed pellet. Utilizing Micro Analysis, a 10 mm analysis can be performed on the sample area, eliminating the surrounding boric acid from the calculations.



Qualitative scan from sample analysis pictured above.

Additional Options for the ZSX Primus

Rigaku's **ZSX Primus** offers amazing technology unsurpassed in the industry. What's more, you can choose from several options to customize your **ZSX Primus** to fit your needs. You'll have an instrument as unique and as individual as your analysis! The **ZSX Primus** really is "The #1 Answer to ALL Your X-ray Needs!" Here are two options to choose from.

Specialized Crystals -

Ia																										2									
1 H																										He									
IIa																																			
3 Li 4 Be																																			
2																																			
11 Na 12 Mg																																			
3																																			
19 K 20 Ca 21 Sc 22 Ti 23 V 24 Cr 25 Mn 26 Fe 27 Co 28 Ni 29 Cu 30 Zn																IIIb 5 B 6 C 7 N 8 O 9 F 10 Ne										IVb 13 Al 14 Si 15 P 16 S 17 Cl 18 Ar									
4																																			
37 Rb 38 Sr 39 Y 40 Zr 41 Nb 42 Mo 43 Tc 44 Ru 45 Rh 46 Pd 47 Ag 48 Cd																49 In 50 Sn 51 Sb 52 Te 53 I 54 Xe																			
5																																			
55 Cs 56 Ba 57-71 La 58 Ce 59 Pr 60 Nd 61 Pm 62 Sm 63 Eu 64 Gd 65 Tb 66 Dy 67 Ho 68 Er 69 Tm 70 Yb 71 Lu																81 Tl 82 Pb 83 Bi 84 Po 85 At 86 Rn																			
6																																			
87 Fr 88 Ra 89-103 Ac																																			
7																																			
57~71																																			
89~103																																			

Training - Rigaku believes that knowledge is power. To that extent, Rigaku offers XRF classes three times a year for all our customers. Whether you are new to XRF or an experienced analyst, the Rigaku XRF Training School offers three days of study directly on the latest Rigaku instruments at our U.S. headquarters. If more in-depth training is necessary, on-site training is available in your lab, on your instrument. Our XRF Applications Team is highly qualified to meet your training needs and answer any questions you may have. Allow us to further your XRF education.

Specifications			
General		Data processor	
Element application	⁴ Be - ⁹² U	Hardware	Computer: Windows® PC 17” TFT display Color inkjet printer <small>Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.</small>
Optics	Wavelength dispersive		
X-ray generator			
X-ray tube	End window type, Rh target 4 kW or 3 kW	Software	Qualitative analysis: Automatic peak identification Smoothing, background subtraction Quantitative analysis: Matrix correction: Lachance-Traill, DeJohng, JIS, etc. Linear, quadratic and cubic regression, multiple line Fundamental parameter method EZ scan (qualitative) Application template [†] Analysis area automatic selection [†] (mask size detection) Peak deconvolution (function and standard profile) [†] Background fitting (multi-point function fitting, area designation) Fixed precision analysis [‡] Help function E-mail forwarding function Universal standard sample Analysis simulation program (analysis depth evaluation, etc.)
High voltage generator	High frequency inverter system Maximum rating: 4 kW, 60 kV - 150 mA Stability: ±0.005% (against ±10% input variability) Various safety circuits Energy saving operation (optional)		
Cooling device	Water-to-water heat exchanger (built-in)		
Spectrometer			
Sample changer	Expandable sample changer (standard 48 samples)		
Sample inlet	Air lock system		
Maximum sample size	φ 51 mm x 30 mm (H)		
Analysis sample area	Maximum φ 35 mm		
Sample rotation	30 rpm		
Primary X-ray filter	Al, Ti, Cu, Zr and Be (optional) for X-ray tube window protection		
Analysis area diaphragm	6 sizes automatic exchange mechanism (φ 35, 30, 20, 10, 1 and 0.5 mm)		
Divergence slit	3 positions automatic exchange mechanism Standard resolution, high resolution and ultra coarse (optional)	Optional program	SQX program EZ scan (SQX) Fixed angle measurement [†] Thin-film analysis Theoretical overlap correction [‡] Drift correction library Photoelectron FP method [†] He atmosphere correction [†] Sample film correction [†] Impurity correction [†] Matching library** SQX scatter FP method [‡] Material judgment [‡] Quantitative scatter FP method Quantitative FP theoretical overlap correction Fusion disk correction (flux evaporation) Charge correction Program operation Time preset analysis Energy saving Auto power off Sample observation mechanism Point/mapping function [†] Remote control function (VCP) [‡]
Receiving slit	For SC and for F-PC		
Goniometer	θ - 2θ independent driving mechanism		
Angular range	SC: 5° - 118°, F-PC: 13° - 148°		
Maximum scan speed	1400°/min (2θ)		
Angular reproducibility	±0.0005°		
Continuous scan	0.1 - 240°/min		
Crystal exchanger	10 crystals automatic exchange mechanism		
Analyzing crystal	(Standard) LiF200, Ge, PET, RX25 (Optional) LiF220, RX-4, RX-9, RX35, RX40, RX45, RX61, RX61F, RX75, RX80, TAP		
Vacuum system	High speed vacuum system (2 pumps) Powder trap attachment (optional)		
He flushing system (optional)	With partition		
Temperature stabilizer	36.5°C ±0.1°C	Maintenance	Automatic pulse height adjustment (PAS) [‡] Automatic center wire cleaning (ACC) [‡] Automatic tube aging Self diagnosis function Remote diagnosis (optional)
Counting/Control system			
Detector	For heavy elements: SC Counting linearity: 1000 kcps For light elements: F-PC Counting linearity: 2000 kcps Heating-type center-wire automatic cleaning system		
Attenuator	In-out automatic exchanger (attenuation 1/10)		

[†] Patented

[‡] Patent pending

^{*}Options available when SQX is ordered



Software

Hardware

Application Packages

Mapping

Micro Analysis

Rigaku Industrial Corporation
14-8, Akaoji-cho, Takatsuki-shi
Osaka 569-1146, Japan
Phone: 81-72-693-7990
FAX: 81-72-693-6746
www.Rigaku.co.jp

Rigaku Americas Corporation
9009 New Trails Drive
The Woodlands, TX 77381 USA
US phone: 281-362-2300
FAX: 281-364-3628
e-mail: info@Rigaku.com

Rigaku Corporation
4-14-4, Sendagaya, Shibuya-ku
Tokyo 151-0051, Japan
Phone: 81-3-3479-6018
FAX: 81-3-3479-6112
e-mail: rinttyo@Rigaku.co.jp

www.Rigaku.com

Rigaku