

橋 THE BRIDGE

MATERIALS ANALYSIS

eNEWSLETTER

June 2023, ISSUE 119

WELCOME

As Charles Dudley Warner once said, "Everybody complains about the weather, but nobody does anything about it" (although the quote is often misattributed to Mark Twain). There have been summers in recent memory from southeast Texas, where Rigaku Americas Corporation is located, has not seen a single day over 100°F. We are still in June and we've already had several triple-digit days, and several heat warnings are the order of most days this month, with "feels like" temperatures routinely above 115 and as high as 125 in some locations. Add to that the highest ever wind speed recorded at Houston airport (92 mph, significantly greater than experienced in recent hurricanes) during an unexpectedly severe, fast-moving thunderstorm and, yes, we might wonder when and how we are going to do something about the weather.

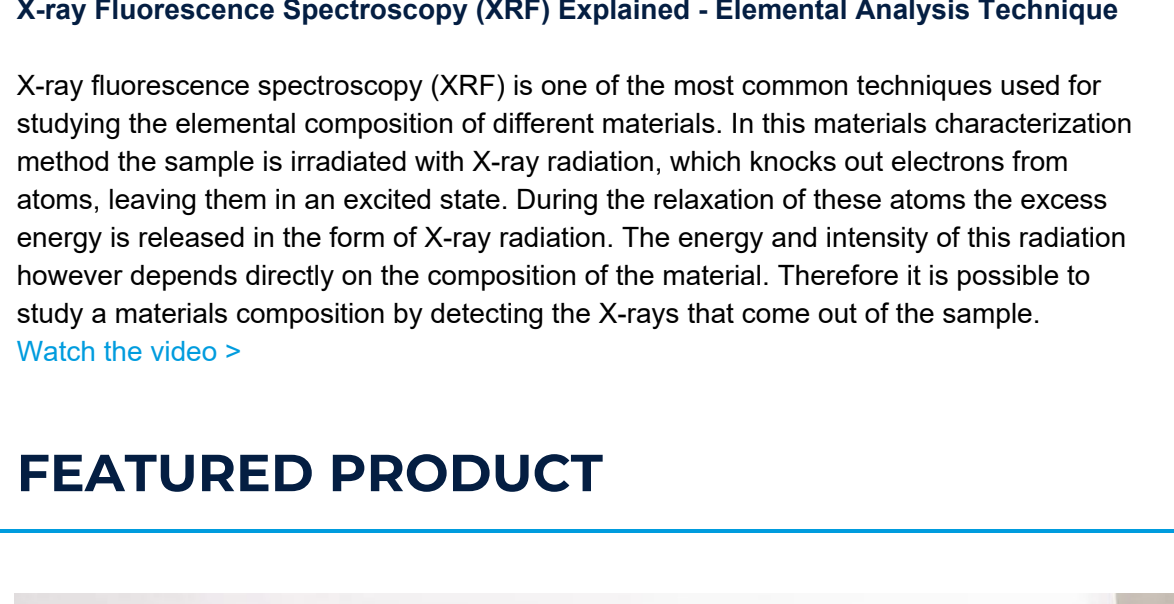
This month, Rigaku announces the release of ZSX Primus III NEXT, a new tube-above WDXRF spectrometer for industrial applications requiring elemental analysis, such as minerals and mining, metals, cement, ceramics and glass manufacturing, petrochemicals, chemicals, environment and many more. See below to learn more about this new instrument.

Also new this month, the CQL Max-ID handheld 1064 nm Raman analyzer offers features and benefits that maximize chemical threat analysis in safety and security applications. It joins the existing CQL Gen-ID—for more general hazardous analysis—with the ability to offer more targeted CQL variations in the future. Rigaku's Raman products are also used to detect illicit compounds disguised in the most ingenious ways, as our news item below reveals.

We have a variety of application notes this month that cover an array of techniques and use cases, and an assortment of news articles discussing the latest discoveries in materials science.

We hope everyone finds a way to stay cool this summer!

2023 SEMICONDUCTOR FORUM



THANK YOU FOR YOUR PARTICIPATION

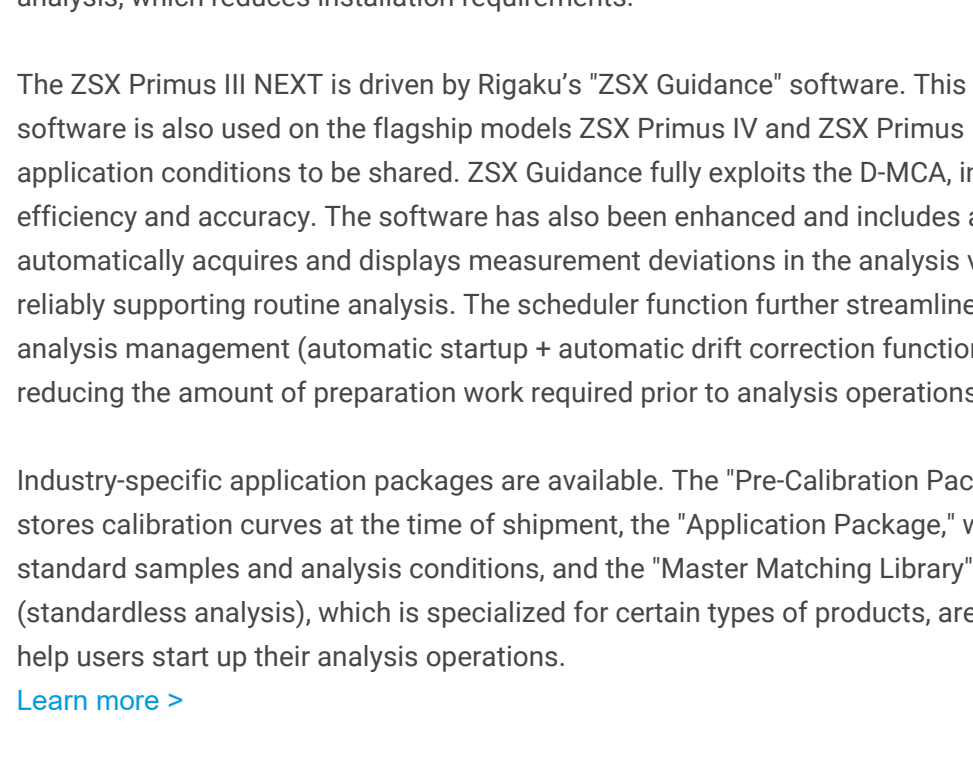
The World of Semiconductors Metrology Tools, from Lab to Fab

We express our gratitude to everyone who attended the inaugural Rigaku Semiconductor Forum in 2023. The esteemed speakers provided valuable insights and perspectives, resulting in an informative and engaging discussion. And also thank all participants for their contributions, which were essential to our event's success. Your active involvement is vital in driving progress in this critical area of study, and we commend your dedication and expertise in advancing knowledge in the semiconductor field.

The forum played a crucial role in exploring the most recent trends, obstacles, and advancements in the semiconductor industry. We extend our heartfelt appreciation for your participation, facilitating teamwork, and propelling innovation within the field. Please keep an eye out for upcoming academic events, as we are committed to unleashing the immense possibilities of semiconductor technology.

Do you have any questions or comments?
Please contact psmd@rigaku.com for more details.

VIDEO OF THE MONTH

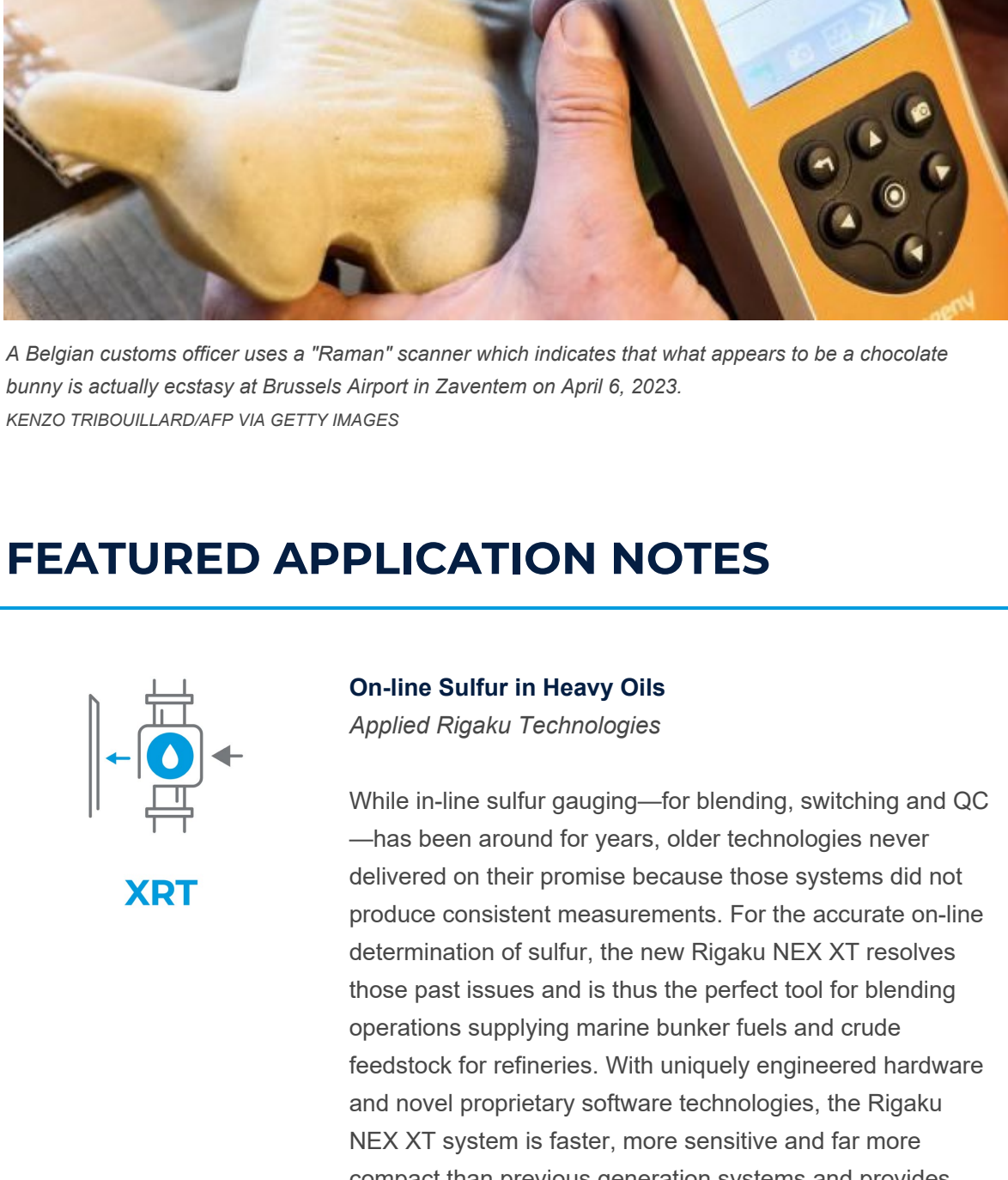


X-ray Fluorescence Spectroscopy (XRF) Explained - Elemental Analysis Technique

X-ray fluorescence spectroscopy (XRF) is one of the most common techniques used for studying the elemental composition of different materials. In this materials characterization method the sample is irradiated with X-ray radiation, which knocks out electrons from atoms, leaving them in an excited state. During the relaxation of these atoms the excess energy is released in the form of X-ray radiation. The energy and intensity of this radiation however depends directly on the composition of the material. Therefore it is possible to study a materials composition by detecting the X-rays that come out of the sample.

[Watch the video >](#)

FEATURED PRODUCT



ZSX Primus III NEXT

The new ZSX Primus III NEXT scanning wavelength dispersive X-ray fluorescence (WDXRF) spectrometer features Rigaku's unique tube-above configuration. This makes it ideal as a general-purpose XRF for applications such as quality control and production control.

The ZSX Primus III NEXT offers higher detection sensitivity and spectral resolution compared to energy dispersive XRFs. The tube-above optical configuration is less prone to contamination from loose powder and dust or potential damage from debris compared to the more common tube-below configuration and is ideal for pressed powder samples. Less chance of contamination assures better uptime of the spectrometer and reduced maintenance cost.

The most significant upgrades featured in the ZSX Primus III NEXT are the integration of a digital multi-channel analyzer (D-MCA) and the efficient control of each driving unit to improve quantitative analysis throughput. This new model also incorporates S-PC LE, an environmentally friendly gas-shielded proportional detector for light elements. The S-PC LE negates the need to install a detector gas cylinder, and there is no gas emission during analysis, which reduces installation requirements.

The ZSX Primus III NEXT is driven by Rigaku's "ZSX Guidance" software. This same software is also used on the flagship models ZSX Primus IV and ZSX Primus VI, allowing application conditions to be shared. ZSX Guidance fully exploits the D-MCA, increasing efficiency and accuracy. The software has also been enhanced and includes a function that automatically acquires and displays measurement deviations in the analysis values, thereby reliably supporting routine analysis. The scheduler function further streamlines routine analysis management (automatic startup + automatic drift correction function), greatly reducing the amount of preparation work required prior to analysis operations.

Industry-specific application packages are available. The "Pre-Calibration Package," which stores calibration curves at the time of shipment, the "Application Package," which includes standard samples and analysis conditions, and the "Master Matching Library" for SQX (standardless analysis), which is specialized for certain types of products, are available to help users start up their analysis operations.

[Learn more >](#)

RIGAKU NEWS

Chocolate Easter bunnies made with ecstasy seized at Brussels airport: "It's pure MDMA"

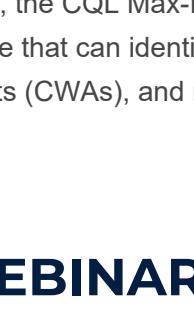
Belgian customs officer uses a Rigaku Raman analyzer to indicate what appears to be a chocolate bunny is actually ecstasy at Brussels Airport in Zaventem. The officer pressed his handheld scanner—which uses Raman spectroscopy to identify substances by their chemical fingerprint—against one supposed chocolate rabbit and took a reading. The screen flashed green and the analysis was clear: "Caution: MDMA (ecstasy)". The false chocolate bunnies had been posted in Belgium, addressed to a buyer in Hong Kong, only to be intercepted at the Brussels airport freight terminal.

[Read the full story here >](#)



A Belgian customs officer uses a "Raman" scanner which indicates that what appears to be a chocolate bunny is actually ecstasy at Brussels Airport in Zaventem on April 6, 2023.
KENZO TRIBOUILLARD/AFP VIA GETTY IMAGES

FEATURED APPLICATION NOTES



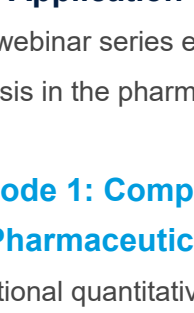
XRT

On-line Sulfur in Heavy Oils

Applied Rigaku Technologies

While in-line sulfur gauging—for blending, switching and QC—has been around for years, older technologies never delivered on their promise because those systems did not produce consistent measurements. For the accurate on-line determination of sulfur, the new Rigaku NEX XT resolves those past issues and is thus the right tool for blending operations supplying marine bunker fuels and crude feedstock for refineries. With uniquely engineered hardware and novel proprietary software technologies, the Rigaku NEX XT system is faster, more sensitive and far more compact than previous generation systems and provides continuous, reliable detection of sulfur from 200 parts-per-million (ppm) to 6.0 wt. %, with analysis times as short as 1 second.

[Read More >](#)



WDXRF

Fused Bead Analysis of Various Oxide Materials using OXIDE-FB-PAK

Rigaku Corporation

The fusion method in X-ray fluorescence (XRF) analysis is an effective sample preparation technique for getting accurate analysis results of powder samples, since the technique eliminates heterogeneity due to grain size and mineralogical difference. In addition, the homogenization of material property by vitrification makes it possible to expand the calibration range by the use of synthetic standards of fused beads with reagents or by using diverse reference materials. Rigaku provides an analysis package for various oxide materials by the fusion method, named "OXIDE-FB-PAK". This package covers 23 major and minor components with wide concentration ranges and so is applicable to a wide variety of materials, such as rock, mineral, ore, slag, refractory or cement.

[Read More >](#)



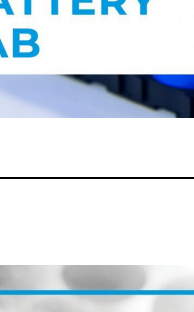
XRD

In-situ observation of structural changes accompanying charging-discharging of cathode materials of lithium ion batteries using a battery cell attachment

Rigaku Corporation

Controlling the state of the charge-discharge process is believed to be crucial for extending the life of lithium ion batteries. With previous methods, it was difficult to observe changes in materials accompanying charging-discharging via an X-ray diffraction measurement. However, with batteries made using a battery cell attachment, X-ray diffraction can be performed simultaneously with charge-discharge testing. Thus it is possible to carry out evaluation by directly relating changes in the state of samples to charge-discharge characteristics, without performing any additional work on the materials subjected to charge-discharge testing, such as opening seals or peeling electrodes.

[Read More >](#)



XRD

Qualitative analysis of a trace amount of pigments used in Japanese painting

Rigaku Corporation

Controlling the state of the charge-discharge process is believed to be crucial for extending the life of lithium ion batteries. With previous methods, it was difficult to observe changes in materials accompanying charging-discharging via an X-ray diffraction measurement. However, with batteries made using a battery cell attachment, X-ray diffraction can be performed simultaneously with charge-discharge testing. Thus it is possible to carry out evaluation by directly relating changes in the state of samples to charge-discharge characteristics, without performing any additional work on the materials subjected to charge-discharge testing, such as opening seals or peeling electrodes.

[Read More >](#)

50th MiniFlex ANNIVERSARY



SEND A HAPPY BIRTHDAY VIDEO MESSAGE TO RIGAKU.COM/MINIFLEX50

Since its introduction, the **MiniFlex** has consistently evolved and continually sets the standard with new innovations, despite the imitators that have come along over the years. This is a testament to the dedication of Rigaku's R&D team and their response to customer feedback and commitment to innovation.

Share your stories with your fellow MiniFlex users from around the world!

You can upload a photograph or a video message from your phone or computer. It will be displayed on the Rigaku website and the Rigaku YouTube channel.

[Visit the MiniFlex Anniversary page >](#)

IN THE NEWS

June 5, 2023: Engineers at Princeton University are deploying lasers to precisely **evaluate a major drawback of 3D-printed cement**—the material's resistance to fracture. The researchers hope that progress in this area could lead to a wider use of additive manufacturing in cement-based structures. The long-term goal is to develop better materials using additive techniques that lead to innovative designs and functions.

June 8, 2023: Japanese researchers now reveal a new way of activating a G protein-coupled receptor by triggering shape changes in the intracellular region of the receptor. This new process can help researchers **design drugs with fewer or no side effects**.

June 9, 2023: A joint research team from the Department of Chemical Engineering at POSTECH and the Department of Nano Engineering at Sungkyunkwan University (SKKU) has developed a technology for high-performance organic polymer semiconductor devices that exhibit both stretchability and electrical functionality, seeking to **preserve semiconductor performance even under deformation**.

June 23, 2023: Researchers have developed a metasurface that enables **strong coupling effects between light and transition metal dichalcogenides**. The concept of the newly developed metasurface provides a foundation for applications in controllable low-threshold semiconductor lasers, photocatalytic enhancement, and quantum computing.

June 26, 2023: John B. Goodenough, the Nobel Prize-winning engineer whose **contributions to developing lithium-ion batteries revolutionized portable technology**, has died. He was 100. Goodenough is credited with the crucial discovery and development in the 1980s of materials that would allow for a more stable and powerful rechargeable battery. He became the oldest Nobel Prize winner at 97 when he was awarded (with two others) the 2019 prize in chemistry for the development of lithium-ion batteries.

June 26, 2023: Rigaku Analytical Devices announces the launch of the **CQL Max-ID handheld 1064 nm Raman analyzer**, offering features and benefits that maximize chemical threat analysis in safety and security applications. With an on-board library of over 13,000 items, the CQL Max-ID provides first responders, border security, and the military with a device that can identify narcotics, explosives, toxic industrial chemicals, chemical warfare agents (CWAs), and more—without the concerns of fluorescence interference.

WEBINAR SERIES

XRD Application to Pharmaceuticals
This webinar series explains concepts of component analysis and standardless quantitative analysis in the pharmaceutical space

Episode 1: Component Analysis and Standardless Quantitative Analysis for Pharmaceutical Applications
Traditional quantitative analysis of solid form content in a solid sample is challenging. Most notably in the production of representative standard calibration samples covering the concentration range of interest. In addition to weighing, mixing and homogeneity errors, the resulting boutique standards will likely be not representative of the unknown material being analyzed.

The ideal solution has always been a Standardless Quantitative approach that is representative and relevant to the materials being studied. Component analysis using equal area scaling can make this ideal quantitative analysis solution a reality.

[Watch the Recording >](#)

PODCASTS

The Opioid Matrix is a podcast for anyone looking for the latest information in the illegal drug supply chain—beginning to end. Each episode will feature a discussion with industry experts about the current opioid crisis, including drug trafficking, drug manufacturing, drug identification, drug addiction, as well as the role of government, law enforcement, new health and social programs, and more.
[Listen to New Episodes >](#)

Understanding Semiconductors: Modern Metrology from Lab to Fab, is a podcast for engineering leaders in characterization, metrology, process, and analytics, looking for discussion around semiconductor metrology challenges. Each episode will feature a conversation with technology experts about problems facing the semiconductor metrology industry.
[Listen to New Episodes >](#)

The Battery Lab is a podcast empowering the researchers powering the future. Every episode features insights from the industry experts, leading academics and cutting-edge research advancing batteries — and society — to the next level of safety and efficiency. From raw materials to analysis to state-of-the-art designs, if you care about fueling the future, you've come to the right place.
Welcome to the Battery Lab!
[Listen to New Episodes >](#)

The Pharma Lab Show is a podcast exploring the technologies, analysis, and innovation that goes into bringing the pharmaceuticals that allow humanity to live longer, fuller, healthier lives. Each episode features interviews with industry leaders and experts who share how they are working tirelessly to bring these life-changing products into the world.
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