OCTOBER 2023, ISSUE 123

WELCOME

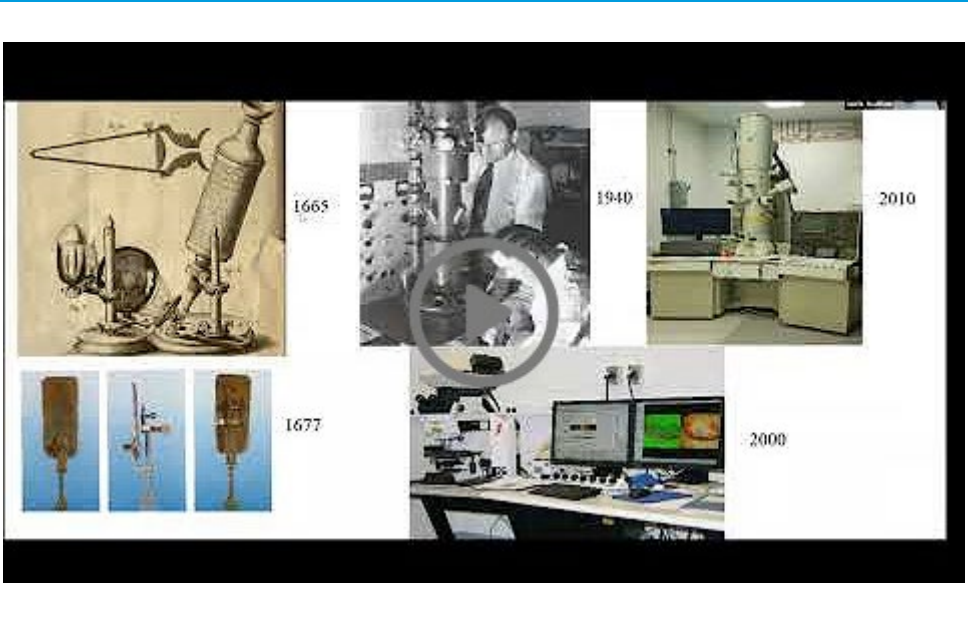
Although it's not a particularly significant time on the calendar, the arrival of November seems to indicate a time of transition. In the northern hemisphere, the days are getting noticeably shorter, the weather is turning colder in many places and, in most of North America at least, the clock is about to change as we "fall back" to daylight saving time. The end of another year, although not imminent, is within sight.

After last month's industry-specific newsletter, we return to a more general issue of *The Bridge.* Although Rigaku offers products in a wide range of categories, these products generally have one thing in common: they allow users to see things that, once upon a time, were considered invisible. Microscopy has been around for over 500 years, evolving from a device created by a father-son team (reminiscent of another father-son team who developed X-ray diffraction) to modern devices that exceed the optical limitations of light using electron beams, which are now incorporated in diffraction devices as well. In our video of the month, Dr. Joel Sheffield delivers an interesting presentation about the people who have advanced microscopy over the centuries, their inventions and the insights gleaned from their creations.

Even when something is visible to the naked eye, it's not always easy to say what the substance is in a timely fashion. The handheld Raman analyzers produced by Rigaku Analytical Devices allow law enforcement and related professionals to quickly and unequivocally identify drugs and other potentially dangerous materials in a matter of seconds, often without even opening the container.

Rigaku's ongoing webinar program includes discussions of sample preparation techniques for X-ray fluorescence experiments, a trend-setting process that allows users to study crystallization in situ, and details of how changes in the internal structure of batteries can be studied while they are charging and discharging. We also have links to a number of podcasts and some applications notes for your listening and reading pleasure on these long, cold, dark nights.

VIDEO OF THE MONTH



Once Invisible - History of Microscopy
Joel Sheffield, Ph.D., Emeritus Professor of Biology, Temple University

Introduction to the series of talks on the history of microscopy, and the formation of the Royal Society in London.

From its earliest uses in the seventeenth century to the present day, the microscope, in its many iterations has led to profound changes in the way that we view the world of nature, and ultimately ourselves. I view this series as a history of the individuals, the instruments, and the observations that have led us to our current understanding of the organization of life. This is not to slight the profound contributions of chemistry and biochemistry, but to provide a structural basis, an architecture, on which to mount those efforts. I also hope to convey the excitement of the researchers as they probed deeper and deeper into the mysteries of life. Each of these topics will be presented as a blend of historical background and appropriate theory, and a surfeit of images.

One of a series of talks derived from presentations in Spring of 2021 offering a personal view of the high points in the history of microscopy from 1660 to the recent present.
Watch the video >

UPCOMING EVENTS

Lab Innovations 2023
November 1 - 2, 2023 Birmingham, UK
Website

CBRNe Convergence 2023
November 8-9, 2023 Knoxville, TN
Website

Rigaku Powder X-ray Diffraction UK User Meeting
November 13, 2023 Didcot, UK
Website

Webinar: XRF Analytical Considerations for the Oxidation Fusion Methods
November 15, 2023 Webinar
Register now

Webinar: How to Run in Operando XRD Experiments
November 15, 2023 Webinar
Register now

TOPIQ Webinar: Flow-XI: A New UK Facility for the Analysis of Crystallisation in Flow Systems
November 15, 2023 Webinar
Register now

Rayons X et Matière 2023
November 23 - 24, 2023 Bordeaux, France
Website

Thermal Analysis Webinar: Let's evaluate materials with DSC
November 22, 2023 Webinar
Register

Materials Research Society (MRS2023)
November 26, 2023 - December 1, 2023 Boston, MA
Website

PRODUCT IN THE SPOTLIGHT

The Handheld CQL Narc-ID 1064 nm Raman Analyzer

Rigaku Analytical Devices announces the launch of the handheld CQL Narc-ID 1064 nm Raman analyzer for the presumptive identification of narcotics, precursor chemicals, and cutting agents - even in non-visible amounts with the optional QuickDetect feature. Designed for counter-narcotic agencies, law enforcement, crime laboratories, prison facilities, customs agencies, or public safety efforts, the CQL Narc-ID can have a direct impact on protecting communities from dangerous chemicals that currently pervade through the illicit drug supply market. The utilization of 1064 nm Raman technology means users have the ability to scan through translucent packaging and identify dirty or mixed substances at the point of need, a common issue for older Raman technology.

The CQL Narc-ID joins Rigaku's portfolio of existing handheld 1064 nm Raman analyzers, including the CQL Max-ID and the CQL Gen-ID. The Narc-ID is different in that it was developed specifically for narcotics analysis. This means users benefit from a smaller, focused, specialized library, specialized algorithms with an optimized result output, as well as the ability to easily create PDF reports for evidentiary needs.

The on-board library contains an extensive list of narcotics, precursor chemicals, cutting agents, pharmaceuticals, steroids, and more. Users benefit from a library that is built and validated directly on the device, rather than spectra purchased and imported from third parties. Users have access to the latest cathinones, cannabinoids, fentanyls, opioids, tryptamines, amphetamines, nitazenes, and more.

Other features unique to the new CQL Narc-ID Raman analyzer include:

- Rapid results that are easy to interpret
- Identify bulk (with Raman) and trace levels of substances (with optional QuickDetect)
- Automated recipe monitoring with 4C Technology
- Ability to build and add user items with configurable library management
- Operate a streamlined GUI via button or touchscreen
- Add memos and pictorial evidence to PDF reports using on-board camera for traceability
- Transfer results via WiFi, USB, or Peer-to-Peer
- Compatible with Rigaku's CommandSuite Fleet Management software
- Certified environmental ruggedization with MIL-8010G / IP-68 certification
- Long batter life of over 5 hours (also hot swappable)
- 2 years of warranty coverage

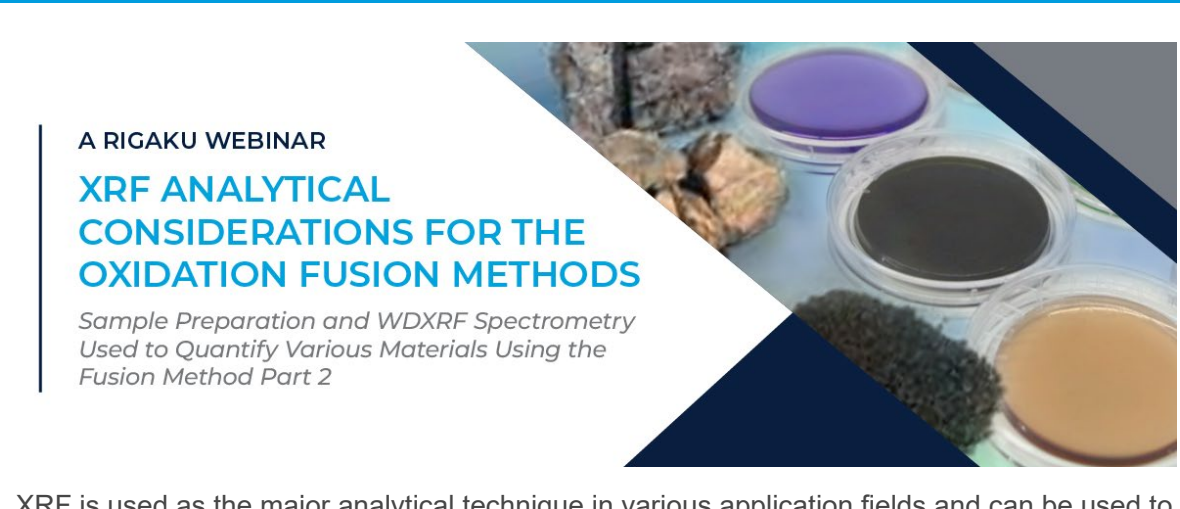
"We're pleased to offer users focused on counter-narcotics applications a cutting-edge solution to replace older technology," said Chris Langford, VP Marketing & Product Management. *"All communities are being negatively impacted by the dangerous illicit drug supply chain, and we have reacted to the need for new presumptive testing capabilities with the release of the CQL Narc-ID."*
Read more >

IN THE NEWS

October 16, 2023: A team from Argonne National Laboratory, University of Wisconsin-Milwaukee, and Stanford University used transmission electron microscopy and X-ray techniques to observe the defects that lead to failure in sodium-ion battery cathodes. Using the insights gained from this study, battery developers may be able to create cathodes for sodium-ion batteries with virtually no defects. These new devices could cost less than current lithium-based batteries and have longer lifetimes.

October 17, 2023: Through a National Science Foundation Future Manufacturing Research Grant, a team of scientists at Arizona State University are exploring new techniques for manufacturing cement to reduce carbon emissions through a synergy of novel energy sources and alterations in the processes and ingredients used.
October 17, 2023: By using neutrons to visualize the additive manufacturing process at the atomic level, ORNL scientists have shown they can measure strain in a material as it evolves and track how atoms move in response to stress. When combined with infrared imaging and computer modeling, this system provides unprecedented insight into material behavior during manufacturing.
October 25, 2023: Researchers from the Fraunhofer Institute for Solar Energy ISE and the University of Warsaw have demonstrated perovskite photovoltaic cells with significantly improved optoelectronic properties. These cells have a nanoimprinted structured anti-reflective layer with a manufactured honeycomb texture to enhance its performance that could help commercialization of the material in photovoltaic panels on a wider scale.
October 26, 2023: A team of chemists at Columbia University described the fastest and most efficient semiconductor yet: a superatomic material called $Re_6Se_8Cl_2$. In experiments run by the team, acoustic exciton-polarons in $Re_6Se_8Cl_2$ moved fast -- twice as fast as electrons in silicon -- and crossed several microns of the sample in less than a nanosecond.

WEBINARS



XRF is used as the major analytical technique in various application fields and can be used to test the quality of various materials.

The Webinar will focus on various applications used to test the quality of a wide range of materials. The most important is the sample preparation of the various types of materials to obtain accurate and precise results.

During the analysis of powders by XRF, sample inhomogeneity due to segregation, grain size, and mineralogical effects influence the intensity and cause errors. The fusion method is beneficial in that the matrix and mineralogy are destroyed. This method means a laboratory only requires one calibration method for the analysis of a wide range of elements.

The analytical considerations are discussed when setting up the analytical method.

Some materials like ferro alloys , sulphide and carbides require a oxidation fusion.

The fusion method is a reference method that can be used to certify inhouse secondary reference materials for your laboratory. Advantages of fusion:

- Analysis error due to grain size and mineralogy removed
- Matrix effect is reduced due to dilution
- Standards can be prepared synthetically
- Wide oxide calibration to analyse all sample types (oxides, non-oxides including metals, sulphides, carbides, and graphite)
- Analytical accuracy is improved for a variety of samples broadening possible applications by fusion
- Wide oxide fusion method can be setup to analyse all materials in your laboratory

During the 45-minute complimentary Webinar you will be hosted by an XRF Specialist from Rigaku on the accurate analysis of the various materials. During the Webinar Rigaku will show you how to develop and setup a fusion method and what to consider when fusing different materials like ferro alloys , sulphide and carbide materials that require oxidation. The webinar concludes with a Q&A session — your chance to put any specific questions you have.

Dates/times
Wednesday, November 15, 2023 - 02:00 CST
Wednesday, November 15, 2023 - 09:00 CST
Register >

TOPIQ
QUICK WEBINARS BY RIGAKU

Flow crystallography is a technique where crystallization processes can be studied in situ by passing a crystallization mixture through an X-ray beam and detecting diffraction from crystals and crystallites.

FlowXl is a new research facility at the University of Leeds that enables state-of-the-art analysis of crystallization processes in-situ through combined Raman spectroscopy and powder X-ray diffraction.

Dr Thomas Turner is a post-doctoral research associate in instrument design and flow systems at the School of Chemistry, University of Leeds. He completed his doctoral studies at the University of Leeds, where his research interests were focused on crystallization and the characterization of organic and pharmaceutical materials, in particular the study of nucleation using in-situ synchrotron X-ray scattering. Currently, his research focus is on the development of a new EPSRC funded national facility, FlowXl, which utilizes state of the art in-situ X-ray diffraction combined with Raman spectroscopy to probe nucleation and crystallization processes of materials in flow.

Date/time
Wednesday, November 15, 2023 - 09:00 CST
Register >

Did you know that you can collect XRD data while charging/discharging a lithium ion battery (LIB)?

Despite the significant advancement of LIB technology, further improvements and optimizations are still required to solve challenges such as energy density, cycle life, and safety. In operando XRD can help us gain a fundamental understanding of the reaction mechanisms in physical and chemical processes during LIB operation.

In the webinar, you will learn the best practices, how to prepare samples, and best ways to configure your in operando XRD experiments. You will see both application examples of liquid and solid-state electrolyte batteries.

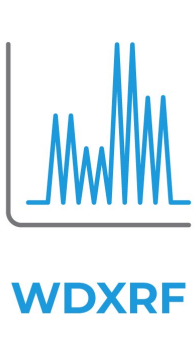
Date/time
Wednesday, November 15, 2023 - 13:00 CST
Register >

FEATURED APPLICATION NOTES

EDXRF

Low Silicone Coating on Plastic
Applied Rigaku Technologies

Thin silicone coating is excellent at reducing the ingress of water and oxygen into packaged products. Applications include plastics used for food packaging as well as pharmaceutical and medical packaging. Specialty plastics are also often coated with a thin silicone coating used as a barrier or release coating. Rigaku NEX QC+ analyzer meets the challenges of the coated plastics industry with several modern features. In this application note, the analysis of low silicone coating on plastic is demonstrated.
Read More >



WDXRF

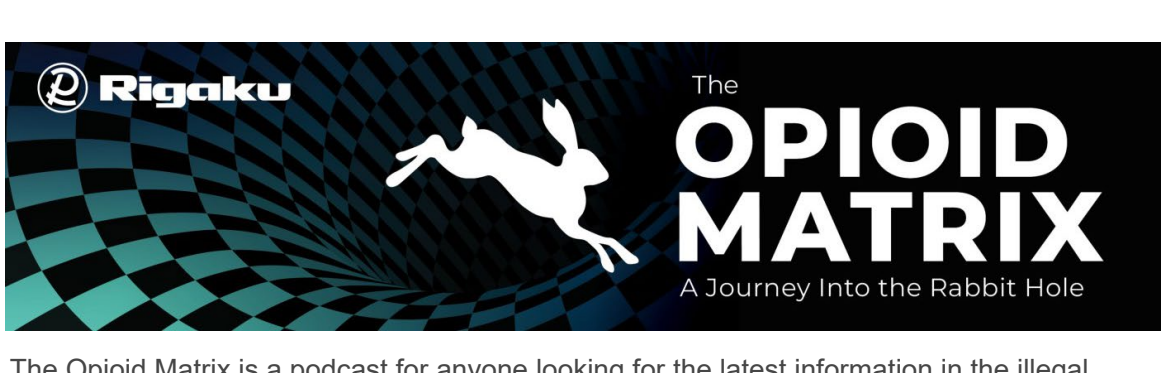
Cement Raw Meal Analysis by Pressed Powder Method on the ZSX Primus III NEXT
Rigaku Corporation

Cement is one of the most important materials for construction. Various physical properties are given to cement by changing the mineral composition of clinker; therefore, it is important to control the chemical composition of cement raw meal. XRF spectrometry has been used for chemical composition analysis in cement production processes owing to its simple sample preparation, rapid analysis and high precision. This application note demonstrates quantitative analysis for cement raw meal by the pressed powder method on Rigaku ZSX Primus III NEXT, a sequential wavelength dispersive XRF spectrometer.
Read more >

PODCASTS

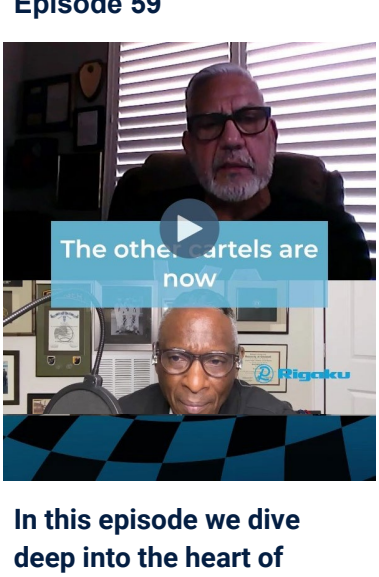
The Battery Lab is a podcast empowering the researchers powering the future. Every episode features insights from the industry experts, leading academics and cutting-edge research advancing batteries — and society — to the next level of safety and efficiency. From raw materials to analysis to state-of-the-art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

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 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 >

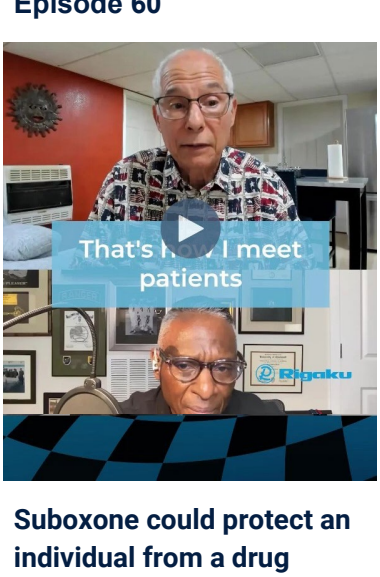
Episode 59



In this episode we dive deep into the heart of Mexico, exploring its complex relationship with the drug cartels.

With over 25 years of experience in the field, we have retired U.S. DEA agent Ralph Villarruel on the show, giving us the ground truth...of the cartel reality. Ralph was one of the lead investigators in the cartel murder case of DEA Special Agent Kiki Camerena in 1985. and has seen things that most cannot fathom. In this riveting conversation, we take a closer look at the chilling transformation of Mexican cartels, including their evolution of tactics and trends in violence and brutality. We also delve into the dark world of money laundering, migrant exploitation, and the unintended consequences of border policies.
Listen Now >

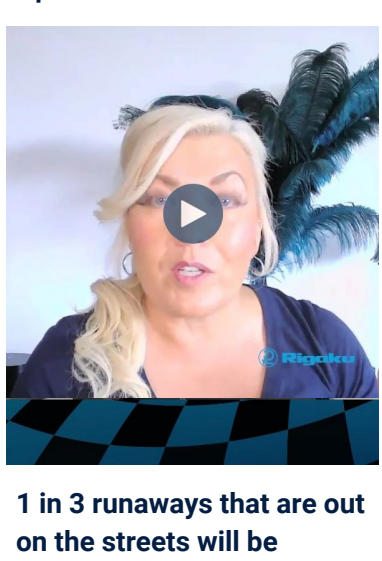
Episode 60



Suboxone could protect an individual from a drug overdose, but the one thing that will keep them in recovery is *love*.

In this episode we're joined by Dr. Schuyler Geller, who has an extensive background in international teaching, patient care, and health care leadership. Previously a Medication-Assisted Recovery Physician, and currently a Hospitalist for the U.S. Department of Veterans Affairs, his humanitarian spirit shines bright throughout this entire discussion. Together we delve into the need for comprehensive approaches, including medication-assisted treatment and harm reduction strategies, in order to save lives and support recovery. Dr. Geller highlights the importance of understanding addiction as a chronic relapsing brain disease and emphasize the significance of immediate intervention and treatment due to the high risk of relapse and mortality associated with opioid use.
Listen Now >

Episode 61



1 in 3 runaways that are out on the streets will be solicited by a sex buyer, or engaged with a trafficker.

In this revealing conversation, our guest Heidi Chance shares her powerful transition from a routine patrol officer, to an undercover detective focused on combating sex trafficking. Heidi sheds light on the face-to-face encounters she's had with vulnerable juveniles, as well as their captors, and the heart-wrenching stories that lead her to take action. You'll hear about the challenges of working with limited resources in a high-demand field, as she paints a vivid picture of the complexities and dangers involved in her work. Heidi's passion for mitigating this crisis has led to the conception of A Chance for Awareness, a program that offers law enforcement training, as well as community sex trafficking awareness via her coaching, training and presentations.
Listen Now >

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