



July 2023, ISSUE 120

WELCOME

Pink is the color of the week, thanks to a newly released film that has people dressing in that color while attending it. A wildlife photographer recently captured an image of an unusual sight in the waters of Corpus Christi, Texas. The dolphin he photographed breaching in front of a boat had a pink belly. This phenomenon is apparently caused by vasodilation, a way for the mammals to dump excess heat during summer months in warm waters. Blood near the surface of the skin causes the pink coloration.

Everyone's talking about heat these days, as the planet experiences a series of record high temperatures. June 2023 was the hottest June ever, and July 4th was, according to some metrics, the globe's hottest day ever, a record that was overtaken by July 5th and again by July 6th. The old saying is, it's not the heat—it's the humidity. It turns out that it's not just the humidity—it's the dew point that best describes the atmosphere's ability to hold moisture. The dew point is the temperature at which the atmosphere is saturated—where relative humidity reaches 100%. The temperature and relative humidity can fluctuate wildly over the course of a day, particularly in southeast Texas, whereas the dew point is much more consistent. When the dew point exceeds 65 degrees, our bodies can definitely feel the extra moisture in the air. And there's little relief in sight.

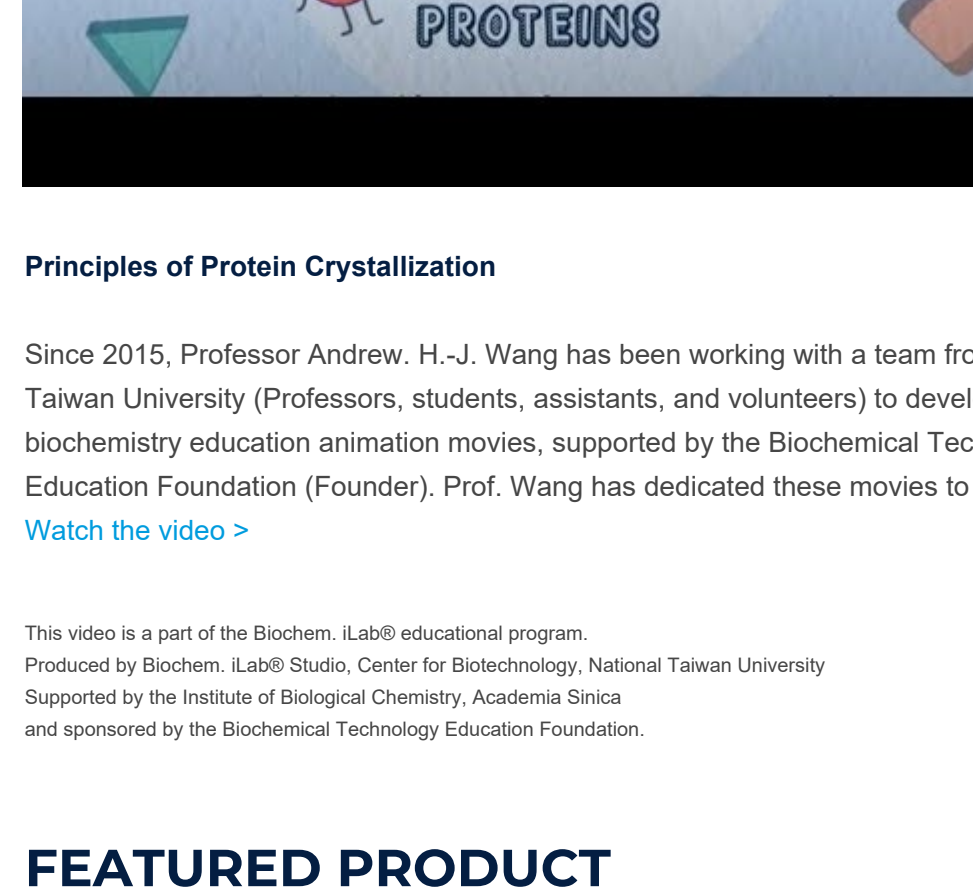
In the midst of this onslaught of heat, [Applied Rigaku Technologies](#) in Austin relocated their offices. The new address is 1405 Arrow Point Drive, Suite 1301, Cedar Park, TX 78613.

This month, we present talks from our semiconductor forum, introduce the CQL Max-ID Raman analyzer and celebrate the longevity of Rigaku instruments, as well as providing links to videos, application notes and news items of interest.

RIGAKU FORUM

2023 Semiconductor Forum: Metrology tools from Lab to Fab.

We want to thank all the attendees of our first-ever Rigaku Semiconductor Forum 2023. Our exceptional speakers made the forum informative and engaging, providing valuable insights and perspectives. We appreciate your support and active participation throughout the event. Your expertise and dedication to advancing knowledge in the semiconductor field have significantly contributed to the growth and vitality of our community. The two-day hybrid event was organized by Rigaku Europe SE and Rigaku Semiconductor Metrology Division. We hope that you found the forum valuable and enjoyable. To access the presentations, please visit our [2023 Semiconductor Forum Content Hub](#). For further information, kindly email us at rsmid@rigaku.com



Dr. Abner Bello
Lab to Fab: The Metrology FOUF (M-FOUF)

Metrology from Lab to Fab at the Rigaku Semiconductor Forum from June 20-21, 2023 online and in-person at Frankfurt, Germany.

PRESENTATION ABSTRACT

The speaker, Dr. Abner Bello, is the head of the Specialty Measurements Group at Corning. His role involves designing and integrating custom metrology equipment to support research and development as well as manufacturing. He holds a Ph.D. in Applied Science from the University of California at Davis/Livermore.

During his presentation, Dr. Bello guided the audience through a discussion on the process of transferring metrology techniques from the laboratory to the production facility. He presented three case studies, namely Thermo-Wave ThermoProbe, Rudolph Technologies, and VDP/TXRF. Additionally, he discussed the Fab Schematic layout and introduced his approach to transferring a tool to the production facility, highlighting the benefits and drawbacks of this application.

The metrology-FOUF (Front Opening Unified Pod) is an instrument found within a standard wafer carrier system. It eliminates the need to transport the FOUF with wafers to a separate metrology tool, as wafers can be measured directly within the FOUF during loading. This saves time in transporting wafers, which is especially important in a semiconductor lab where the metrology-FOUF may be stationed at a process tool being serviced. Multiple measurements from a set of samples define a design of experiments that may be required. The metrology-FOUF is a more cost-effective solution compared to a Fab-ready ellipsometer. This report describes how the Metrology-FOUF is integrated into a semiconductor Fab.

VIDEO OF THE MONTH



Principles of Protein Crystallization

Since 2015, Professor Andrew H.-J. Wang has been working with a team from the National Taiwan University (Professors, students, assistants, and volunteers) to develop a suite of biochemistry education animation movies, supported by the Biochemical Technology Education Foundation (Founder), Prof. Wang has dedicated these movies to IUBMB.

[Watch the video >](#)

This video is part of the Biochem. iLab® educational program.
Produced by Biochem. iLab® Studio, Center for Biotechnology, National Taiwan University
Supported by the Institute of Biological Chemistry, Academia Sinica
and sponsored by the Biochemical Technology Education Foundation.

FEATURED PRODUCT



CQL Max-ID

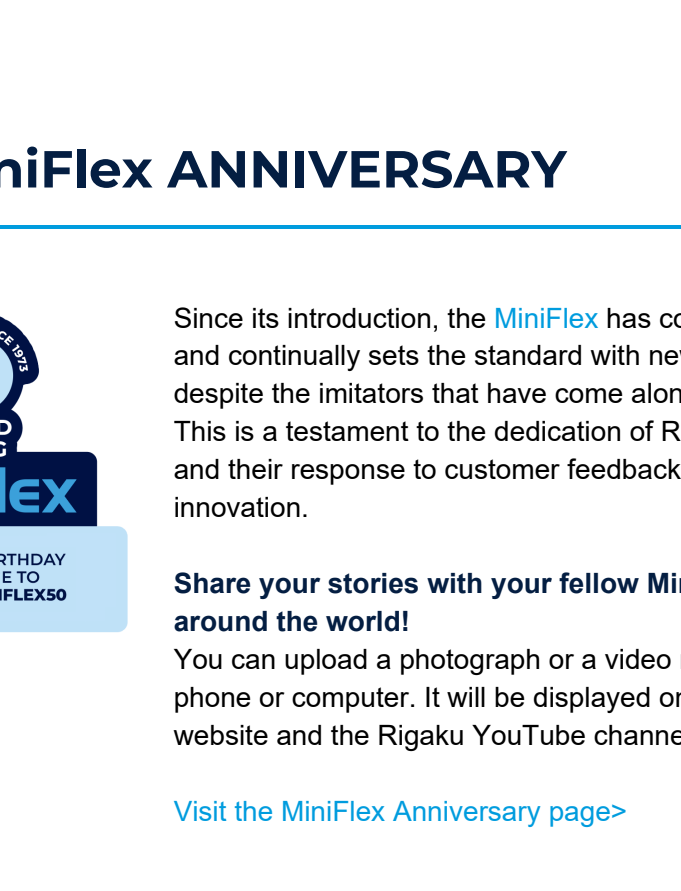
Rigaku Analytical Devices announces the launch of the **CQL Max-ID handheld 1064 nm Raman analyzer**, offering features and benefits that maximize chemical analysis in safety and security applications. With an on-board library of over 13,000 items, the CQL Max-ID provides first responders, border security, 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.

Based upon the award-winning Rigaku 1064 nm Raman-based platform, the CQL Max-ID reduces sample induced fluorescence interference, ensuring a result within less than one minute. With the ability to select the analysis mode, the CQL Max-ID has the unique capability of providing situational analysis based on the user's needs:

1. Identification of an unknown
2. Priority listing of a substance (utilization of ThreatAlert hazard targeting)
3. Detection of an unknown (with optional QuickDetect)

Additional features available on the new CQL Max-ID include:

- Automatic mixture analysis of up to five components
- Addition of notes and pictorial evidence using an on-board camera
- Adjustable nose cone to scan through different thickness and types of packaging
- Integrated Chemwatch SDS information
- Pre-configured setting selections based on application
- CommandSuite integrated fleet management capability
- Long battery life of over five hours (also hot swappable)
- Connectivity to desktop or mobile device via USB, Wi-Fi or Peer-to-Peer
- Three years of warranty coverage



"With the integration of the Rigaku CQL Max-ID into our portfolio of handheld Raman analyzers, we are expanding chemical solutions for our end users that truly fit their needs," said Chris Langford, VP Marketing & Product Management. "We're excited to continue to develop based on feedback from the field, as we want to ensure our customers are equipped with the most advanced tools for everyone's safety."

Built upon the updated CQL platform that has been accepted as part of the U.S. DoD JPEO DR SKO System Modernization Program, the CQL Max-ID joins the existing **CQL Gen-ID**—for more general hazardous analysis—with the ability to offer more targeted CQL variations in the future.

The Rigaku CQL Max-ID is supported by Rigaku's global sales and distribution channels, offering 24/7 reachback support and access to [spectral library and software updates](#). For more information on the CQL Max-ID, please visit: www.rigakuanalytical.com.

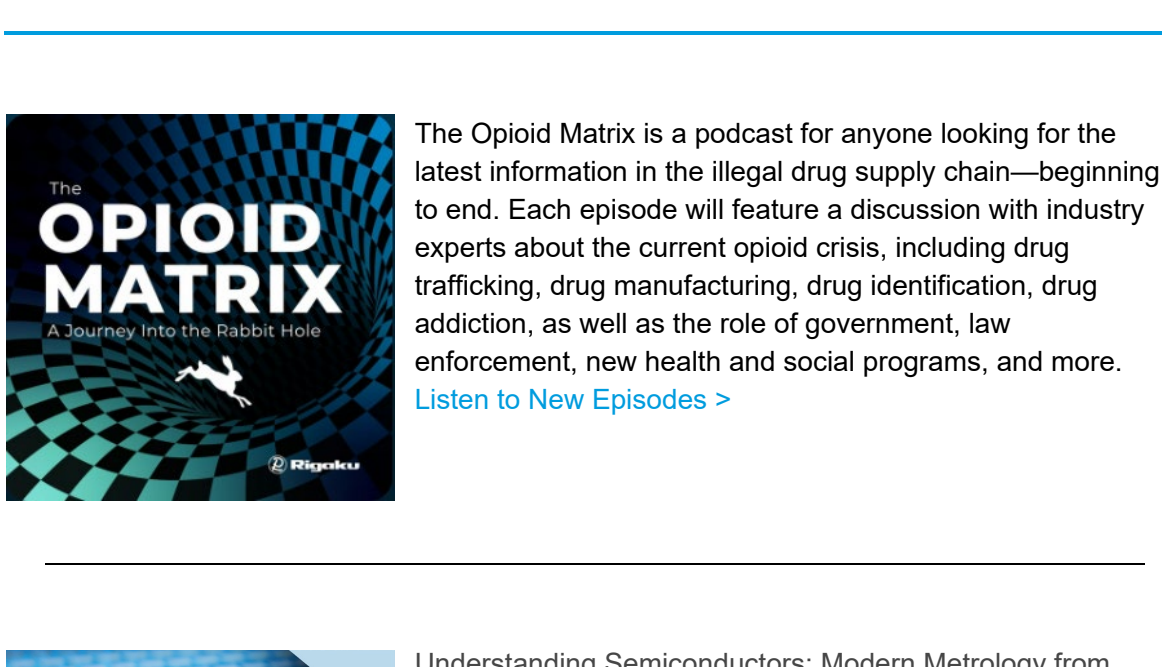
[Follow Rigaku Analytical Devices on LinkedIn!](#)

RIGAKU NEWS

LabCri has the oldest XRD Rigaku system in operation in Brazil.

We had an interesting email recently from Prof. Dr. Carlos Bastilio Pinheiro, current user of a Rigaku Geigerflex X-ray diffractometer that was installed at the [Universidade Federal de Minas Gerais](#) in 1977 (featured in the 2019 Issue of *The Bridge* and on [LabCri's Instagram page](#), where it is billed as the oldest Rigaku XRD system in operation in Brazil). This 46-year-old system, a θ-2θ type system configured in Bragg-Brentano geometry, has undergone several upgrades and adaptations over the years, and is still in use for student training (alignments, tube spectra) and for measurements with special wavelengths. It is also used to align large crystals using the Laue technique.

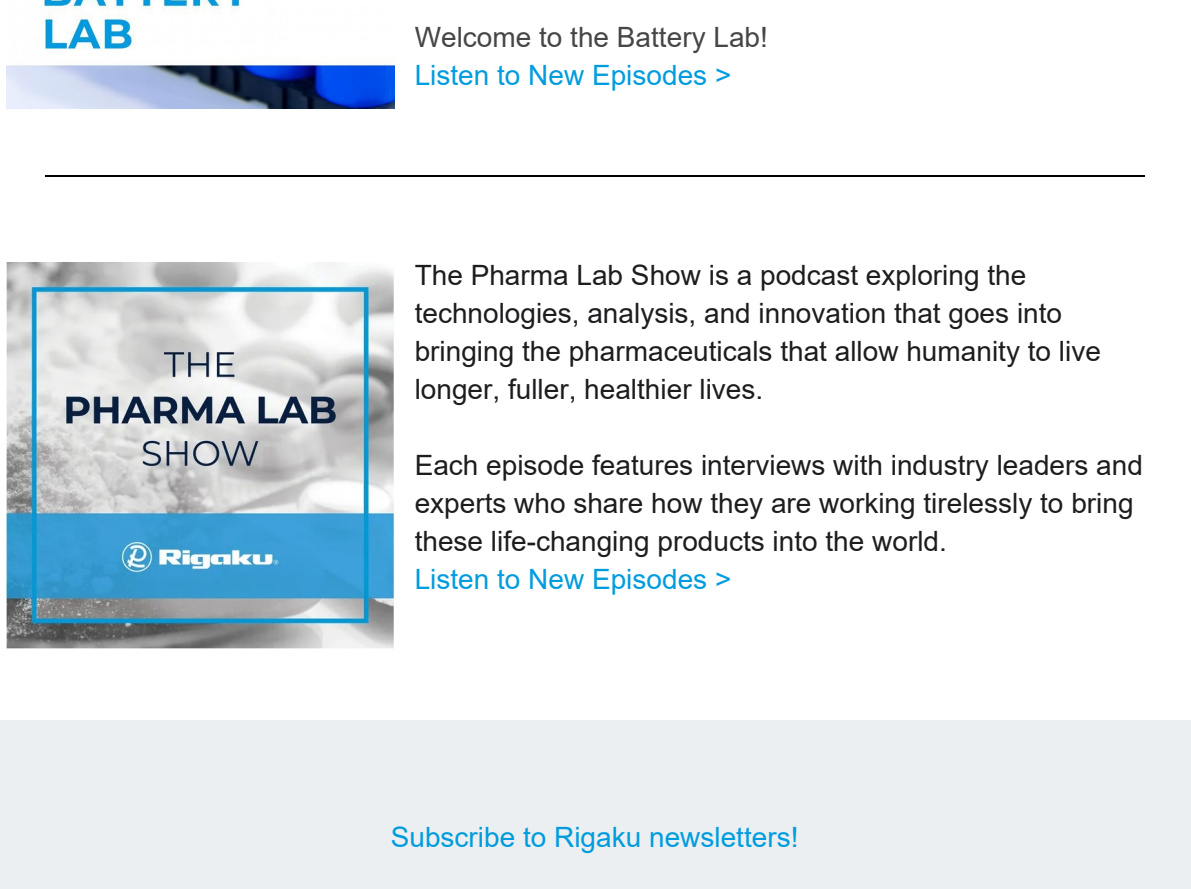
We love hearing about these vintage systems in operation, so if you know of any others, please let us know.



Discover the power of materials science

Rigaku's Live Demonstrations at FEMS EUROMAT23

FEMS EUROMAT 2023, the leading international conference on the latest advances in materials science and technology, will be held **September 3-7 in Frankfurt, Germany**. Rigaku plans to captivate the audience with live demonstrations of the **MiniFlex** in its booth. By seeing the instrument in action, attendees will have a unique opportunity to see firsthand how our cutting-edge technology can help them gain valuable insights into the materials they work with. From crystallographers to metallurgists or other materials-related disciplines, everyone will find something of interest at the Rigaku booth.



FEATURED APPLICATION NOTES



Quality and Process Control Analysis of Natural and Processed Iron Ores by the Pressed Powder Method

Rigaku Corporation

For powder samples in X-ray fluorescence spectrometry, the pressed powder method is the best solution in terms of speed and simplicity. Since iron ores have complex matrices owing to their varied mineral compositions, appropriate corrections for these matrix effects are required in XRF analysis. The conventional correction technique for total iron is a method using Compton scattering as an internal standard, but it has not been rigorous enough to meet the requirements of the iron ore industry. Rigaku developed an improved Compton scattering method by integrating theoretical alpha corrections to significantly improved analytical results. This note demonstrates an improved method to determine total iron in natural and processed iron ores by the pressed powder method using the new **ZSX Primus III NEXT**.

[Read More >](#)

Iron Oxide in Silica Sand

Applied Rigaku Technologies, Inc.

One of the major uses of silica sand is to make glass, and in particular, glass bottles. The iron content is one of the major factors that affect the color of the glass. Low iron sands are used to produce clear glass for bottles, while sand with higher iron content is used to make amber glass bottles. Thus, both at the quarry site and in the manufacturing process, monitoring the iron content is very important to ensure the quality of the glass products. The Rigaku NEX QC is an ideal tool for reliably measuring the iron content in sand and can be used at the quarry along the production line to help ensure the highest quality while minimizing wastes and cost overruns.

[Read More >](#)

50th MiniFlex ANNIVERSARY



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

July 5, 2023: Engineers at the University of Illinois Urbana-Champaign have developed a [new test that can predict the durability of cement in seconds to minutes](#), rather than the hours it takes using current methods. The test measures the behavior of water droplets on cement surfaces using computer vision. The new study could help the cement industry move toward rapid and automated quality control of their materials.

July 14, 2023: Researchers from the US Department of Energy (DOE)'s Pacific Northwest National Laboratory (PNNL) have found that a [derivative of starch can boost the capacity and longevity of a next-generation flow battery design](#). The novel flow battery, designed for electrical grid energy storage, maintained its capacity to store and release energy for more than a year of continuous charge and discharge.

July 19, 2023: A team led by researchers at Penn State has developed a [new thermoelectric cooler that boasts a much higher cooling power and efficiency](#) than current commercial thermoelectric units. This new thermoelectric cooler may help control heat in future high-power electronics. The new thermoelectric device showed a 210% enhancement in cooling power density compared to the leading commercial device while potentially maintaining a similar ratio of useful cooling to energy required.

July 19, 2023: A team of researchers from the Georgia Institute of Technology is using [aluminum foil to create batteries with higher energy density and greater stability](#). The team's new battery system could enable electric vehicles to run longer on a single charge and would be cheaper to manufacture and have a positive impact on the environment.

July 19, 2023: Scientists have witnessed [pieces of metal crack then fuse back together without any human intervention](#), overturning fundamental scientific theories in the process. If the newly discovered phenomenon can be harnessed, it could usher in an engineering revolution—one in which self-healing engines, bridges and airplanes could reverse damage caused by wear and tear, making them safer and longer-lasting.

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.

[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.

[Listen to New Episodes >](#)

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