



SEPTEMBER 2020, ISSUE 87

WELCOME

October is upon us and, after a very quiet summer with respect to conferences and exhibitions, we are fully embracing the new Virtual Event model employed by many organizers. We look forward to participating in [analytica 2020](#) toward the end of the month, along with other regional events.



Please join us on Wednesday, October 14, at 1 PM CDT for a 3D look at the structures of a reptile, insects and a mouse, including their stained organs. In the newest episode of the webinar series "X-ray Computed Tomography for Materials & Life Sciences," we will discuss how to deal with unique challenges in life science sample preparation and introduce some quantitative analyses. You can register for the webinar [here](#).

Previously in this series, we have shown the value of using X-ray Computed Tomography (CT) for everything from generic and brand name tablet comparison to drill-core pore network analysis. Be sure to check previous webinars [here](#).



We would also like to invite you to join us in a virtual, interactive roundtable discussion—moderated by [Rigaku Analytical Devices](#) in partnership with [American Pharmaceutical Review](#)—with pharmaceutical industry professionals. We will discuss how handheld Raman technology has transformed workflows and maximized quality insight in their organizations. Panelists will review some of their own real-world challenges and successes in the implementation of handheld 1064 nm-based Raman instrumentation. Join us at the Virtual Roundtable Discussion [here](#).

Finally, [welcome news](#) was reported by JP Morgan at the beginning of September. The global manufacturing sector posted its fastest growth in nearly 21 months in August of 2020. An optimistic outlook for many working in this industry in what has been a difficult period for most sectors. It provides reassurance for those planning to invest in materials analysis infrastructure and instrumentation.

UPCOMING RIGAKU EVENTS

FLORIAN 2020

October 8-10, 2020
Dresden, Germany

ACS SERMACS 2020

October 14-17, 2020
New Orleans, LA

analytica 2020

October 19-23, 2020
Virtual Conference

[VIEW MORE](#)

UPCOMING RIGAKU WEBINARS

Best Operating Practices for XRF Users Including the Importance of Sample Preparation

October 22, 9 AM & 2 PM | CDT

Quality Control in industry is imperative, this webinar will highlight the XRF best operating practices that will ensure the daily monitoring and compliance of quality control data. The fundamentals to stable, reproducible analytical results from your XRF spectrometer is not only a stable, working spectrometer, but also a stable, reproducible sample preparation that is appropriate for the material being measured. Choosing an appropriate sample preparation method depends both on the material itself, and on the limitations of the analytical technique with respect to the elements you wish to analyze. During this 1-hour complimentary webinar, specialists from Retsch and Rigaku will present the background to sampling and sample preparation.

[Read More >](#)

X-ray Computed Tomography for Materials & Life Sciences 8: Metrology Applications

December 16, 1 PM | CDT

Basics of metrology analysis and a number of X-ray CT application examples will be discussed. Examples include size and shape measurements of metal and plastic parts, tolerancing evaluation, comparison of nominal (CAD) and actual (CT) or a golden standard and a test subject. We will also introduce available resources to learn more about X-ray CT metrology.

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FEATURED JOURNALS & REPORTS



Journals

Study of the physical properties that confer string cheese with its texture and taste

By *Jungeun Kim, Keigo Nagao and Akihito Yamano, Rigaku Corporation*

String cheese, which has a texture similar to that of jerky, the taste of fresh cheese, and strands that can be split apart, is a type of immature natural cheese. Natural cheese is generally prepared by adding lactic acid bacteria and rennet to milk, followed by adding salt to the coagulated milk protein to solidify it. String cheese is made from natural mozzarella cheese. After soaking the mozzarella cheese in hot water at 80°C, it can be stretched into a bar shape at room temperature and folded in half.

[Read More >](#)

Water analysis by X-ray fluorescence spectrometry using UltraCarry®

By *Shohei Uemura and Takao Moriyama, Rigaku Corporation*

X-ray fluorescence (XRF) analysis has a wide range of applications because it allows quick and non-destructive qualitative and quantitative analysis of contained elements with simple sample preprocessing and has excellent measurement reproducibility. It is used in the industrial fields of steel, non-ferrous metals, mining, petroleum, ceramics, cement, and for R & D and quality control of electronic materials such as multilayer capacitors and piezoelectric elements.

[Read More >](#)

Unique new features for structure analysis in the Powder XRD plugin of SmartLab Studio II

By *Akito Sasaki, Akihiro Himeda, Rigaku Corporation*

The procedure of *ab-initio* crystal structure analysis from powder XRD data is complicated even for experienced users, not to mention for non-experienced ones. Furthermore, you have to evaluate whether the result obtained at each step is correct or not before going on to the next. Therefore, it is necessary to combine information about the physical and chemical properties of the target compound with your crystallographic knowledge. In other words, more advanced skill is required compared to single-crystal structure analysis.

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Reports

Rigaku Virtual Analytical X-ray Convention 2020

By *Rigaku Americas Corporation*

Rigaku held its first online X-ray Convention (RAXC 2020) on August 4–6, 2020. The event was a great success with over 1,500 attendees and more than 4,000 presentation views during the three-day technical program. The program was segmented into three channels, each live broadcasting equipment demonstrations and technical seminars associated with the X-ray diffraction, X-ray fluorescence and X-ray imaging techniques.

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FEATURED PRODUCTS



nano3DX

Rigaku nano3DX is a true X-ray microscope (XRM) with the ability to deliver 3D computed tomography (CT) images of relatively large samples at high resolution. This is accomplished by using a high-powered rotating anode X-ray source and a high-resolution CCD detector. The rotating anode provides for fast data acquisition and the ability to switch anode materials easily to optimize contrast for specific sample types.

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CT Lab HX

Rigaku CT Lab HX is a high-performance benchtop X-ray micro-CT system with the most powerful X-ray source in its class (130 kV, 39 W). The CT Lab HX has the advantage of a small footprint with low running costs. The powerful X-ray source covers a wide variety of applications, from polymer and bones to electronics and metals, and enables fast data collection at 18 seconds per scan.

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FEATURED APPLICATION NOTES



EDXRF

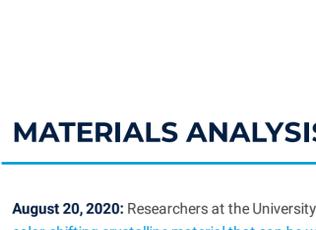
Gold Alloys

Applied Rigaku Technologies

Alloys of gold, silver and base metals are used for many purposes, including jewelry making and refining to pure precious metals. Gold is very soft, and often palladium or platinum is mixed in the alloy to harden the gold when making jewelry and other gold alloy items. At the mine site, initial extraction and primary refining may be performed to establish initial gold and silver semi-pure alloy content before sending material for final refining. The Rigaku NEX QC EDXRF analyzer offers a simple, non-destructive and low-cost analytical technique for measuring alloy chemistry of doré bars, ingots and foils, as well as other gold alloy materials.

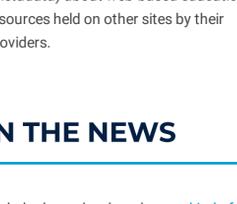
[Read More >](#)

FEATURED VIDEO & USEFUL LINK OF THE MONTH



The Chemistry of X-rays

X-rays are often used in characterization of chemical compounds. This video presents some general and specific background information on the chemistry behind X-rays.



National Science Digital Library

The National Science Digital Library provides high-quality online educational resources for teaching and learning, with current emphasis on the sciences, technology, engineering, and mathematics (STEM) disciplines both formal and informal, institutional and individual, in local, state, national and international educational settings. The NSDL collection contains structured descriptive information (metadata) about web-based educational resources held on other sites by their providers.

MATERIALS ANALYSIS IN THE NEWS

August 20, 2020: Researchers at the University of Tsukuba have developed [a new kind of color-shifting crystalline material that can be used to indicate the presence of water](#). The change in hue is dramatic enough to be gauged by the unaided human eye. This work could lead to the creation of highly sensitive "vaporchromic" sensors that can show if a particular gas or water vapor is present without the need for external power.

August 20, 2020: Using micro CT scanners, which generate 3D images with 100-times the resolution of medical CT scans, [mummified animals' remains from ancient Egypt were analyzed in previously unseen detail](#), giving an insight into how they were killed and the ritual behind it.

August 24, 2020: Scientists are preparing for the increased brightness and resolution of next-generation light sources used in high-resolution X-ray imaging using supercomputers to [demonstrate a computing technique that reconstructs images faster and with more precision](#).

August 26, 2020: New work led by Sally June Tracy of the Carnegie Institution examined the crystal structure of the silica mineral quartz under shock compression and is challenging [longstanding assumptions about how this ubiquitous material behaves under such intense conditions](#).

August 31, 2020: A team of Florida State University researchers led by Biwu Ma, a professor in the Department of Chemistry and Biochemistry has developed a new material that could be used to make [flexible X-ray detectors that are less harmful to the environment and cost less than existing technologies](#).

September 3, 2020: Contrary to what was thought to be a scientific impossibility, [scientists detected rust—a product that requires oxygen, water and oxidative conditions on the surface of the Moon](#), a famously oxygen-poor, liquid waterless and reducing environment that prohibits oxidation.

September 3, 2020: Researchers have demonstrated that certain molecules previously viewed as potentially detrimental to copper electrolyte performance are [crucial to suppressing recombination losses and maximizing efficiency when harnessed correctly](#).

September 4, 2020: Better batteries are a critical enabling technology for everything from your gadgets all the way up to the stability of an increasingly renewable grid. A recent paper covers [a new electrode material that seems to avoid the problems that have plagued other approaches to expanding battery capacity](#) and it's a remarkably simple material: a variation on the same structure that's formed by crystals of table salt.

September 4, 2020: One proposed paradigm for shifting away from fossil fuels is using hydrogen gas to power society's electrical needs. [Scientists are studying the process of splitting water to mass produce hydrogen gas](#), which would result in hydrogen fuel and breathable oxygen gas.

September 9, 2020: Researchers from the University of St. Andrews have developed an innovative new technique [using lasers to accurately measure the authenticity of some of the world's most exclusive whiskies](#)—without ever removing the cap.

September 10, 2020: Superhard materials are of great interest in various practical applications, and an increasing number of research efforts are focused on their development. A group of Skoltech scientists [used machine learning methods to predict superhard materials based on their crystal structure](#).

September 14, 2020: At the core of the quest for the origins of Stonehenge's stones are petrographical and geochemical analyses, and one of the most frequently used of these analytical tools is X-ray fluorescence (XRF). It offers [a quick method for identifying the unique elements that make up a sample](#).

September 14, 2020: Israeli researchers have [developed new accurate radiation sources using unique materials](#). According to the Israel Institute of Technology (Technion), the development is expected to lead to breakthroughs in medical imaging and other areas. It includes the analysis of chemicals and biological materials, X-ray equipment for security screening and other uses of accurate X-ray sources.

September 15, 2020: A new research consortium featuring industry, academia and government will use [the power of artificial intelligence to accelerate design of the next generation of high-performance materials](#), with applications ranging from renewable energy to consumer electronics.

September 15, 2020: A new study found that [176 open access journals from 47 countries vanished from the internet between 2000 and 2019](#), and nearly 900 "inactive" journals may be at risk of vanishing in the future.

September 16, 2020: Researchers at Wright-Patterson Air Force Base are seeking to patent [a novel process for manufacturing a type of material called preceramic polymer-grafted nanoparticles](#), or "hairy nanoparticles" (HNP).

September 16, 2020: A team from Empa, the Swiss Federal Laboratories for Materials Science and Technology, was recently granted European and U.S. patents for [a process that could help lower the cost and environmental footprint of the world's most widely used building material](#). The technology helps make concrete elements leaner and easier to work with, yet durable and stable.

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