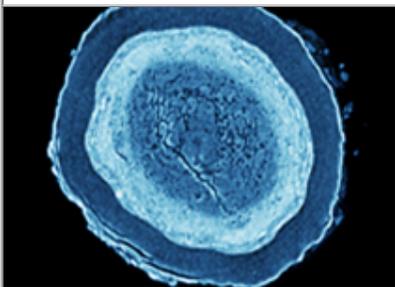


Upcoming Webinar



X-ray Computed Tomography for Materials Science

Join us on September 25th for the third webinar on X-ray Computed Tomography for Materials Science. Learn about X-ray CT applications in the food and pharmaceutical industries such as analysis of sugar coatings, seed structures, food texture, and cracks and aggregations in tablets. Find out how to achieve high contrast in low density food and pharmaceutical samples. **More info >**

MiniFlex – qualitative and quantitative analysis of polycrystalline materials



Welcome

September is always a big month for Rigaku as the annual Japan Analytical Instruments Manufacturers' Association (JASIS 2019) exhibition comes around on the calendar. This year's event, held at the Makuhari Messe (Booth 4A-101) outside Tokyo, will run from 9/4 through 9/6/19. Please come and visit us to see the latest in X-ray analytical technologies (admission is free). A complete list of all upcoming events can be found [here](#).

Below is a recent photo taken at LabCri (Laboratório de Cristalografia) within UFMG (Universidade Federal de Minas Gerais). Pictured are Prof. Carlos Basílio Pinheiro (Lab Coordinator) and Carla Pereira Ricardo (XRD Technician) with their Geigerflex XRD that was installed in 1977. In routine use, it stands as testament to Rigaku's reputation for superior reliability. Photo and information courtesy of André Belinello at Dairix Equipamentos Analíticos Ltda.



This month's issue features a special report on the 68th annual Denver X-ray Conference (DXC) by Dr. Atsushi Ohbuchi. Our featured article by Dr. Michael Kriese takes the reader on a journey to the sub-atomic scales at which our Rigaku Innovative Technologies division typically work.

Application Notes for the month feature articles on *High speed RSM of an epitaxial film using a 1D detector in still mode (XRD)*, *Fe, Ni and Co Based Alloy Analysis by Fundamental Parameter Method Using ZSX PrimusIII+ (WDXRF)*, *Nuclear Power Station Cooling Water Filters (EDXRF)*, and *Aseptic Identification of Polysorbates Using Handheld Raman*.

The book review covers *Bottle of Lies: The Inside Story of the Generic Drug Boom* by Katherine Eban. And, as always, the news and papers sections are at the bottom of the page for a taste of the latest developments in materials science.

R.C. Tisdale, Ph.D. – Editor

Benchtop X-ray diffraction (XRD) instrument

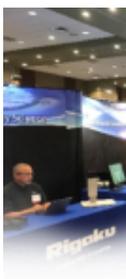
The new sixth generation MiniFlex X-ray diffractometer (XRD) is a multipurpose analytical instrument that can determine: phase identification and quantification, percent (%) crystallinity, crystallite size and strain, lattice parameter refinement, Rietveld refinement, and molecular structure. It is widely used in research, especially in material science and chemistry, as well as in industry for research and quality control. It is the newest addition to MiniFlex series of benchtop X-ray diffraction analyzers from Rigaku, which began with the introduction of the original MiniFlex system decades ago. **For more >**

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Publish Your Work Here

The Bridge now welcomes manuscripts, communications, and papers that describe techniques and applications of all forms of X-ray fluorescence (XRF) and X-ray diffraction (XRD, including SAXS) that are of interest to fellow scientists in industry, academia, and government. Manuscripts, in PDF format, are only accepted with the understanding that they are not commercial in nature. Authors are responsible for all statements made in their work. If illustrations or other material in a manuscript have been published previously, the author is responsible for obtaining permission to republish. Please [email copy](#) to the editor.



Featured Report

Denver X-ray Conference 2019

Reported by *Atsushi Ohbuchi, Applied Rigaku Technologies, Inc.*

The 68th annual Denver X-ray Conference (DXC) was held as a joint meeting with the 25th International Congress on X-ray Optics and Microanalysis (ICXOM-25) from August 5 – 9 in Lombard, Illinois, USA. Located about 30 km southwest of the Chicago O'Hare Airport, Chicago's modern skyline and skyscrapers could be clearly seen from the conference hotel. **For more >**

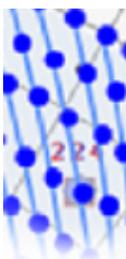


Featured Article

How small is "small" at Rigaku Innovative Technologies?

Article by *Michael Kriese, Rigaku Innovative Technologies*

I once said off-handedly to a colleague, referencing the scale of our work at Rigaku Innovative Technologies (RIT): "Take your skyscrapers and your microns and go away...WE work on small stuff!" But, just how small is "small"? **For more >**



XRD Application Note

High speed RSM of an epitaxial film using a 1D detector in still mode

Rigaku Corporation

Transistors using silicon germanium (SiGe) have low power consumption and operate at high speed. The device performance is affected by the Ge concentration, lattice strain (relaxation), and the crystal quality of the SiGe layer. Reciprocal space mapping using a one-dimensional (1D) detector efficiently revealed these characteristics in short timeframes. This example demonstrates how this can be achieved in around 10 minutes. **For more >**



WDXRF Application Note

Fe, Ni and Co Based Alloy Analysis by Fundamental Parameter Method Using ZSX PrimusIII+

Rigaku Corporation

Fe, Ni and Co based alloys, including high-temperature alloys, tool steel, and stainless steel, have broad ranges of concentrations for many elements. These alloys are analyzed during production control by X-ray fluorescence (XRF) spectrometry. The calibration curves have to be separated into many groups when using the empirical calibration method even if matrix correction is introduced, because of strong inter-element absorption and enhancement effects. **For more >**



EDXRF Application Note

Nuclear Power Station Cooling Water Filters

Applied Rigaku Technologies

Excessive metal content can contribute to corrosion in the piping used in the cooling systems in power stations. Corrosion is minimized by the selection of metal alloys used for the pipes and the chemistry of the cooling water itself. The cooling water is monitored for excessive metal content using both Millipore and Cation filters. The filters are then analyzed to determine concentrations of Fe and Cu, as well as other unwanted metals such as Ni, Zn and Pb. **For more >**

WDXRF for quantitative elemental analysis with mapping and multi-point analysis



ZSX Primus IV

As a tube-above sequential wavelength dispersive X-ray fluorescence (WDXRF) spectrometer, the Rigaku ZSX Primus IV delivers rapid quantitative determination of major and minor atomic elements, from beryllium (Be) through uranium (U), in a wide variety of sample types — with minimal standards.

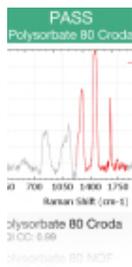
For more >

Video of the Month



Pressurised Rover Concept – Toyota and Japan Aerospace Exploration Agency

Could this be our modern-day Space Cruiser? The Japan Aerospace Exploration Agency (JAXA) and Toyota Motor Corporation (Toyota) are looking into how they can collaborate on international space exploration. As a start, JAXA and Toyota will

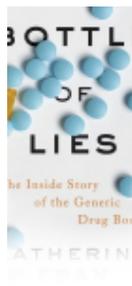


Raman Application Note

[Aseptic Identification of Polysorbates Using Handheld Raman](#)

Rigaku Analytical Devices

Polysorbates are used in a variety of industries including food, cosmetics, pharmaceuticals and biopharmaceuticals — specifically in the manufacturing of parenteral medication and cell culture growth. Due to industry regulations and quality standards, it is considered good practice to identify incoming materials prior to manufacturing. **For more >**

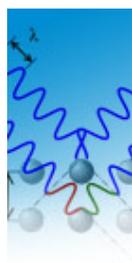


Book Review

[Bottle of Lies: The Inside Story of the Generic Drug Boom](#)

By Katherine Eban

Katherine Eban's *Bottle of Lies* is a remarkable piece of investigative journalism, one she has been working on for over a decade, though the story she tells has roots digging even decades deeper. The focus of her narrative is the Indian pharmaceutical company Ranbaxy Laboratories. **Read review >**



Material Analysis in the News

[News for August 2019](#)

August 1, 2019. Japanese researchers, led by Prof. Kaoru Ohno at Yokohama National University, were able to rapidly and accurately [predict the microstructure of Nickel–Aluminum \(Ni–Al\) alloys](#) that are commonly used in the design of jet engine turbine parts. Predictions of the microstructure of these alloys have so far been time-consuming and expensive. The findings have the potential to greatly advance the design of materials — made up of a range of different alloys — that are used to make products in several different industry sectors.

August 1, 2019. When two mesh screens are overlaid, beautiful moiré patterns appear when one screen is offset. A Rutgers-led team has paved the way to solving one of the most enduring mysteries in materials physics by [discovering that in the presence of a moiré pattern in graphene](#), electrons organize themselves into stripes, like soldiers in formation. Their findings, published in the journal *Nature*, could help in the search for quantum materials, such as superconductors, that would work at room temperature.

August 2, 2019. Resistive random-access memory (RRAM) has evolved as one of the most promising candidates for the next-generation memory, but bistability for information storage, simultaneous implementation of resistive switching and rectification effects, and a better understanding of switching mechanism are still challenging in this field. An international team of scientists [reported a RRAM device based on a chiral metal-organic framework \(MOF\)](#) with voltage-gated proton conduction and also the first single material showing both rectifying and resistive switching effects. By single-crystal X-ray diffraction analyses, the mechanism of the resistive switching was demonstrated.

August 5, 2019. Across the Milky Way, there are millions of undiscovered black holes that are consuming matter from interstellar space and cannot be detected using traditional methods used to observe other celestial objects. Astronomers Daichi Tsuna and Norita Kawanaka, from the University of Tokyo and Kyoto University in Japan, claim to have [found a new way of detecting these "isolated black holes"](#) (IBHs) by observing their X-ray emissions.

accelerate their ongoing joint study of a manned, pressurised rover that employs fuel cell electric vehicle technologies. **For more >**

Conferences and Workshops



Join Rigaku at future meetings

Rigaku will be sponsoring, attending or exhibiting at the following conferences and trade shows:

Colorado Drug Investigators Annual Training

Breckenridge, CO
September 3 – 6, 2019

JASIS

Tokyo, Japan
September 4 – 6, 2019

CMA 2019

Niagara Falls, ON
September 8 – 12, 2019

See the complete list >

Useful Link of the Month

Website Test behind the Great Firewall of China

Test any website in real-time to check if it is accessible from China. The Golden Shield Project (aka Great Firewall of China) is owned by the Government of China (PRC) and was started in 1998. The firewall system blocks website content by preventing IP addresses from being routed through and rerouting of standard firewall and proxy servers at the Internet gateways of China's ISPs. The banning of websites is mostly unannounced and ad-hoc, with some web sites being blocked from some cities and the same websites being allowed from other cities and vice-versa. (You can find more details [here](#).)

Check your website from the following cities in China: Shanghai, Beijing, Guangzhou and Hong Kong. Hong Kong is not behind the China firewall but is included for comparison with the other China locations.

Enter URL

Test Now >

example.com

Website Test behind the Great Firewall of China

Test any website in real-time to check if it is accessible from China.

August 6, 2019. Researchers in Japan have found a high-tech way to identify new high-performance materials for next-generation applications using [machine-learning methods that could identify key materials](#) even from a small data set. A team from various Japanese think tanks, including the Tokyo Institute of Technology, used artificial intelligence (AI) to design and identify polymers with high thermal conductivity, which paves the way for their use to manage heat in 5G mobile devices as well as in other applications.

August 6, 2019. Researchers have made [high-performance thick organic light-emitting diodes](#) (OLEDs) by combining organic thin films and organic-inorganic perovskite transport layers. The drawback of thin layers is that they cannot completely cover defects and residues on a substrate. A team led by Prof. Chihaya Adachi from Kyushu University in Japan says that it may now have found an answer to this challenge—by using the organic-inorganic perovskite methylammonium lead chloride instead of organic molecules as the transport layer.

August 12, 2019. In order to understand advanced materials like graphene nanostructures and optimize them for devices in nano-, opto- and quantum-technology it is [crucial to understand how phonons — the vibration of atoms in solids — influence the materials' properties](#). Researchers from the University of Vienna, the Advanced Institute of Science and Technology in Japan and others have developed a method capable to measure all phonons existing in a nanostructured material. This is a breakthrough in the analysis of nanoscale functional materials and devices.

August 19, 2019. A Japanese research team led by Koji Hashimoto (Osaka University), Keiju Murata (Nihon University) and Shunichiro Kinoshita (Chuo University) has proposed a novel theoretical framework whose experiment could be performed in a laboratory to [better understand the physics of black holes](#). Our understanding of black holes remains incomplete because the theory of general relativity is not currently compatible with quantum mechanics. This project can shed light on the fundamental laws that govern the cosmos on both unimaginably small and vastly large scales.

August 21, 2019. Materials laboratories all over the world want what Takashi Taniguchi and Kenji Watanabe are making at the Extreme Technology Laboratory, a building on the leafy campus of the National Institute of Materials Science (NIMS) in Tsukuba, outside Tokyo. For the past decade, the Japanese pair have been the [world's premier creators and suppliers of ultra-pure hBN](#) (hexagonal boron nitride), which they post to hundreds of research groups at no charge.

August 21, 2019. Researchers at the Institute for Integrated Cell-Material Sciences at Japan's Kyoto University claim to have [developed a dye-sensitized solar cell with 10.7% efficiency](#). In their study, *Renaissance of Fused Porphyrins: Substituted Methylene-Bridged Thiophene-Fused Strategy for High-Performance Dye-Sensitized Solar Cells* – published in the *Journal of the American Chemical Society* – the scientists claim the device is the most efficient technology available for dye-sensitized cells with fused porphyrin sensitizers.

Recent Scientific Papers of Interest

Papers for August 2019

Recent Scientific Papers of Interest is a monthly compilation of material analysis papers appearing in recently released journals and publications. **See below**



The Golden Shield Project (a.k.a. Great Firewall of China) is owned by the Government of China (MPS) and was started in 1998. The firewall system blocks website content by preventing IP addresses from being routed through and consists of standard firewall and proxy servers at the Internet gateways of China's ISPs. The banning of websites is mostly uncoordinated and ad-hoc, with some web sites being blocked from one city and the same web sites being allowed from other cities and vice versa. (You can find more details [here](#).) Check your website from the following cities in China: Shanghai, Beijing, Guangzhou and Hong Kong. Hong Kong is not behind the China firewall but is included for comparison with the other China locations. **For more >**

Planning to submit a grant?



Rigaku is happy to assist

If you are planning on submitting an instrument grant proposal, Rigaku will be happy to assist you. We can help you determine the correct instrument and configuration best suited for your analytical needs. **Start the process >**

Rigaku's Materials Analysis eNewsletter, The Bridge

XRF topography information: Simulations and data from a novel silicon drift detector system. Kourousias, G.; Billè, F.; Cautero, G.; Bufon, J.; Rachevski, A.; Schillani, S.; Cirrincione, D.; Altissimo, M.; Menk, R.H.; Zampa, G.; Zampa, N.; Rashevskaya, I.; Borghes, R.; Gandola, M.; Picciotto, A.; Borghi, G.; Ficorella, F.; Zorzi, N.; Bellutti, P.; Bertuccio, G. *Nuclear Instruments & Methods in Physics Research Section A*. Aug2019, Vol. 936, p80-81. 2p. DOI: [10.1016/j.nima.2018.10.142](https://doi.org/10.1016/j.nima.2018.10.142).

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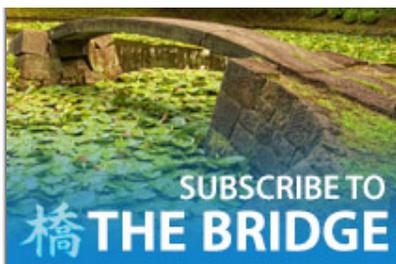
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Join us

Each month, Rigaku distributes two eNewsletters: *The Bridge*, which focuses on Materials Analysis, and *Crystallography Times*, which concentrates on X-ray crystallography. **Join us >**

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