



OCTOBER 2020, ISSUE 88

WELCOME

As we head into the final month of autumn, we've seen somewhat of an upswing in activity as we all adjust to the new virtual and remote event paradigms. We would like to thank everyone who joined us for analytical virtual 2020 and those who made our own event presented by Rigaku Analytical Devices—Transforming workflows with handheld Raman—success.



Also, a special thank you to those who joined us for our Virtual XRF School. Our next session will be held Jan. 26–28, 2021. You can view more details and register [here](#).

VIRTUAL WORKSHOP
4TH PQRI WORKSHOP
ON ICH Q3D ELEMENTAL
IMPURITIES REQUIREMENTS

REGISTER NOW

November also promises to be a productive month. On Nov. 9–10, the Product Quality Research Institute (PQRI) will host the live virtual *4th PQRI Workshop on ICH Q3D Elemental Impurities Requirements*. As the implementation of the ICH Q3D guideline went into full effect in the United States and Europe in 2018 for all pharmaceutical products, this workshop will provide an overview of—and update on—implementation experiences since the [2017 PQRI Workshop](#) and review ongoing work in the industry to resolve challenges involved in the global implementation of Elemental Impurities (EI) guidelines and standards.

Our XRF applications scientists, Glenn Williams, Ph.D. and Thanh Nguyen, Ph.D will be presenting XRF data for the PQI Phase 2 Elemental Impurity Collaborative Study from 11:45 AM–12:15 PM on Nov. 10. You can register [here](#).

In the meantime, we present the latest news and applications in X-ray material science.

Enjoy!

UPCOMING RIGAKU EVENTS

MS&T 2020
November 2–6, 2020
Virtual Event

JASIS 2020
November 11–13, 2020
Tokyo, Japan

IPMI 44th Annual Conference
November 16–17, 2020
Virtual Event

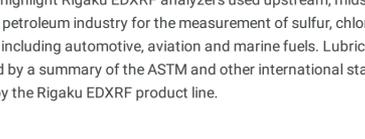
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UPCOMING RIGAKU WEBINARS



TOPIQ | Rigaku EDXRF Analyzers in the Petroleum Industry
November 10, 9 AM and 8 PM | CDT

In this webinar, we highlight Rigaku EDXRF analyzers used upstream, midstream and downstream in the petroleum industry for the measurement of sulfur, chlorine and metals in crude and fuel oils, including automotive, aviation and marine fuels. Lubricating oils are also discussed, followed by a summary of the ASTM and other international standard test methods covered by the Rigaku EDXRF product line.

[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

Defect structure analysis in single crystal substrates using XRTmicron

By Katsuhiko Inaba, Rigaku Corporation

For more than 50 years, X-ray topography (XRT) has been an indispensable industrial and research tool for crystal growth of functional materials, since crystalline defects, such as dislocations, stacking faults, etc., can be detected with this technique non-destructively. Industrial demand for almost dislocation-free Si has greatly contributed to this technique, providing important insights for the improvement of crystal quality.

[Read More >](#)

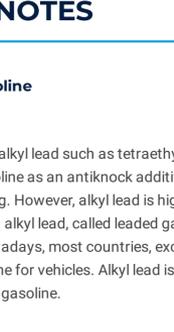
FEATURED PRODUCTS



XRTmicron

Rigaku XRTmicron is a fast, high-resolution laboratory X-ray topography system for non-destructive dislocation imaging. Various types of dislocations and non-uniformity within single crystal wafers (such as Si, SiC, GaN, Ge, GaAs, quartz, sapphire, rutile, calcium fluoride etc.) can be imaged across wafers up to 300 mm in diameter. X-ray topography is a widely used dislocation analysis technique for both research and development and process control by various single crystal, wafer and device manufacturers.

[Read More >](#)



NANOPIX mini

Rigaku NANOPIX mini is the world's first benchtop small-angle X-ray scattering (SAXS) system that is engineered to deliver automatic nanoparticle size distribution analysis for both quality control and research and development applications. Nanoparticle size, size distribution, and particle shape are the key pieces of information obtained from SAXS.

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FEATURED APPLICATION NOTES



WDXRF

Lead Analysis in Gasoline
Rigaku Corporation

Lead (Pb), in the form of alkyl lead such as tetraethyl lead, used to be added to gasoline as an antiknock additive to increase the octane rating. However, alkyl lead is highly poisonous. Gasoline with alkyl lead, called leaded gasoline, causes air pollution. Nowadays, most countries, except in Africa, ban leaded gasoline for vehicles. Alkyl lead is still used as an additive in aviation gasoline.

[Read More >](#)



EDXRF

Organic Chlorides in Crude
Applied Rigaku Technologies

Chlorides in crude contribute to corrosion in the piping at refineries during cracking as well as mid-stream in pipelines. Organic chlorides do not naturally occur in crude; however, inorganic chlorides in the form of salts as well as residual organic chlorides from various natural sources as well as adulteration can contaminate crude. Contracts at the pipelines may contain clauses limiting the amount of organic chloride allowed in the crude.

[Read More >](#)



Raman

Polymorph Monitoring with the Rigaku Progeny 1064 nm Handheld Raman Analyzer
Rigaku Analytical Devices

Polymorphs are chemicals with the same atomic components but the physical arrangement of the molecules differ. The differences in their structures cause polymorphs to behave differently—and within the pharmaceutical industry—this means bioavailability changes. It is important to differentiate polymorph types in any pharmaceutical formulation because a change in the polymorph will affect physical properties from particle size to solubility and have distinct impact on bioavailability of the drug.

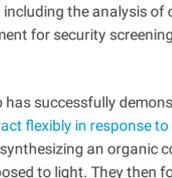
[Read More >](#)

FEATURED VIDEO & USEFUL LINK OF THE MONTH



Synchrotron X-ray Diffraction Analysis

Learn about the work and facilities in X-ray diffraction at the Centre for Nano in X-ray and Micro Analysis at the Danish Technological Institute.



Polymer Properties Database

This web-based library gives a brief overview of the most common resins, plastics and elastomers, their properties, uses, and manufacture. It also provides information about products made of plastics like fibers, textiles, films, seals and products that are formulated with resins like adhesives, sealants, and coatings.

MATERIALS ANALYSIS IN THE NEWS

September 22, 2020: Electrochemical reactions, which will play an important role in the future of energy supply, can now be explained in detail, thanks to measurements carried out by TU Wien and DESY. [A special material made of lanthanum, strontium, iron and oxygen can be switched back and forth between two different states:](#) In one state the material is catalytically extremely active, in the other less so.

September 22, 2020: PSI scientists have gained [a fundamental understanding of a highly promising material that could be suited to future data storage applications.](#) Their experiments with strontium-iridium oxide, Sr₂IrO₄, investigated both the electronic and magnetic properties of the material as a thin film. The study was enabled by sophisticated X-ray scattering, a technology where PSI researchers are amongst the world experts. The results are published in the journal *Proceedings of the National Academy of Sciences*.

September 22, 2020: The term "quantum materials" was introduced [to highlight the exotic properties of unconventional superconductors, heavy-fermion systems and multifunctional oxides,](#) but the definition has broadened in recent times. With this in mind, "The 2020 Quantum Materials Roadmap" review has been published in *Journal of Physics: Materials*.

October 1, 2020: Technion researchers have developed [accurate radiation sources that are expected to lead to breakthroughs in a variety of fields,](#) including the analysis of chemicals and biological materials, medical imaging, X-ray equipment for security screening, and other uses of accurate X-ray sources.

October 1, 2020: A Hokkaido University research group has successfully demonstrated that [carbon-carbon \(C-C\) covalent bonds expand and contract flexibly in response to light and heat.](#) The team found bond flexibility by designing and synthesizing an organic compound that self-assembles into a cage-like structure when exposed to light. They then focused on the bond length between two particular carbon atoms at the molecule's core using X-ray analysis and Raman spectroscopy, and found this cyclization process had contracted this bond.

October 1, 2020: Materials scientists at Imperial College have contributed to two Henry Royce Institute-led roadmaps detailing [how to reach net-zero carbon emissions by 2050.](#)

October 14, 2020: Researchers from POSTECH demonstrate a novel physical phenomenon by controlling variations of the atomic structure. They have revealed the mechanism behind [making materials used in new memory devices by using artificial intelligence.](#)

October 15, 2020: Magnesium silicide (Mg₂Si) is a thermoelectric material that can convert heat into electricity. Though it is known that adding antimony impurities enhances the performance of Mg₂Si, the mechanisms underlying this effect are unclear. Now, scientists from Japan shed light on the effects of these impurities at the atomic level, taking us closer to arriving at a [practical way of efficiently harvesting waste heat from cars and thermal power plants to produce clean energy.](#)

October 16, 2020: A research group led by Prof. Zhang Yongsheng from the Institute of Solid State Physics, Hefei Institutes of Physical Science successfully explained [the novel physical mechanisms behind pyrite-type ZnSe₂.](#)

October 13, 2020: Researchers at Penn State and the University of Cincinnati received a \$500,000 National Science Foundation (NSF) grant to advance [quality control methods for parts produced through additive manufacturing, or 3D printing.](#) The grant will support three years of experimental research and model development.

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