



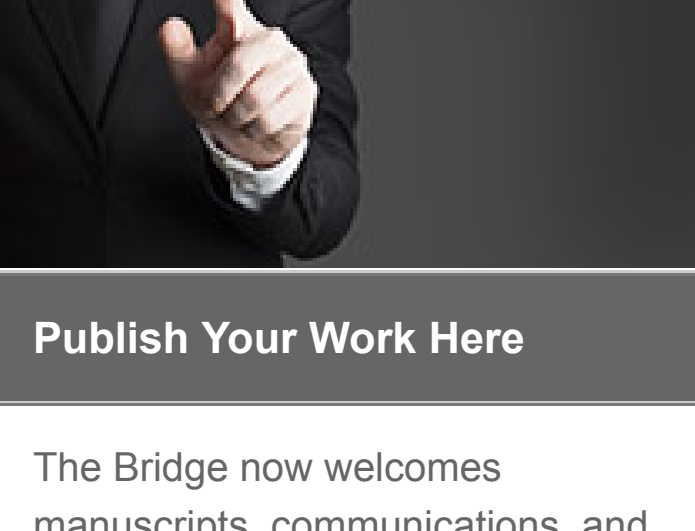
NEX DE – High-resolution elemental analysis of sodium (Na) through uranium (U)



Fast Silicon Drift Detector (SDD) EDXRF spectrometer

As a premium high-performance benchtop EDXRF elemental analyzer, the new Rigaku NEX DE delivers wide elemental coverage with an easy-to-learn Windows[®]-based QuantEZ software. Non-destructively analyze from Na through U in almost any matrix, from solids and alloys to powders, liquids and slurries. **For more >**

Interested in publishing your work in The Bridge?



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 send copy to the editor at Rigaku.newsletter@Rigaku.com

Powder diffraction, thin film diffraction, SAXS, in-plane scattering



SmartLab[®]

The SmartLab is the most novel high-resolution X-ray diffractometer available today. Perhaps its most novel feature is the SmartLab Guidance software, which provides you with an intelligent interface that guides you through the intricacies of each experiment. It is like having an expert standing by your side. **For more >**

Video of the Month



The Delicious Chemistry of Sushi

Reactions checked out some sushi chemistry. What creates the subtle interplay of flavors in your tuna nigiri? Take a deep dive with us into the science of rice, fish, and seaweed! **Watch video >**

Conferences and Workshops



Join Rigaku at future meetings

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

Annual National Narcotics Officers Association Coalition Delegate Meeting
Washington, DC, USA
February 3 – 8, 2018

AWA Global Release Liner Industry Conference & Exhibition
Amsterdam, Netherlands
February 14 – 16, 2018

Pittcon 2018
Orlando, FL, USA
February 26 – March 1, 2018

See the complete list >

Useful Link of the Month



The Free Software Directory

Welcome to the Free Software Directory, a catalog of free software that anyone can edit.

Free software is a matter of liberty, not price. Think of "free" as in "free speech", not as in "free beer". Free software is a matter of the users' freedom to run, copy, distribute, study, change and improve the software. **For more >**

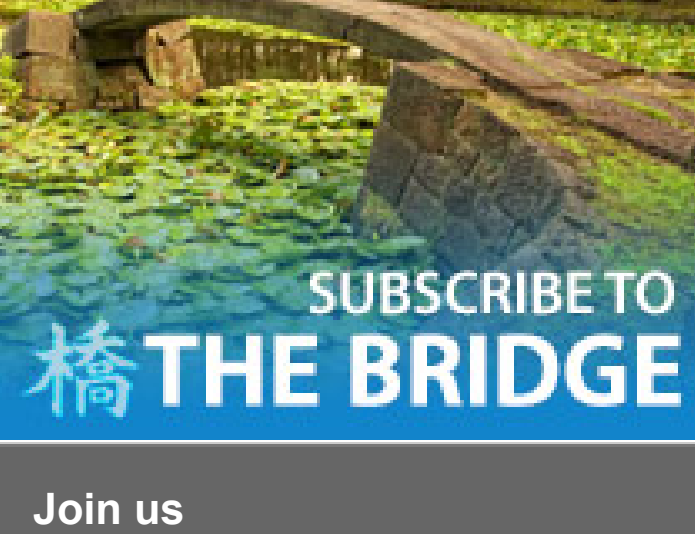
Planning to submit a grant?



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



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 >**

Welcome

Thanks again to everyone who came by our booths at the rescheduled Gulf Coast Conference (GCC in Houston) this month. It was great to see everyone and to have the chance to talk about our new and exciting products. In February, we invite our readers to visit us at The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon 2018, booths 2000 – 2002 at the Orange County Convention Center, Orlando, Florida).



Rigaku Corporation saw the heaviest snowfall it's had in years (pictures by Masayuki Watanabe)

This month's issue contains two *Rigaku Journal* articles that provide an introduction to X-ray analysis using the diffraction method and another that provides insight into liquid sample preparation for XRF analysis.

Application papers are also included for thermal analysis (TA), Raman spectroscopy, EDXRF, WDXRF, and single crystal X-ray diffraction (SCX). The book review covers a variety of interesting topics while this month's video covers "The Delicious Chemistry of Sushi," an educational experience that everyone should find appetizing. Check out the news and papers sections at the bottom of the page for the latest developments in materials science.

R.C. Tisdale, Ph.D. – Editor

Featured Rigaku Journal Article

Introduction to X-ray analysis using the diffraction method

By Hideo Toraya, Rigaku Corporation



This article has been written for the people who are beginning X-ray analysis of crystalline powder samples using the diffraction method. In X-ray powder diffraction measurements, so-called an X-ray diffraction pattern is recorded, in which many peaks called diffraction lines queue on the abscissa calibrating the diffraction angle. **Full article >**

Featured Rigaku Journal Article

Sample preparation for X-ray fluorescence analysis

VII. Liquid sample

By Takao Moriyama and Tatsushi Morikawa, Rigaku Corporation

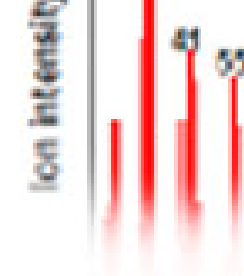


We discussed the features of X-ray fluorescence analysis (XRF), which is a quick and non-destructive analysis method for liquid, solid and powder samples in the previous issues. In this paper, analysis examples of liquid samples are shown. Careful attention is required for handling of liquid sample, because there are many kinds of liquids, such as water solution, organic solvent, oil, etc., and each one has various kinds of properties, such as acid, alkaline, etc. In this issue, an analysis method for liquid samples by wavelength dispersive X-ray fluorescence spectrometer (WDX) is discussed. **Full article >**

Thermal Analysis (TA) Application Note

Rapidly discriminative of thermal decomposition analysis for several Nylons

Rigaku Corporation



Nylon is polyamide which includes the multiple monomers combined due to amide bond. To study thermal decomposition of three typical Nylon resins which have similar structure, we employed the skimmer-type TG-DTA-PIMS, photoionization mass spectrometer, which can be used to characterize the evolved gases in real time and to discriminate easily for each Nylon. **For more >**

Raman Application Note

Presumptive Field Testing for Narcotics, Explosives and Chemical Warfare Agents with Rigaku's Progeny ResQ Portable Raman Analyzer

Rigaku Analytical Devices

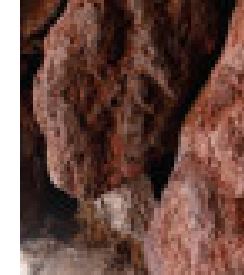


Raman spectroscopy is a well-established technique widely used in the pharmaceutical, chemical and safety and security areas. In safety and security environments, the use of portable Raman instruments has revolutionized the presumptive testing of narcotics and explosives. Overall, the use of portable Raman instruments has resulted in faster response times for on-site narcotics and explosives detection by first responders – helping them resolve potential hazardous situations rapidly and safely. **For more >**

WDXRF Application Note

Semi-Quantitative Analysis for Geological Samples

Rigaku Corporation



Requirement of quick determination of elements in geological samples has been increasing for industries, environment and earth science. They are, for example, exploration of resource, operation of mining, discrimination of contaminated materials hazardous to environment and human health and characterization for geochemical profiling. **For more >**

EDXRF Application Note

On-line Sulfur in Heavy Oils

Applied Rigaku Technologies



On-line, real time X-ray Transmission (XRT) measurement of sulfur (S) in heavy or light oils to satisfy the needs of refineries, pipelines, blending operations, bunkering terminals and other storage facilities. Applications include bunker fuel blending to meet MARPOL Annex VI sulfur restrictions, interface detection of different grade fuels delivered via pipelines, refinery feedstock blending and monitoring, diesel/kerosene blending or production, and the quality monitoring of crude at remote collection and storage facilities. **For more >**

Small Molecule Application Note

Absolute Structure of L-Alanine

Rigaku Oxford Diffraction



Determining the absolute structure of light-atom organic molecules is a developing field with several research groups working on novel statistical methods in data refinement. All of these methods require precise experimental determination of very small differences in the intensities of related reflections. With high-intensity sources and ultra-sensitive, low noise detectors coupled with efficient data collection strategies, Rigaku Oxford Diffraction's microfocus SuperNova X-ray diffractometer is well suited to this field. **For more >**

Book Reviews

***Artemis* by Andy Weir; *The Hate U Give* by Angie Thomas; and *Origin* by Dan Brown**

Reviewed by Joseph Ferrara, Ph.D.



For this issue I have some holiday reading selections. **Read reviews >**

Material Analysis in the News

News for January 2018



January 2, 2018. SEMI announced the [appointment of Masahiko \(Jim\) Hamajima as president](#) of SEMI Japan. Reporting to SEMI president and CEO Ajit Manocha, Hamajima assumes profit and loss (P&L) responsibility for SEMI Japan and leadership of SEMICON Japan along with all regional programs, events, and initiatives including SEMI Standards and industry advocacy.

January 7, 2018. A Japanese start-up company said it has developed the [technology to produce bendable light-emitting diode \(LED\) screens](#), a development that could revolutionize the way information is presented. PI-Crystal Inc., an entrepreneurial spinoff from the University of Tokyo, said that the LED panel it developed can bend freely like a curtain.

January 9, 2018. A collaborative [research team has designed a wearable robot](#) to support a person's hip joint while walking. The team, led by Minoru Hashimoto, a professor of textile science and technology at Shinsu University in Japan, published the details of their prototype in *Smart Materials and Structures*, a journal published by the Institute of Physics.

January 12, 2018. [NIMS researcher Katsuhiko Ariga receives the STAM Best Contribution Award 2017](#) for his efforts and dedication in the publication of the journal Science and Technology of Advanced Materials (STAM). Supramolecular chemistry and surface scientist, Katsuhiko Ariga has made important contributions to the publication of STAM.

January 17, 2018. Researchers in Japan have demonstrated that [moss can be a green alternative for decontaminating polluted water and soil](#). Their study shows that the moss Funaria hygrometrica tolerates and absorbs an impressive amount of lead (Pb) from water.

January 19, 2018. Overall, [science funding is on a good trajectory](#). In 2005, global R&D spending was just under a trillion dollars; by 2015, it had cleared \$2 trillion. In total, 75 percent of that is spent in 10 nations; in order of spending, these are the United States, China, Japan, Germany, North Korea, France, India, and the United Kingdom.

January 22, 2018. An international team of scientists, in conjunction with Toyohashi University of Technology in Japan, has produced the [first high-powered, randomly polarised laser beam with a "Q switch" laser](#). This study emits pulses of light so brief that they're measured in nanoseconds.

January 23, 2018. The BBVA Foundation Frontiers of Knowledge Award in the Basic Sciences category goes, in this tenth edition, to [Jordanian-American chemist Omar Yaghi](#). "for his pioneering work in the conception and synthesis of new crystalline materials, MOFs and COFs, of major impact in science and engineering," with potential applications that extend to "the capture and storage of carbon dioxide (CO₂) and trapping water molecules in air to produce water for drinking."

January 25, 2018. Until now, the metamaterials used to create tunable color from structural geometry have been based on metals. Although effective in achieving high resolutions, metallic materials suffer from inherent energy losses at visible wavelengths, which makes optimizing color purity challenging. By comparison, the resonance of silicon materials enables high reflectance and purity. [A trio of researchers at Osaka University recently demonstrated precise color control using monocrystalline silicon](#).

Recent Scientific Papers of Interest

Papers for January 2018



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

Who's Who in Mineral Names: Max von Laue and the Discovery of X-Ray Diffraction by Crystals (1879–1960). Neumeier, Günther. *Rocks & Minerals*. Jan/Feb2018, Vol. 93 Issue 1, p74-80. 7p. DOI: [10.1080/00357529.2018.1383834](https://doi.org/10.1080/00357529.2018.1383834).

Elucidating the Crystal Structure of DL-Arginine by Combined Powder X-ray Diffraction Data Analysis and Periodic DFT-D Calculations. Hughes, Colin E.; Boughdir, Ines; Bouakkaz, Clément; Williams, P. Andrew; Harris, Kenneth D. M. *Crystal Growth & Design*. 1/3/2018, Vol. 18 Issue 1, p42-46. 5p. DOI: [10.1021/acs.cgd.7b01412](https://doi.org/10.1021/acs.cgd.7b01412).

Mechanism of Action of TiF₄ on Dental Enamel Surface: SEM/EDX, KOH-Soluble F, and X-Ray Diffraction Analysis. Comar, Livia P.; Souza, Beatriz M.; Al-Ahji, Luana P.; Martins, Jessica; Grizzo, Larissa T.; Piasentim, Isabelle S.; Rios, Daniela; Buzalaf, Afrieh Afonso; Rabelo; Magalhães, Ana Carolina. *Caries Research*. Jan2018, Vol. 51 Issue 6, p554-567. 14p. 3 Black and White Photographs, 2 Charts, 4 Graphs. DOI: [10.1159/000479038](https://doi.org/10.1159/000479038).

X-ray Diffraction and Rietveld Refinement in Defferrated Clays for Forensic Science. Prandel, Luis V.; Melo, Vander de F.; Brinatti, André M.; Saab, Sérgio da C.; Salvador, Fábio A. S. *Journal of Forensic Sciences* (Wiley-Blackwell). Jan2018, Vol. 63 Issue 1, p251-257. 7p. DOI: [10.1111/1556-4029.13476](https://doi.org/10.1111/1556-4029.13476).

Gaseous detectors for energy dispersive X-ray fluorescence analysis. Veloso, J.F.C.A.; Silva, A.L.M. *Nuclear Instruments & Methods in Physics Research Section A*. Jan2018, Vol. 878, p24-39. 16p. DOI: [10.1016/j.nima.2017.09.011](https://doi.org/10.1016/j.nima.2017.09.011).

Energy dispersive X-ray fluorescence spectrometry for the direct multi-element analysis of dried blood spots. Margui, E.; Queralt, I.; Garcia-Ruiz, E.; Garcia-González, E.; Rello, L.; Resano, M. *Spectrochimica Acta Part B*. Jan2018, Vol. 139, p13-19. 7p. DOI: [10.1016/j.sab.2017.11.003](https://doi.org/10.1016/j.sab.2017.11.003).

Use of Monte Carlo Simulation as a Tool for the Nondestructive Energy Dispersive X-ray Fluorescence (ED-XRF) Spectroscopy Analysis of Archaeological Copper-Based Artifacts from the Chalcolithic Site of Perdigueões, Southern Portugal. Bottaini, Carlo E.; Brunetti, Antonio; Montero-Ruiz, Ignacio; Valera, Antonio; Candéias, Antonio; Mirão, José. *Applied Spectroscopy*. Jan2018, Vol. 72 Issue 1, p17-27. 11p. DOI: [10.1177/0003702817721934](https://doi.org/10.1177/0003702817721934).

Determination of effective atomic numbers and mass attenuation coefficients of samples using in-situ energy-dispersive X-ray fluorescence analysis. Zhang, Qingxian; Guo, Yingli; Bai, Haitao; Gu, Yi; Xu, Yang; Zhao, Jiankun; Ge, Liangquan; Peng, Yi; Liu, Jun. *XRS: X-ray Spectrometry*. Jan/Feb2018, Vol. 47 Issue 1, p4-10. 7p. DOI: [10.1016/xrs.2799](https://doi.org/10.1016/xrs.2799).

Size-resolved analysis of fine and ultrafine fractions of indoor particulate matter using energy dispersive X-ray fluorescence and electron microscopy. Hamdan, Nasser M.; Alawadhi, Hussain; Jisrawi, Najeh; Shamer, Mohamed. *XRS: X-ray Spectrometry*. Jan/Feb2018, Vol. 47 Issue 1, p72-78. 7p. DOI: [10.1002/xrs.2813](https://doi.org/10.1002/xrs.2813).

Observation of non-basal slip in Mg-Y by in situ three-dimensional X-ray diffraction. Huang, Zhonghe; Wang, Leyun; Zhou, Bijin; Fischer, Torben; Yi, Sangbong; Zeng, Xiaojin. *Scripta Materialia*. Jan2018, Vol. 143, p44-48. 5p. DOI: [10.1016/j.scriptamat.2017.09.011](https://doi.org/10.1016/j.scriptamat.2017.09.011).

Internal stresses and carbon enrichment in austenite of Quenching and Partitioning steels from high energy X-ray diffraction experiments. Allain, Sébastien Yves Pierre; Gaudet, Steve; Gaudier, Guillaume; Hell, Jean-Christophe; Gouné, Mohamed; Danox, Frédéric; Soler, Michel; Aoued, Samy; Poulou-Quintin, Angeline. *Materials Science & Engineering: A*. Jan2018, Vol. 710, p245-250. 6p. DOI: [10.1016/j.msea.2017.10.105](https://doi.org/10.1016/j.msea.2017.10.105).

Radial X-ray diffraction study of the static strength and texture of tungsten to 96 GPa. Xiong, Rui; Li, Bin; Tang, Yumei; Li, Qiang; Hao, Jiabo; Bai, Ligang; Li, Xiaodong; Liu, Jing. *Solid State Communications*. Jan2018, Vol. 269, p83-89. 7p. DOI: [10.1016/j.ssc.2017.10.016](https://doi.org/10.1016/j.ssc.2017.10.016).

Small-angle X-ray scattering tensor tomography: model of the three-dimensional reciprocal-space map, reconstruction algorithm and angular sampling requirements. Liebi, Marianne; Georgiadis, Marios; Kohlbrecher, Joachim; Holler, Mirko; Raabe, Jörg; Usov, Ivan; Menzel, Andreas; Schneider, Philipp; Bunk, Oliver; Guizar-Sicarios, Manuel. *Acta Crystallographica. Section A, Foundations & Advances*. Jan2018, Vol. 74 Issue 1, p1-13. 13p. DOI: [10.1107/S205327331701614X](https://doi.org/10.1107/S205327331701614X).

Thermal shrinkage and microscopic shutdown mechanism of polypropylene separator for lithium-ion battery: In-situ ultra-small angle X-ray scattering study. Xiong, Bin; Chen, Ran; Zeng, Fangxinyu; Kang, Jian; Men, Yongfeng. *Journal of Membrane Science*. Jan2018, Vol. 545, p213-220. 8p. DOI: [10.1016/j.memsci.2017.10.001](https://doi.org/10.1016/j.memsci.2017.10.001).

Large-scale reverse Monte Carlo analysis of the morphologies of silica nanoparticles in end-modified rubbers based on ultra-small-angle X-ray scattering data. Hagita, Katsumi; Tominaga, Tetsuo; Sone, Takuo. *Polymer*. Jan2018, Vol. 135, p219-229. 11p. DOI: [10.1016/j.polymer.2017.12.018](https://doi.org/10.1016/j.polymer.2017.12.018).