



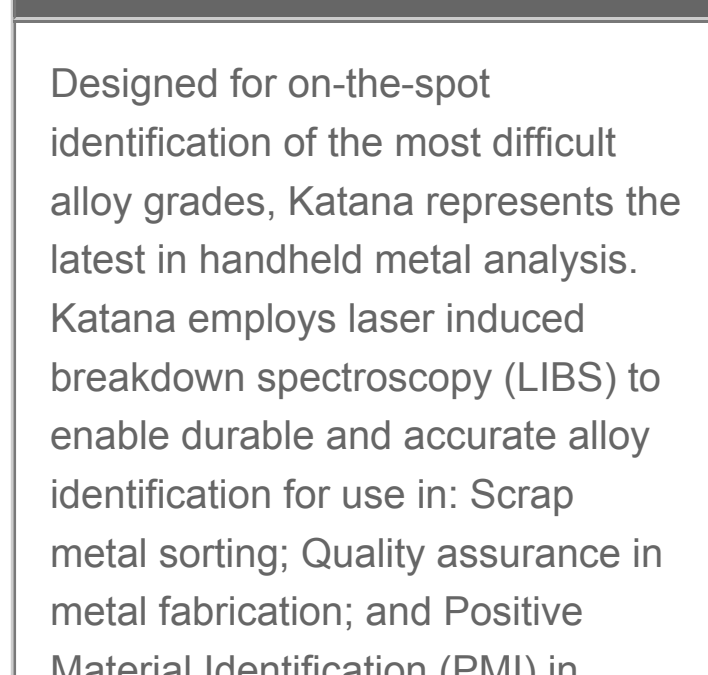
Variable spot size EDXRF spectrometer



NEX DE VS

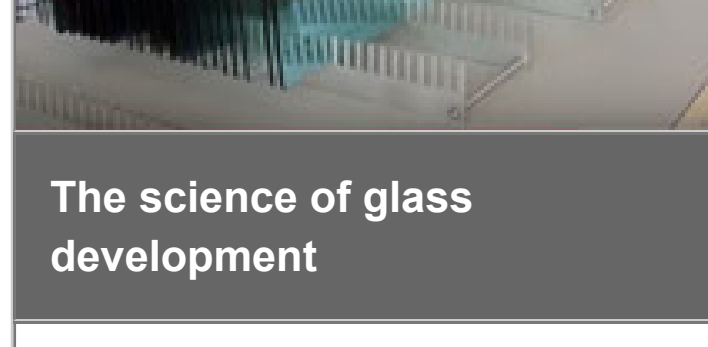
NEX DE VS is the newest Rigaku direct excitation EDXRF elemental analyzer. Each spectrometer in the NEX DE series is equipped with a 60 kV, 12 W X-ray tube and a high-throughput SDD detector. NEX DE VS analyzer is suited for small spot analysis applications. It features a high-resolution camera combined with automated collimators allowing for precise positioning of a sample for the analysis of 1 mm, 3 mm, and 10 mm spot sizes. [For more >](#)

Handheld laser induced breakdown (LIBS) spectrometer



Designed for on-the-spot identification of the most difficult alloy grades, Katana represents the latest in handheld metal analysis. Katana employs laser induced breakdown spectroscopy (LIBS) to enable durable and accurate alloy identification for use in: Scrap metal sorting; Quality assurance in metal fabrication; and Positive Material Identification (PMI) in petrochemical operations. [For more >](#)

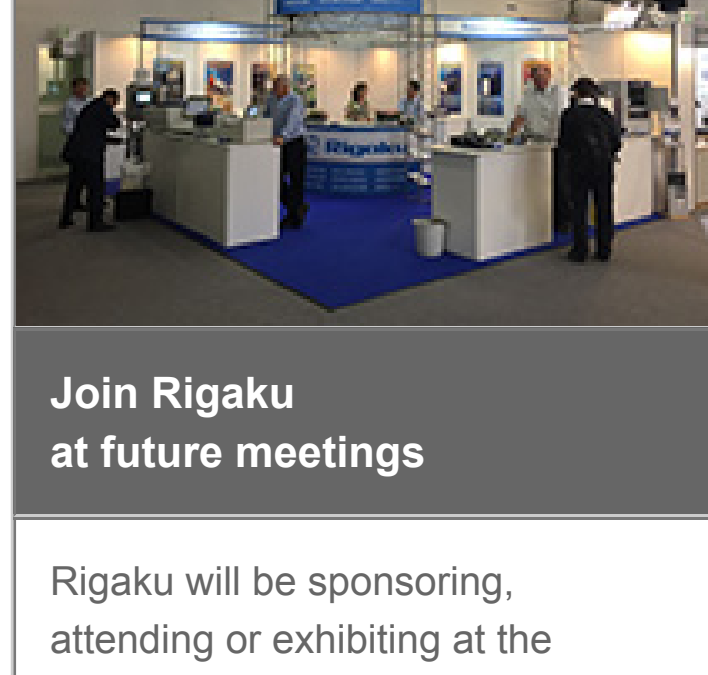
Video of the Month



The science of glass development

The impressive performance of the latest architectural glass products is often down to extremely thin surface coatings, normally made up of many different layers, each around 1,000 times thinner than a human hair. The order of these layers and their exact thickness determines how the glass performs, and advanced scientific techniques are essential in measuring and understanding the microscopic structures involved. In this video, Gary Nichol, resource group manager, thin film technology at Pilkington Group Limited talks us through the scientific research and development capabilities available to the company at its European Technical Centre in Lathom, Lancashire, UK. He explains the role that methods including depth-profiling mass spectrometry, electron microscopy and (Rigaku supplied) X-Ray diffraction play in developing innovative new high-performance coatings and further improving existing products. [Watch the video >](#)

Conferences and Workshops



Join Rigaku at future meetings

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

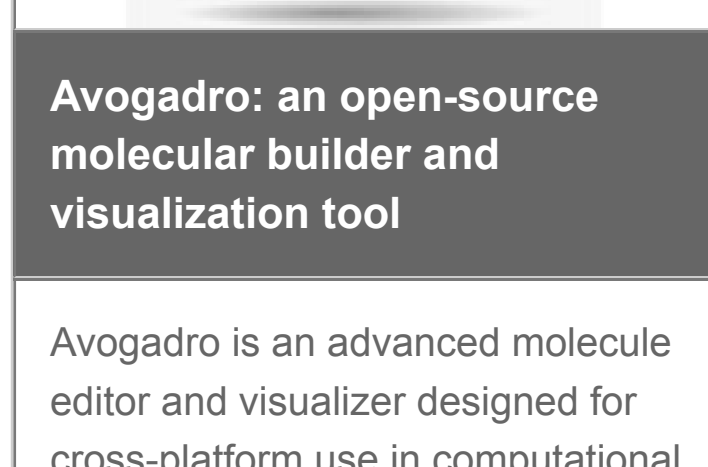
GSA Cordilleran
Ontario, CA
April 4 – 6, 2016

ISRI
Las Vegas, NV, USA
April 4 – 6, 2016

MRO Americas
Dallas, TX, USA
April 5 – 7, 2016

[See the complete list >](#)

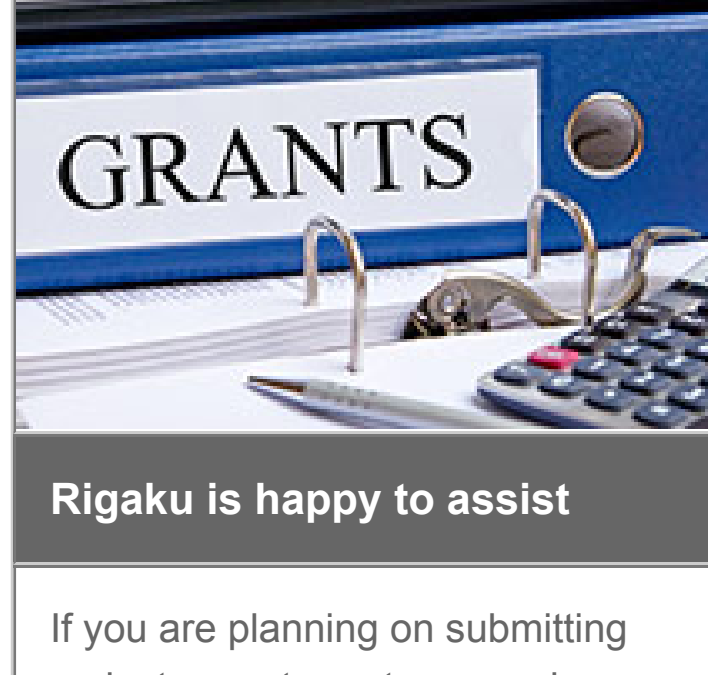
Useful link of the Month



Avogadro: an open-source molecular builder and visualization tool

Avogadro is an advanced molecule editor and visualizer designed for cross-platform use in computational chemistry, molecular modeling, bioinformatics, materials science, and related areas. It offers flexible high quality rendering and a powerful plugin architecture. Marcus D Hanwell, Donald E Curtis, David C Lonie, Tim Vandermeersch, Eva Zurek and Geoffrey R Hutchison; 'Avogadro: An advanced semantic chemical editor, visualization, and analysis platform' *Journal of Cheminformatics* 2012, 4:17. [For more >](#)

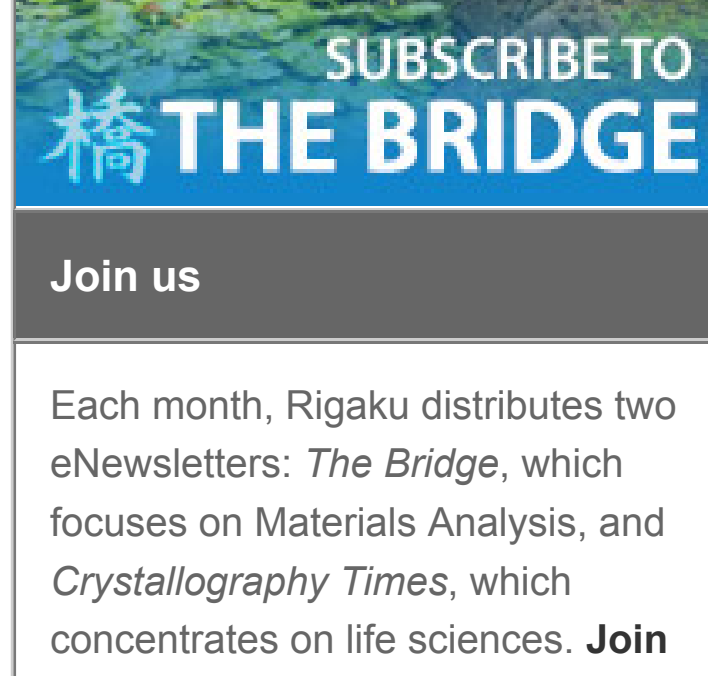
Planning to Submit a Grant?



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

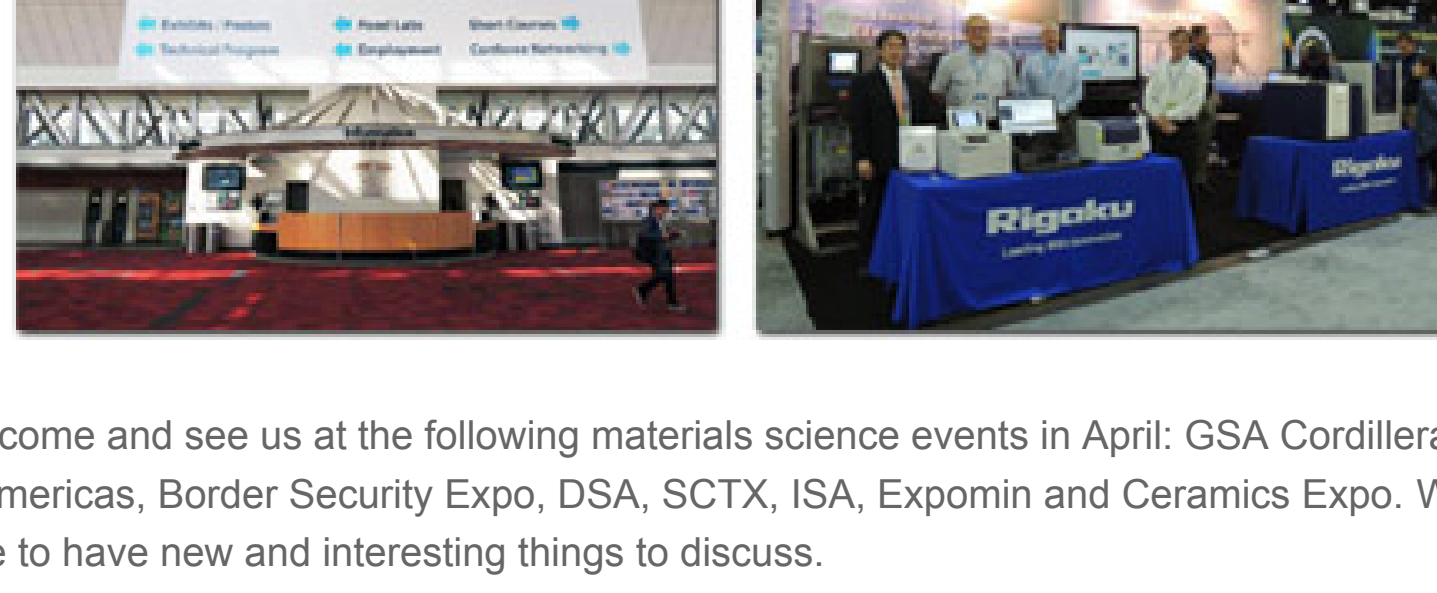


Join us

Each month, Rigaku distributes two eNewsletters: *The Bridge*, which focuses on Materials Analysis, and *Crystallography Times*, which concentrates on life sciences. [Join us >](#)

Welcome

We want to thank everyone who visited Rigaku at Pitcon16 in Atlanta, where the NEX DE VS small spot benchtop EDXRF spectrometer was launched. Over 1,000 exhibitors and about 14,000 attendees made for a great time. Next year's Pitcon will be in Chicago.



Please come and see us at the following materials science events in April: GSA Cordilleran, ISRI, MRO Americas, Border Security Expo, DSA, SCTX, ISA, Expomint and Ceramics Expo. We promise to have new and interesting things to discuss.

For your continuing education, we offer the eighth installment of our new series "Introduction to single crystal X-ray analysis," entitled "Key points for investigation and analysis of twins." Our featured technical paper is a primer on "Micro-area X-ray diffraction measurement by SmartLab μ HR diffractometer system with ultra-high brilliance microfocus X-ray optics and two-dimensional detector HyPix-3000."

The material science of glass is the video topic this month. Gary Nichol, resource group manager, thin film technology at Pilkington Group Limited talks us through the scientific research and development capabilities available to the company at its European Technical Centre in Lathom, Lancashire, UK.

Check out the news and papers sections at the bottom of the page for the latest developments in materials science. Enjoy the newsletter.

R.C. Tisdale, Ph.D. – Editor

Introduction to Single Crystal X-ray Analysis VIII

Key points for investigation and analysis of twins
Rigaku Corporation

Among the various analysis techniques, single crystal X-ray structure analysis can be regarded as the most effective analysis technique for acquiring knowledge about the 3-dimensional configuration of molecules. However, in single crystal X-ray structure analysis, there is also a major problem in that measurement cannot be done if the target sample will not form a single crystal. In addition, even if a crystal is obtained, it is often a twin. [For more >](#)

Featured XRD Rigaku Journal Article

Micro-area X-ray diffraction measurement by SmartLab μ HR diffractometer system with ultra-high brilliance microfocus X-ray optics and two-dimensional detector HyPix-3000
Rigaku Corporation

SmartLab μ HR is a diffractometer system combining the goniometer of the general purpose SmartLab instrument with a microfocus rotating anode X-ray source and a CMF (Confocal Max-Flux) mirror as the incident optic system. Since the goniometer holds the sample horizontally, it is easy to measure powders, liquids and bulky specimens without worrying about the sample falling. [For more >](#)

SCX Application Note

The 2015 Nobel Prize in Physiology or Medicine
Rigaku Corporation

Dr. Satoshi Omura of Kitasato University and his collaborator, Dr. William C. Campbell of Merck, were awarded the 2015 Nobel Prize in Physiology or Medicine "for their discoveries concerning a novel therapy against infectious caused by roundworm parasites". What they discovered is the breakthrough medicine ivermectin which cures onchocerciasis, an insect-borne disease caused by the parasite *Onchocerca volvulus*. [For more >](#)

XRD Application Note

MiniFlex300/600: Differences in resolution due to differences in Soller slits
Rigaku Corporation

Powder X-ray diffractometers are used in many fields of industry and research, for substances ranging from inorganic materials such as ceramics and minerals, to pharmaceuticals and other organic materials. The MiniFlex Series is a line of benchtop instruments – with 1/20 the volume, and 1/10 the weight, of stand-alone powder X-ray diffractometers – that can operate with power from an AC 100 V outlet. [For more >](#)

WDXRF Application Note

Cement Raw Meal Analysis by the Pressed Powder Method on Benchtop WDXRF Supermini200
Rigaku Corporation

Cement is one of the most important materials in the construction industry. Since its physical properties and those of the concrete ultimately made from it depend on its composition, it is important to monitor the composition of the raw meal used to make the clinker. Thanks to simple sample preparation and routine operation, short measurement times and high precision, X-ray fluorescence (XRF) spectrometry has become the technique of choice for elemental analysis at all points in cement production. [For more >](#)

EDXRF Application Note

Low Silicone Coating on Plastic
Applied Rigaku Technologies

Thin silicone coating is excellent at reducing ingress of water and oxygen into packaged products. Applications include plastics used for food packaging as well as pharmaceutical and medical packaging. Specialty plastics are also often coated with a thin silicone coating used as a barrier coating or release coating. [For more >](#)

Raman Application Note

Robust Recycled Aluminum Identification Using Handheld LIBS
Rigaku Analytical Devices

As the global demand for aluminum (Al) increases, the role of recycled aluminum has become more significant. Accurate alloy grade verification is essential throughout the life-cycle of aluminum-based products. This is particularly true in secondary production because scrap aluminum is often obtained from a variety of sources. Ultimately, profitability and product quality are greatly impacted by incorrect scrap sorting. [For more >](#)

Scientific Book Review

On the Move: A Life by Oliver Sacks and When Breath Becomes Air by Paul Kalanithi

This month I read two memoirs from physicians: Oliver Sacks, a neurologist who lived a long life, and Paul Kalanithi, a neurosurgeon who barely finished his residency, both of whom passed away last year. [For more >](#)

Material Analysis in the News

News for March 2016

March 2, 2016. One of the world's top particle accelerators, Japan's SuperKEKB, has reached a milestone, achieving its "first turns"—circulating beams of particles for the first time—and opening a new window into the universe, a view that will give physicists access to a record rate of particle collisions in a tiny volume in space.

March 2, 2016. Scientists at the Institute of Minerals and Materials Technology (India) have discovered a new way to improve the color, clarity and radiance of red rubies: simply zap them in the microwave. Researchers have previously studied a variety of treatment methods for gemstones, involving heat and chemicals, but this is the first time a microwave oven has been used.

March 3, 2016. A group of researchers demonstrated, for the first time, *in situ* high-speed crack propagation within silicon wafers under thermal stress, imaged simultaneously in direct transmission and diffraction X-ray imaging. The scientists showed how the propagating crack tip and the related strain field can be tracked in the phase-contrast and diffracted images, respectively.

March 3, 2016. Dr. Matt O'Keefe, professor of materials science and engineering and director of the Materials Research Center at Missouri University of Science and Technology, has been named chair of the materials science and engineering department at Missouri S&T. His appointment took effect March 1.

March 3, 2016. Susan Trolter-McKinstry, professor of ceramic science and engineering, and electrical engineering, has been named the Steward S. Flaschen Professor in the Department of Materials Science and Engineering at Penn State. An endowed professorship is among the highest honors that can be bestowed on a faculty member. The endowed professorship was established with a \$1 million gift from Penn State alumnus Steward S. Flaschen and his family.

March 4, 2016. A new Materials Innovation Platforms (MIPs) program that aims to significantly accelerate materials research and development has made its first awards, to Penn State University and Cornell University. The National Science Foundation (NSF) will provide up to \$25 million over the next five years to support the platforms, with each eligible for a one-time, five-year renewal.

March 8, 2016. A study conducted by researchers from Indian Institute of Technology Bombay described the results of various formulations developed to study the effects of fly ash cenospheres on the heat shielding performance of intumescent passive fire proofing coatings during fire testing.

March 9, 2016. An entirely new class of hydrogen bond that forms between a boron-hydrogen group and the aromatic, π -electron system of a benzene ring has been discovered. The non-classical B-H... π bond can be seen in the gas phase locking together diborane and benzene with a strength comparable to the hydrogen bonds that hold water dimers together.

March 10, 2016. Platinum nanoparticles found in a car's catalytic converter fuse together during its operation, forfeiting some of their efficiency as a result. This process has now been observed live on the nano-scale by research scientists from Hamburg.

March 14, 2016. A team of researchers, including scientists from Lawrence Livermore National Laboratory (LLNL), provided new insight into the process of the shock-induced transition from graphite to diamond and uniquely resolve the dynamics of the phase change. The experiments showed unprecedented *in situ* X-ray diffraction measurements of dynamic diamond formation on nanosecond timescales by shock compression of graphite starting at pressures above 0.5 Mbar (1 Mbar = 1 million atmospheres).

March 14, 2016. Researchers from Kyoto University have, for the first time, isolated a water dimer. Using a technique known as molecular surgery, they encapsulated the dimer within a fullerene- C_{70} molecule. Investigating a water dimer would allow researchers to gain further insight into water's intermolecular bonding network.

March 15, 2016. John W. Cahn, who fled Nazi Germany as a boy and became a foremost thinker in materials science — the field of study focused on the understanding and improvement of metals and other substances that form the physical foundations of everyday life — died March 14 at a retirement community in Seattle. He was 88.

March 24, 2016. Two prominent Japanese scientists have published analyses of the chemical make-up of 32 Chinese medicines, 21 samples were purchased online and the rest from Japanese markets and pharmaceutical companies. The authors employed two non-dissolving methodologies: INAA to examine the concentrations of any hazardous elements present and XRD to determine chemical structures of high concentration elements present. The results from these tests showed the presence of As and Hg in all samples.

March 28, 2016. Tokyo Institute of Technology (Tokyo Tech) will launch the Institute of Innovative Research (IIR) on April 1, 2016 to enhance international collaboration in emerging and interdisciplinary research fields. The new institute consists of about 180 researchers affiliated with four research laboratories, two research centers, and ten research units.

Recent Scientific Papers of Interest

Papers for March 2016

Recent Scientific Papers of Interest is a monthly compilation of material analysis papers appearing in recently released journals and publications. [See below](#)

- Bragg-von Laue diffraction generalized to twisted X-rays. Jüstel, Dominik; Friesicke, Gero; James, Richard D. *Acta Crystallographica. Section A, Foundations & Advances*. Mar2016, Vol. 72 Issue 2, p190-196. 6p. DOI: [10.1107/S2055273315024390](https://doi.org/10.1107/S2055273315024390).
- Focal construct geometry for high intensity electron dispersive x-ray diffraction based on x-ray capillary optics. Fangzuo Li; Zhiguo Liu; Tianxi Sun; Bowen Jiang; Yu Zhu. *Journal of Chemical Physics*. 3/14/2016, Vol. 144 Issue 10, p104201-1-104201-7. 7p. 3 Diagrams, 2 Charts, 6 Graphs. DOI: [10.1063/1.4943268](https://doi.org/10.1063/1.4943268).
- A Preliminary Study on Sinus Fungus Ball with MicroCT and X-Ray Fluorescence Technique. Jiang, Zhong; Zhang, Kai; Huang, Wanxia; Yuan, Qingxi. *PLoS ONE*. 3/15/2016, Vol. 11 Issue 3, p1-10. 10p. DOI: [10.1371/journal.pone.0148515](https://doi.org/10.1371/journal.pone.0148515).
- Microanalysis of clay-based pigments in paintings by XRD techniques. Hradil, David; Bezdicaka, Petr; Hradilová, Janka; Vašutová, Vlasta. *Microchemical Journal*. Mar2016, Vol. 125, p10-20. 11p. DOI: [10.1016/j.microc.2015.10.032](https://doi.org/10.1016/j.microc.2015.10.032).
- Accuracy and application of quantitative X-ray diffraction on the precipitation of struvite product. Lu, Xingwen; Shih, Kaimin; Li, Xiao-yan; Liu, Guoqi; Zeng, Eddy Y.; Wang, Fei. *Water Research*. Mar2016, Vol. 90, p9-14. 6p. DOI: [10.1016/j.watres.2015.12.014](https://doi.org/10.1016/j.watres.2015.12.014).
- Double Dispersive X-Ray Fluorescence (D²XRF) based on an Energy Dispersive pnCCD detector for the detection of platinum in gold. Radtke, Martin; Buzanich, Günter; Guillemer, Ana; Reinholz, Uwe; Riesemeier, Heinrich; Scharf, Oliver; Scholz, Philipp; Guerra, Maria F. *Microchemical Journal*. Mar2016, Vol. 125, p56-61. 6p. DOI: [10.1016/j.microc.2015.10.039](https://doi.org/10.1016/j.microc.2015.10.039).
- Fluorinated Laponite–PEG/PEO dispersions with 10 nm valve, a SAXS and simulation study. Thuresson, A.; Segad, M.; Turesson, M.; Skepp, M. *Journal of Colloid & Interface Science*. Mar2016, Vol. 466, p330-342. 13p. DOI: [10.1016/j.jcis.2015.12.033](https://doi.org/10.1016/j.jcis.2015.12.033).
- The application of XRF and PIXE in the analysis of rice shoot and compositional screening of genotypes. Bado, S.; Padilla-Alvarez, R.; Migliori, A.; Forster, B.P.; Jaksic, M.; Diawara, Y.; Kaiser, R.; Laimer, M. *Nuclear Instruments & Methods in Physics Research Section B*. Mar2016, Vol. 371, p407-412. 6p. DOI: [10.1016/j.nimb.2015.08.081](https://doi.org/10.1016/j.nimb.2015.08.081).
- A new insight into the vaults of the Kings in the Alhambra (Granada, Spain) by combination of portable XRD and XRF. Gómez-Morón, María Auxiladora; Ortiz, Pilar; Martín-Ramírez, Jose María; Ortiz, Rocío; Castaing, Jacques. *Microchemical Journal*. Mar2016, Vol. 125, p260-265. 6p. DOI: [10.1016/j.microc.2015.11.023](https://doi.org/10.1016/j.microc.2015.11.023).
- ⁵⁷Fe Mössbauer, SEM/EDX, p-XRF and μ -XRF studies on a Dutch painting. Lehmann, R.; Schmidt, H.-J.; Costa, B.; Blumers, M.; Sansano, A.; Rull, F.; Wengrowitsky, D.; Nümberger, F.; Maier, H.; Klingelshofer, G.; Renz, F. *Hyperfine Interactions*. 3/1/2016, Vol. 237 Issue 1, p1-10. 10p. DOI: [10.1007/s10751-016-1296-3](https://doi.org/10.1007/s10751-016-1296-3).
- Structure analysis and spectroscopic characterization of 2-Fluoro-3-methylpyridine-5-Boronic Acid with experimental FT-IR, Raman, NMR and XRD techniques and quantum chemical calculations. Alver, Özgür; Dikmen, Gökhan. *Journal of Molecular Structure*. Mar2016, Vol. 1108, p103-111. 9p. DOI: [10.1016/j.mostruc.2015.11.041](https://doi.org/10.1016/j.mostruc.2015.11.041).
- Conformation analysis of 1",4"-Dispirocyclohexane-5,6'-bis(benzothiazolinone): Combined IR, Raman, XRD and DFT approach. P.J., Arathi; Gupta, Parth; Babu N., Jagadeesh; C.N., Sundaresan; Venkatarayan, Ramanathan. *Spectrochimica Acta Part A: Molecular & Biomolecular Spectroscopy*. Mar2016, Vol. 157, p192-196. 5p. DOI: [10.1016/j.saa.2015.12.032](https://doi.org/10.1016/j.saa.2015.12.032).
- Characterization of 1,3-diammonium propylselenate monohydrate by XRD, FT-IR, FT-Raman, DSC and DFT studies. Thinunayanan, S.; Arjunan, V.; Marchewka, M.K.; Mohan, S.; Atalay, Yusuf. *Journal of Molecular Structure*. Mar2016, Vol. 1107, p220-230. 11p. DOI: [10.1016/j.mostruc.2015.11.052](https://doi.org/10.1016/j.mostruc.2015.11.052).
- Formation Mechanism of Gold Nanoparticles Synthesized by Photoreduction in Aqueous Ethanol Solutions of Polymers Using In Situ Quick Scanning X-ray Absorption Fine Structure and Small-Angle X-ray Scattering. Masafumi Harada; Syoko Kizaki. *Crystal Growth & Design*. Mar2016, Vol. 16 Issue 3, p1200-1212. 13p. DOI: [10.1021/acs.cgd.5b01168](https://doi.org/10.1021/acs.cgd.5b01168).
- Phase transitions in H₂O₆ at high pressures: Raman and X-ray diffraction studies. Kim, Minseob; Yoo, Choong-Shik. *Chemical Physics Letters*. Mar2016, Vol. 648, p13-18. 6p. DOI: [10.1016/j.cplett.2016.01.043](https://doi.org/10.1016/j.cplett.2016.01.043).
- The Change of X-ray Diffraction Peak Width Shifting in situ Krivanon Sintering of Nanoscale Powders. Lebrun, Jean-Marie; Jha, Dhiraj K.; Naik, K. N. S.; Seymour, Kevin C.; Kriven, Waltraud M.; Raj, Rishi. *Journal of the American Ceramic Society*. Mar2016, Vol. 99 Issue 3, p765-768. 4p. 2 Graphs. DOI: [10.1111/jace.14112](https://doi.org/10.1111/jace.14112).
- Evaluation of microstructural parameters of oxide dispersion strengthened steels from X-ray diffraction profiles. Vlasenko, Svetlana; Benediktovich, Andrej; Ulyanenkova, Tatjana; Uglov, Vladimir; Skuratov, Vladimir; O'Connell, Jacques; Neethling, John. *Journal of Nuclear Materials*. Mar2016, Vol. 470, p139-146. 8p. DOI: [10.1016/j.jnmat.2015.11.047](https://doi.org/10.1016/j.jnmat.2015.11.047).
- Analysis of oxidation decomposition reaction scheme and its kinetics of delafossite-type oxide CuLaO₂ by thermogravimetry and high-temperature X-ray diffraction. Fujishiro, Tetsuo; Takeuchi, Sayo; Hirakawa, Kosuke; Hashimoto, Takuya. *Journal of Thermal Analysis & Calorimetry*. Mar2016, Vol. 123 Issue 3, p1833-1839. 7p. DOI: [10.1007/s10973-015-4723-9](https://doi.org/10.1007/s10973-015-4723-9).
- Dispersion and strength parameter of nano-sized bubbles in copper investigated by means of small-angle X-ray scattering and transmission electron microscopy. Shi, Shi; Oono, Naoko; Ueki, Shigeharu; Ishida, Toshihiro; Ohnuma, Masato. *Materials Science & Engineering: A*. Mar2016, Vol. 658, p296-300. 5p. DOI: [10.1016/j.msea.2016.01.107](https://doi.org/10.1016/j.msea.2016.01.107).
- Small-Angle X-Ray Scattering Study on PVA/Fe₂O₃ Magnetic Hydrogels. Sunaryono; Taufiq, Ahmad; Putra, Edy Giri Rahmat; Okazawa, Atsushi; Watanabe, Isao; Kojima, Norimichi; Rugmita, Supagorn; Soontaranon, Sirivut; Zainuri, Mohamadi; Triwikantoro; Pratapa, Sumirno; Darminto. *NANO*. Mar2016, Vol. 11 Issue 3, p1. 12p. DOI: [10.1142/S1793292016500272](https://doi.org/10.1142/S1793292016500272).
- Study of metal release from stainless steels in simulated food contact by means of total reflection X-ray fluorescence. Dalipi, R.; Borgese, L.; Casaroli, A.; Boniardi, M.; Fittschen, U.; Tsuji, K.; Depero, L.E. *Journal of Food Engineering*. Mar2016, Vol. 173, p85-91. 7p. DOI: [10.1016/j.jfoodeng.2015.10.045](https://doi.org/10.1016/j.jfoodeng.2015.10.045).
- Data-driven research on chemical features of Jingdezhen and Longquan celadon by energy dispersive X-ray fluorescence. He, Ziyang; Zhang, Maolin; Zhang, Huijie. *Ceramics International*. Mar2016, Vol. 42 Issue 4, p5123-5129. 7p. DOI: [10.1016/j.ceramint.2015.12.030](https://doi.org/10.1016/j.ceramint.2015.12.030).
- Determination of Fe in blood using portable X-ray fluorescence spectrometry: an alternative for sports medicine. Zamboni, C.; Metairon, S.; Kovacs, L.; Macedo, D.; Rizzuto, M. *Journal of Radioanalytical & Nuclear Chemistry*. Mar2016, Vol. 307 Issue 3, p1641-1643. 3p. 1 Chart, 1 Graph. DOI: [10.1007/s10967-015-4511-9](https://doi.org/10.1007/s10967-015-4511-9).