Welcome

Thanks to everyone who came by our booth at Pittcon this month. It was great to see so many familiar faces and, of course, new ones too. In April, we invite members of the geosciences community to come see us at AAPG Annual Convention & Exhibition (CE) at the George R. Brown Convention Center in Houston (April 2 – 5, Booth 1415). Also, we will be at the ACS Spring conference at the Moscone Center in San Francisco (April 2 – 6, Booth 1308). There is a link to a complete list of events below.

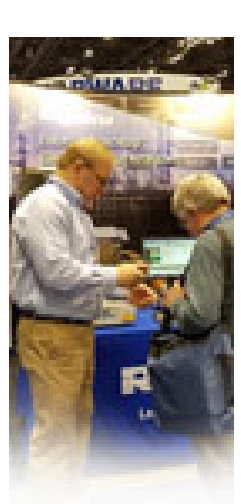
This month's issue contains three special feature articles. The first is "The NEX Story," which describes the origins of the EDXRF group in Austin, TX. The second paper reports on the recent thermal analysis workshop organized by Korea ITS (KITS), Rigaku's distributors in Korea. Finally, the career of Dr. Stanislav Ulitzka is detailed in an excellent piece by Dr. Cameron Chai of AXT.

Images from articles below (clockwise from top left): Applied Rigaku Technologies, Inc. at Pittcon, AXT's Applications Specialist Dr. Stanislav Ulitzka, and KITS Thermal Analysis Workshop attendees.

Application papers are included for XRD, WDXRF, EDXRF and RAMAN techniques. In the book review this month, acclaimed crystallographer John R. Helliwell describes how to be a good scientist and a good citizen. The video topic is a Single Crystal X-ray Diffraction (SCX) familiarization video from the Southampton Diffraction Centre, employing a Rigaku XtaLAB mini and CrysAlis^{Pro} software. 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



Featured Article by Applied Rigaku Technologies, Inc.

The NEX Story

By Scott Fess, EDXRF Product Manager, Applied Rigaku Technologies, Inc.

Rigaku established *Applied Rigaku Technologies, Inc.* (ART) in Austin, Texas in 2009. ART—as the Rigaku EDXRF Center of Excellence—has brought modern, innovative design into the 21st century with the NEX series of EDXRF analyzers. President and CEO Robert Bartek built the ART organization around the core team from the original ASOMA Instruments in Austin – the core group that has been at the forefront of benchtop EDXRF design and application since the 1980s. Applied Rigaku Technologies continues this tradition at Rigaku, designing and manufacturing all EDXRF systems in Austin. **Full article >**

Second Thermal Analysis Workshop in Korea

Report on Workshop organized by Korea ITS (KITS)

Reported by Dr. T. Arii Senior Scientist, Thermal Analysis Division at Rigaku Corporation

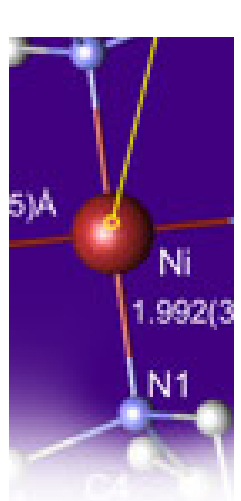
The second thermal analysis workshop organized by Korea ITS (KITS), Rigaku's distributors in Korea, was held in the conference room in the KITS laboratory on 22nd February 2017. The workshop was attended by 22 researchers from university, government institutes and major private companies in Korea. Many of the participants were young researchers. This time, five keynote lectures were carried out for the workshop. **Full report >**

Featured Article by AXT Pty Ltd

Dr. Stanislav Ulitzka – Applications Specialist at AXT

By Dr. Cameron Chai, Marketing Communications Manager, AXT

Stani is AXT's applications specialist, having over 30 years' experience in the areas of mineralogy and materials analysis, primarily with XRF, as well as other associated technologies and techniques. **Full article >**



Application of Integrated X-ray Powder Diffraction Software: PDXL

Ni(II)-N,N-Diethylethylenediamine Complex

Rigaku Corporation

One of the Ni(II) complexes, $[Ni(Et_2en)_2](BF_4)_2$, is known to show thermo-chromism. The complex turns from orange to red abruptly at around 100°C. The crystal structures of both low-temperature phase and high-temperature phase have been determined from their powder diffraction data. **For more >**

WDXRF Application Note

Sulfur Analysis in Crude Oil and High-Sulfur Fuels by WDXRF According to ASTM D2622-10

Rigaku Corporation

Crude oil is raw material for petroleum products and contains sulfur in concentration from 0.5 mass% to 5.0 mass% typically. Residual fuel oil and high-sulfur diesel fuel are mainly used for boilers and burners, agricultural machines, and long-distance mass transportation means, such as vessels and diesel locomotives of rail road, equipped with large engines. **For more >**

EDXRF Application Note

Analysis of Metals in Aerosols on Air Filters

Applied Rigaku Technologies

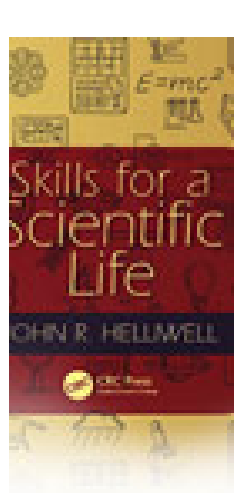
Element analysis of aerosols and particulate matter released in smokestacks and other industrial gas discharge is vital to ensure that environmentally acceptable levels of toxic and hazardous elements are released properly into the air. Monitoring smoke or other gaseous waste is important in many areas, such as industrial manufacturing, coal-fired power plants, chemical and plastics production, etc., in order to minimize air pollution and the release of toxic metals in compliance with US EPA and other world and regional or local governing regulations. As a tool to help ensure compliance and proper release, Rigaku offers the NEX DE EDXRF analyzer with 60 kV excitation source and high resolution and throughput Si Drift Detector, giving the analysts and technician alike a fast, simple, yet powerful means for monitoring elemental analysis of air filters. **For more >**

Raman Application Note

Rapid Identification of New Psychoactive Substances Using 1064nm Handheld Raman

Rigaku Analytical Devices

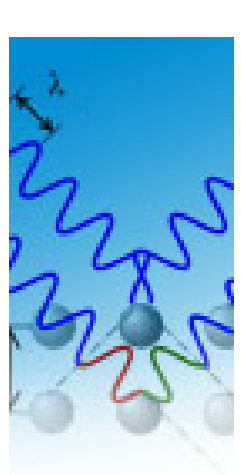
New psychoactive substances, commonly referred to as NPS, continue to rapidly emerge and pose a health threat globally. Field-deployed technologies providing NPS identification in under a minute support efforts to reduce supply. Data from several studies on identification of NPS preparations demonstrate how Rigaku's Progeny ResQ 1064nm handheld Raman minimizes sample interference issues, identifies more compounds and expands at-scene documentation and reporting. **For more >**



Scientific Book Review

Skills for a Scientific Life by John R. Helliwell

When I agreed to review this book, I had no idea that Helliwell had referenced me as a reviewer in his chapter on how to review a book. Nevertheless, I kept this review unbiased, just like the previous review I wrote for a book by the same author. **Full review >**



Material Analysis in the News

News for March 2017

March 1, 2017. Prominent scientists Warren Oliver, Ph.D., and Yujie Meng, Ph.D., of the global company Nanomechanics, Inc., presented at the 2017 International Nanomechanical Science and Technology Forum in Taipei, Beijing and Shanghai March 13 – 17.

March 1, 2017. ETH material scientists have developed a new method of manufacturing ceramics that does not require the starting materials to be fired. Instead, they are compacted under high pressure at room temperature in a significantly more energy-efficient process.

March 13, 2017. Sid Pathak, assistant professor of materials science and engineering at the University of Nevada, Reno, received the Young Leaders Professional Development Award from The Minerals, Metals and Materials Society, or TMS, at the TMS annual meeting in San Diego last week.

March 15, 2017. Zhifeng Ren, a University of Houston physicist and a principal investigator with the Texas Center for Superconductivity at UH, has launched a new academic journal, "Materials Today Physics," which will focus on new and emerging materials.

March 15, 2017. Researchers have developed a groundbreaking one-step, crystal growth process for making ultra-thin layers of material with molecular-sized pores. Researchers demonstrated the use of the material, called zeolite nanosheets, by making ultra-selective membranes for chemical separations.

March 20, 2017. Thanks to the discovery of a new material, a cooking pan could generate enough electricity to charge a cellphone in just a few hours. The team found that a combination of the chemical elements calcium, cobalt and terbium can create an efficient, inexpensive and bio-friendly material that can generate electricity through a thermoelectric process involving heat and cold air.

March 21, 2107. Physicists announced that they had successfully simulated a material called fullerite — harder than diamonds — which could someday revolutionize electronics, nanotechnology and materials science. Using computer and X-ray simulations, researchers at the Technological Institute for Superhard and Novel Carbon Materials (TISNCM) should be able to build the ultra-hard material.

March 27, 2017. Not only have scientists from Ibaraki University (Japan) performed the first non-destructive morphological observations on the Fleshy brittle star, *Asteronyx loveni*, using micro X-ray tomography, but they also published their research as the first study supported via crowdfunding in the Asian country.

March 28, 2017. Vantablack® (a special coating developed from an amalgam of carbon nanotubes measuring 20 nm) in a spray-on form has been released. The blackest material's "spray-on" form is capable of blocking 99.8 percent of infrared, ultraviolet, and visible light. However, like the original, it may not be able to give the perception of a 3D object in the 2D form.

Recent Scientific Papers of Interest

Papers for March 2017

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

The contributions of Albert W. Hull to X-ray powder diffraction at one hundred years of his landmark publication. Delgado, José Miguel. *Powder Diffraction*. Mar2017, Vol. 32 Issue 1, p2-9. 8p. DOI: 10.1017/S0885715616000750.

Automated Phase Segmentation for Large-Scale X-ray Diffraction Data Using a Graph-Based Phase Segmentation (GPhase) Algorithm. Zheng Xiong; Yinyan He; Hattrick-Simpers, Jason R.; Jianjun Hu. *ACS Combinatorial Science*. Mar2017, Vol. 19 Issue 3, p137-144. 8p. DOI: 10.1021/acscombsci.6b00121.

Studies on strain relaxation of $La_{0.5}Ba_{0.5}MnO_3$ film by normal and grazing incidence X-ray diffraction. Wang, Haiou; Tan, Weishi; Liu, Hao; Cao, Mengxiong; Wang, Xingyu; Ma, Chunlin; Jia, Quanjie. *Applied Physics A: Materials Science & Processing*. Mar2017, Vol. 123 Issue 3, p1-6. 6p. DOI: 10.1007/s00339-017-0795-7.

Uranium oxidation kinetics monitored by *in-situ* X-ray diffraction. Zalkind, S.; Rafailov, G.; Halevy, I.; Livneh, T.; Rubin, A.; Maimon, H.; Schweke, D. *Journal of Nuclear Materials*. Mar2017, Vol. 485, p202-206. 5p. DOI: 10.1016/j.jnucmat.2016.12.021.

Powder X-ray diffraction detection on a paper-based platform. Ouyang, Liangfei; Liu, Qian; Xu, Chaoping; Liu, Changgui; Liang, Heng. *Talanta*. Mar2017, Vol. 164, p283-290. 8p. DOI: 10.1016/j.talanta.2016.11.021.

Precise Analysis of Thermal Volume Expansion of Crystal Lattice for Fully Aromatic Crystalline Polyimides by X-ray Diffraction Method: Relationship between Molecular Structure and Linear/Volumetric Thermal Expansion. Ryohei Ishige; Toshiaki Masuda; Yukiko Kozaki; Eisuke Fujiwara; Tomohiro Okada; Shinji Ando. *Macromolecules*. Mar2017, Vol. 50 Issue 5, p2112-2123. 12p. DOI: 10.1021/acs.macromol.7b00095.

The contribution of 180° domain wall motion to dielectric properties quantified from *in situ* X-ray diffraction. Fancher, C.M.; Brewer, S.; Chung, C.C.; Röhrig, S.; Rojac, T.; Esteves, G.; Deluca, M.; Bassiri-Gharb, N.; Jones, J.L. *Acta Materialia*. Mar2017, Vol. 126, p36-43. 8p. DOI: 10.1016/j.actamat.2016.12.037.

Elemental mapping in a contemporary miniature by full-field X-ray fluorescence imaging with gaseous detector vs. scanning X-ray fluorescence imaging with polycapillary optics. Silva, A.L.M.; Cirino, S.; Carvalho, M.L.; Manso, M.; Pessanha, S.; Azevedo, C.D.R.; Carramate, L.F.N.D.; Santos, J.P.; Guerra, M.; Veloso, J.F.C.A. *Spectrochimica Acta Part B.* Mar2017, Vol. 129, p1-7. 7p. DOI: 10.1016/j.sab.2016.12.006.

Characterization by X-ray powder diffraction of alpha lipoic acid. Quintana Mendoza, Jose H.; Toro, R. A.; Blanco, Laura A.; Henao, J. A. *Powder Diffraction*. Mar2017, Vol. 32 Issue 1, p35-39. 5p. DOI: 10.1017/S0885715616000658.

Quantification of preferred orientation in graphite electrodes for Li-ion batteries with a novel X-ray-diffraction-based method. Malifarge, Simon; Delobel, Bruno; Delacourt, Charles. *Journal of Power Sources*. Mar2017, Vol. 343, p338-344. 7p. DOI: 10.1016/j.jpowsour.2017.01.065.

***In situ* X-ray diffraction characterization of $NiSe_2$ as a promising anode material for sodium ion batteries.** Ou, Xing; Li, Jiao; Zheng, Fenghua; Wu, Peng; Pan, Qichang; Xiong, Xunhui; Yang, Chenghao; Liu, Meilin. *Journal of Power Sources*. Mar2017, Vol. 343, p483-491. 9p. DOI: 10.1016/j.jpowsour.2017.01.097.

Effective X-ray beam size measurements of an X-ray tube and polycapillary X-ray lens system using a scanning X-ray fluorescence method. Gherase, Mihai R.; Vargas, Andres Felipe. *Nuclear Instruments & Methods in Physics Research Section B*. Mar2017, Vol. 395, p5-12. 8p. DOI: 10.1016/j.nimb.2017.01.045.

Investigations on Empire series postage stamps of Ottomans (printed 1880–1890) by vibrational spectroscopic and energy dispersive X-ray fluorescence techniques. Akyuz, Tanil; Akyuz, Sevim. *Vibrational Spectroscopy*. Mar2017, Vol. 89, p37-43. 7p. DOI: 10.1016/j.vibspec.2016.12.012.

Evaluation of metals distribution in *Solanum lycopersicum* plants located in a coastal environment using micro-energy dispersive X-ray fluorescence imaging. Trebolazabala, Josu; Maguregui, Maite; Morillas, Héctor; de Diego, Alberto; Madariaga, Juan Manuel. *Microchemical Journal*. Mar2017, Vol. 131, p137-144. 8p. DOI: 10.1016/j.microc.2016.12.009.

Multi-element analysis of vegetal foodstuff by means of low power total reflection X-ray fluorescence (TXRF) spectrometry. Dalipi, Rogerta; Marguí, Eva; Borgese, Laura; Depero, Laura E. *Food Chemistry*. Mar2017, Vol. 218, p348-355. 8p. DOI: 10.1016/j.foodchem.2016.09.022.

Error of sample preparation in pressing emitters for X-ray fluorescence analysis. Kuz'mina, T.; Troneva, M.; Kononkova, N.; Romashova, T. Journal of Analytical Chemistry. Mar2017, Vol. 72 Issue 3, p272-278. 7p. DOI: 10.1134/S1061934817030066.

X-ray fluorescence determination of La, Ce, Pr, Nd, and Sm in industrial sediments of calcium sulfate using linear regression analysis. Zinin, D.; Bushuev, N.; Kuznetsov, V. *Journal of Analytical Chemistry*. Mar2017, Vol. 72 Issue 3, p279-288. 10p. DOI: 10.1134/S1061934817030157.

GIMPy: a software for the simulation of X-ray fluorescence and reflectivity of layered materials. Brigidi, Fabio; Pepponi, Giancarlo. *XRS: X-ray Spectrometry*. Mar/Apr2017, Vol. 46 Issue 2, p116-122. 7p. DOI: 10.1002/xrs.2746.

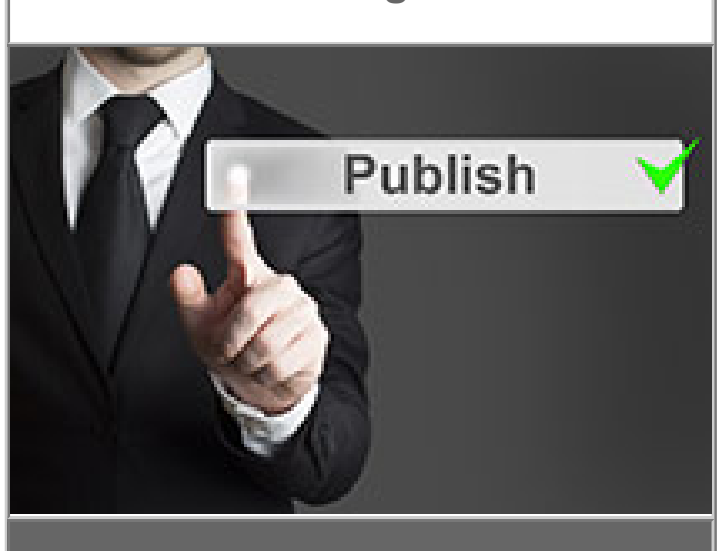
14th Pharmaceutical Powder X-ray Diffraction Symposium PPXRD-14 summary. Maguire, Theresa. *Powder Diffraction*. Mar2017, Vol. 32 Issue 1, p56-57. 2p. DOI: 10.1017/S0885715616000609.

High-contrast, high-resolution computed micro-tomography

nano3DX

Rigaku has developed the nano3DX as a high-resolution 3D X-ray microscope that combines Rigaku's unique high-brightness rotating anode X-ray generator with a proprietary high-resolution CCD X-ray camera to provide high-contrast computed tomography at the submicron level. The nano3DX is able to observe an ultra-wide field-of-view while retaining high 2D/3D spatial resolution and providing improved density resolution compared to conventional X-ray microscopes. **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

Video of the Month

Single Crystal X-ray Diffraction familiarisation

Single Crystal X-ray Diffraction (SCX) familiarization video from the Southampton Diffraction Centre, employing a Rigaku XtaLAB mini and CrysAlis^{Pro} software. **Watch video >**

Conferences and Workshops

Join Rigaku at future meetings

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

AAPG 2017
Houston, TX, USA
April 2 – 5, 2017

ACS Spring 2017
San Francisco, CA, USA
April 2 – 6, 2017

AWPA 2017
Las Vegas, NV, USA
April 9 – 11, 2017

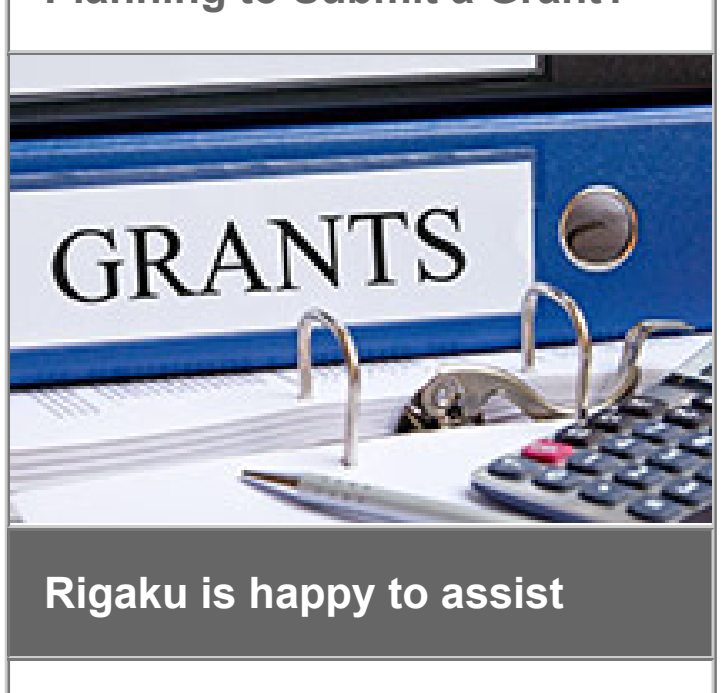
See the complete list >

Useful link of the Month

xrayutilities

"*xrayutilities* is a collection of scripts used to analyze and simulate x-ray diffraction data. It consists of a python package and several routines coded in C. It especially useful for the reciprocal space conversion of diffraction data taken with linear and area detectors. Several models for the simulation of thin film reflectivity and diffraction curves are included." **For more >**

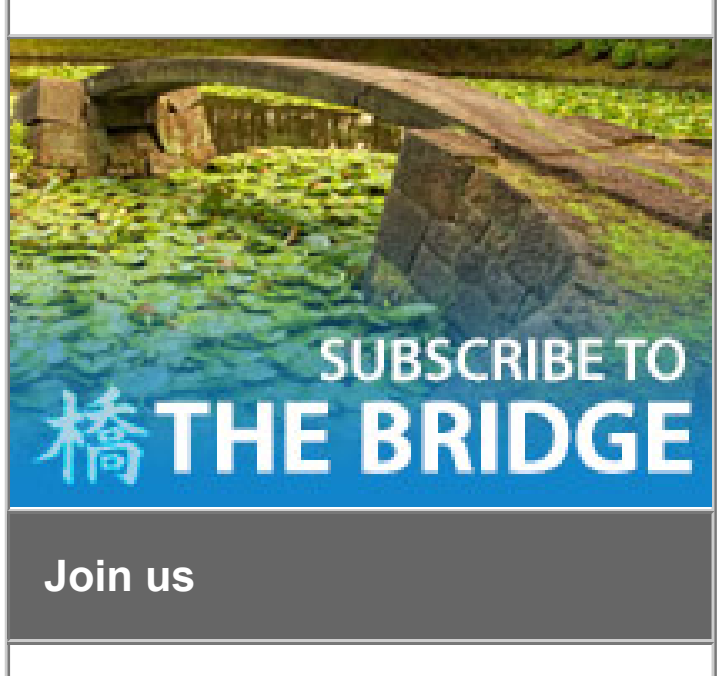
Planning to Submit a Grant?



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 configura-tion 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 >**