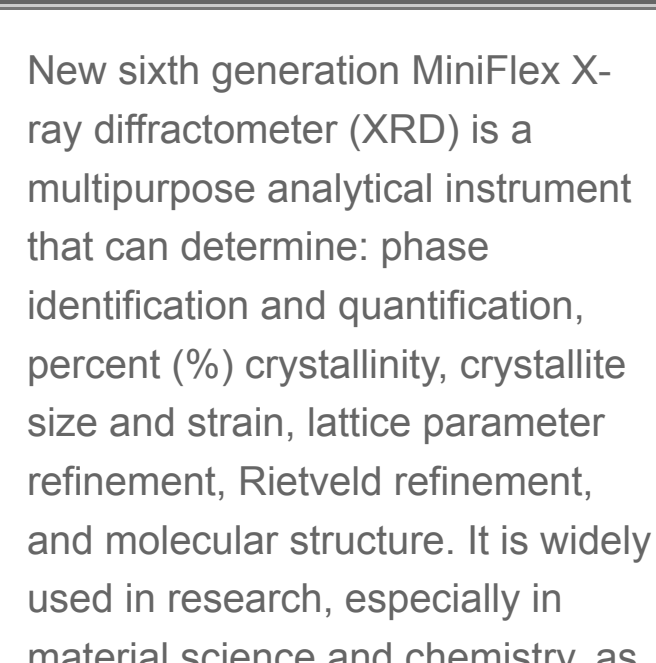


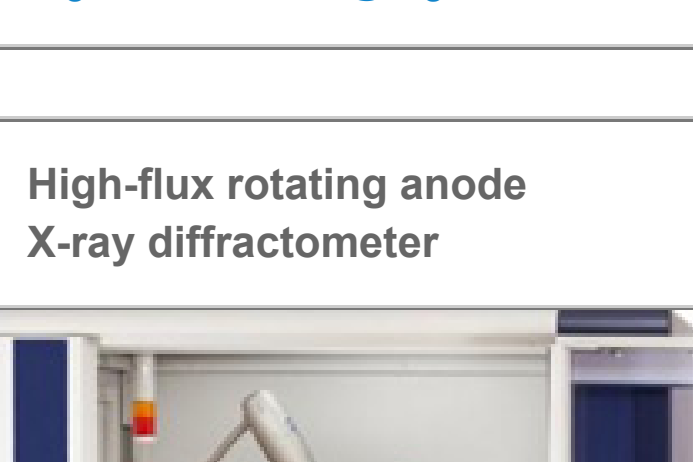
MiniFlex – qualitative and quantitative analysis of polycrystalline materials



Benchtop X-ray diffraction (XRD) instrument

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 >**

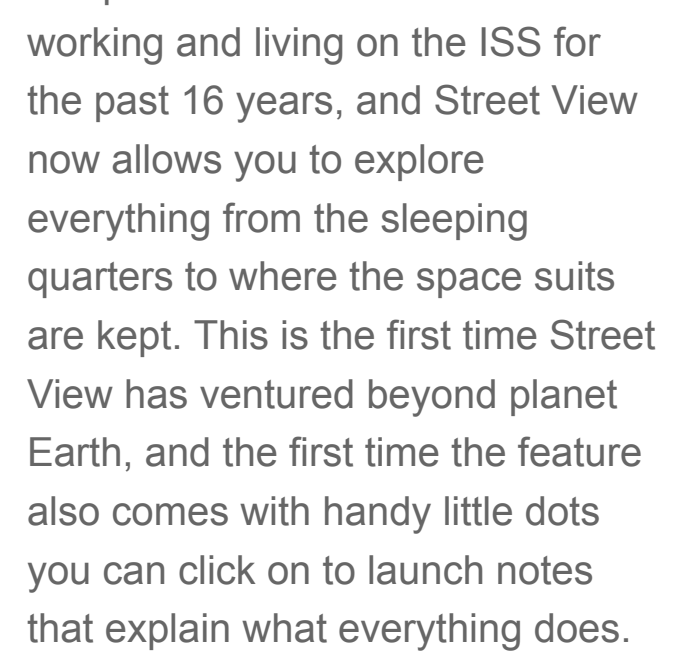
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The Bridge now welcomes manuscripts, communications, and papers that describe techniques and applications of all forms of X-ray fluorescence (XRF) and X-ray diffraction (XRD, including SAXS) that are of interest to fellow scientists in industry, academia, 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

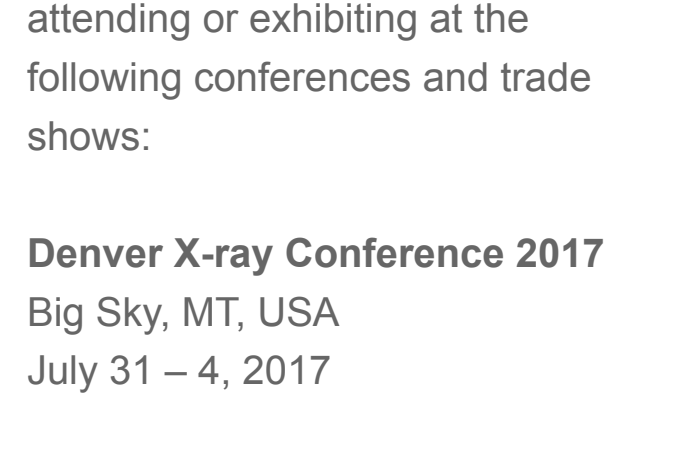
High-flux rotating anode X-ray diffractometer



XtaLAB Synergy-R

The XtaLAB Synergy-R is the most powerful small molecule diffractometer available. It includes a high-flux, low-maintenance microfocus rotating anode, the PhotonJet-R, with a high-precision kappa goniometer and Rigaku's own Hybrid Photon Counting detector (HPC) the HyPix-6000HE. For labs with high-throughput requirements, increasing the flux will reduce data collection time and thus increase the number of samples that can be studied in your laboratory. For extremely small samples, additional flux will extend the minimum size limits for crystals that you can study. **For more >**

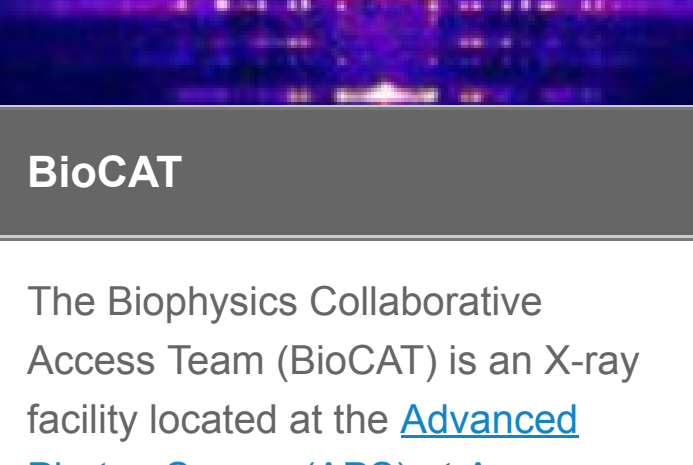
Video of the Month



Google Street View lands on the International Space Station

If you've always wanted to poke around inside a spaceship but don't ever wish to leave the safety of Earth, Google Street View now lets you explore the International Space Station (ISS) right from your computer. Astronauts have been working and living on the ISS for the past 16 years, and Street View now allows you to explore everything from the sleeping quarters to where the space suits are kept. This is the first time Street View has ventured beyond planet Earth, and the first time the feature also comes with handy little dots you can click on to launch notes that explain what everything does. The notes detail things like where the astronauts work out to stay fit, the kinds of food they eat and where scientific experiments are conducted. **Watch video >**

Conferences and Workshops



Join Rigaku at future meetings

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

Denver X-ray Conference 2017

Big Sky, MT, USA
July 31 – 4, 2017

M&M2017 (Microscopy & Microanalysis)

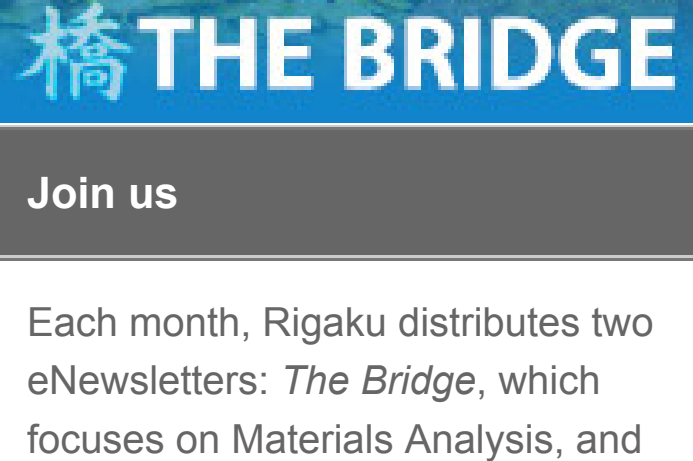
St. Louis, MO, USA
August 6 – 10, 2017

PPXRD-15

Hyderabad, India
August 18 – 20, 2017

See the complete list >

Useful link of the Month



BioCAT

The Biophysics Collaborative Access Team (BioCAT) is an X-ray facility located at the [Advanced Photon Source \(APS\)](#) at [Argonne National Laboratory \(ANL\)](#). It is funded by the [National Institutes of Health \(NIH\)](#) to study the structure and dynamics of partially ordered biological systems. They offer a web page of useful X-ray tools: [BioCAT's Scattering and Diffraction Calculators](#). **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

SUBSCRIBE TO 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

August is going to be a big month at Rigaku, as we will attend the Denver X-ray Conference (booths 5 – 8) in Big Sky, MT. Kosuke Kawakami wrote an [overview of the Denver X-ray Conference](#) noting our participation. Other major events of interest include PPXRD-15 and the 24th Congress & General Assembly of the International Union of Crystallography 2017 (Hall 3, #46). Both will be held in Hyderabad, India towards month's end. Please come and visit, as we would love to show you our latest instrumentation.

At PPXRD-15, Rigaku will give two presentations of interest to our readers:

[Appropriate Restraint Settings for Crystal Structure Refinement](#)
A. Sasaki*, H. Konaka, Rigaku Corporation, Japan

[Detailed Investigation of Crystalline Phases of Pharmaceutical Drugs Found by XRD-DSC by Employing a Thermal Analysis System having a Sample Observation Camera and Raman Spectroscopy](#)
Y. Shiramata*, A. Miyayama, A. Yamano, Rigaku Corporation, Japan

This month's issue contains a *Rigaku Journal* article describing XRD analysis of modern functional thin films using a 2-dimensional detector on the Rigaku SmartLab.

Application papers are also included for TXRF, WDXRF and EDXRF techniques, with the WDXRF AppNote highlighting cement raw meal analysis by the pressed powder method. The book reviews this month concern three works all covering dystopian themes. This month's video is about Google Street View landing on the International Space Station. 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 Rigaku Journal Article

[Introduction to XRD analysis of modern functional thin films using a 2-dimensional detector – \(2\) Analysis of epitaxial films](#)
By Katsuhiko Inaba, Rigaku Corporation

Epitaxial thin films are widely studied in the interest of fundamental scientific research into the physical properties of materials, but also due to the emerging demands of high efficiency in a wide range of industrial applications. Among the most famous epitaxial thin films are GaN films for LED applications, the development of which led to the awarding of the Nobel Prize in Physics in 2014. **Full article >**

TXRF Application Note

[Benchtop TXRF spectrometer NANOHUNTER II Analysis of Ultra-small Amount of Powder](#)
Rigaku Corporation

An incident X-ray beam impinges upon the sample at a shallow angle resulting in virtually complete reflection of the excitation beam away from the silicon drift detector. This affords dramatically reduced background contributions in the measured energy dispersive X-ray fluorescence spectra. It is possible to measure powder on the substrate without any water or adhesive due to the horizontal substrate setting. **For more >**

WDXRF Application Note

[Cement Raw Meal Analysis by Pressed Powder Method on the ZSX Primus III+](#)
Rigaku Corporation

Cement is one of the most important materials for construction. Various physical properties are given to cement by changing the mineral composition of clinker; therefore, it is important to control the chemical composition of cement raw meal. XRF spectrometry has been used for chemical composition analysis in cement production processes owing to its simple sample preparation, rapid analysis and high precision. This application note demonstrates quantitative analysis for cement raw meal by the pressed powder method on Rigaku ZSX Primus III+, a sequential wavelength dispersive XRF spectrometer. **For more >**

EDXRF Application Note

[Elements in Polypropylene](#)
Applied Rigaku Technologies

In the production of polymers such as polypropylene (PP), polyethylene (PE) and polyethylene terephthalate (PET, PETE) various additives and stabilizers are added, as well as Si (as SiO₂) as an anti-block. Trace levels of catalyst residues may also be present. To ensure proper quality control during the production process test samples are made and the trace elements are measured. To meet this industry need Applied Rigaku Technologies offers a full line of benchtop EDXRF analyzers. With simple, intuitive software interface and powerful, innovative design, Rigaku EDXRF systems make an excellent tool for quality control check at several places along the polymer production process. **For more >**

Book Reviews

[Great Utopian and Dystopian Works of Literature](#) By Pamela Bedore
[It Can't Happen Here](#) By Sinclair Lewis
[A Handmaid's Tale](#) By Margaret Atwood
Reviewed by Joseph D. Ferrara, Ph.D., Deputy Director, X-ray Research Laboratory, Rigaku

Back in January the *1A* podcast did a special on dystopian novels because of the surge in sales of books in that genre since November 2017. 1984 was at the top of the list, but because I have read it once a decade since high school I didn't read it this year. I picked up two of the novels on the list, *It Can't Happen Here* and *A Handmaid's Tale*, and also found a Great Course titled *Great Utopian and Dystopian Works of Literature*. **Full review >**

Material Analysis in the News

News for July 2017

July 3, 2017. The first experiment placed on [Diamond's Long Duration Experimental \(LDE\) facility](#), on beamline I11, has now been in place for 1,000 days. The experiment, led by Dr. Claire Corkhill from the University of Sheffield, has used the world-leading capabilities of the beamline to investigate the hydration of cements used by the nuclear industry for the storage and disposal of waste.

July 4, 2017. A prestigious international science journal selected the work of a Pakistani female scientist for its cover page. The work of [Dr. Sammer Yousuf, Associate Professor at ICCBS](#), has appeared on the cover of the June issue of *Acta Crystallographica Section C Structural Chemistry*.

July 4, 2017. Researchers have [unlocked the chemistry of Roman concrete](#), which has resisted the elements for thousands of years. This new study says the scientists found significant amounts of tobermorite growing through the fabric of the concrete, with a related, porous mineral called phillipsite. The researchers say that the long-term exposure to sea water helped these crystals to keep on growing over time, reinforcing the concrete and preventing cracks from developing.

July 7, 2017. Two important breakthroughs in the [understanding of iron-selenide superconductors](#) have been made by two independent research groups. One team has shown that the electrons responsible for superconductivity in the material probably come from a specific atomic orbital. The other team, meanwhile, has measured the interaction between electrons and atomic vibrations in iron selenide, which is believed to be involved in its superconductivity.

July 10, 2017. An international team of scientists has set a new record for creating [ice crystals that have a near-perfect cubic arrangement of water molecules](#) – a form of ice that may exist in the coldest high-altitude clouds but is extremely hard to make on Earth.

July 10, 2017. When Cornell physicists Robert Richardson, David Lee and Douglas Osheroff received the 1996 Nobel Prize for their discovery of the [superfluid state of liquid helium](#), it was only the beginning. Now a new team of Cornell researchers, building on that work, has found new complexities in the phenomenon, with implications for the study of superconductivity and theoretical models of the origin of the universe.

July 12, 2017. The CUHKSZ Applied Spintronics Lab led by Prof. Yan Zhou and multi-institutional collaborators report in detail the [motion and dynamics of an isolated skyrmion](#) in a magnetic nanowire driven by magnonic momentum-transfer forces. The group's results show that the skyrmion trajectory is determined by an interplay of both forces due to the magnon and the device boundary in confined geometries.

July 15, 2017. Maryam Mirzakhani, the 40-year-old Iranian woman won math's most prestigious prize, died on July 15. [Mirzakhani was awarded the Fields Medal](#), affectionately referred to as the "Nobel Prize for Mathematics," in 2014 for her work on dynamical systems and complex geometry.

July 24, 2017. Scientists at [Nagoya University have developed a new way to make stimuli-responsive materials](#) in a predictable manner. They used this method to design a new material, a mixture of carbon nanotubes and iodine, which conducts electricity and emits white light when exposed to electricity.

July 25, 2017. Lawrence Livermore National Laboratory (LLNL) scientists recently used synchrotron [X-ray scattering to fully capture the hierarchical structure in self-organized carbon nanotube](#) materials from the atomic to micrometer scale. Their work, recently published in the June issue of *ACS Nano*, is the first to continuously map the structural order of nanotube ensembles across four orders of magnitude in length scale, all while employing a single technique.

Recent Scientific Papers of Interest

Papers for July 2017

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

Detection of Ambient Oxidation of Ultrasmall Supported Platinum Nanoparticles with Benchtop Powder X-Ray Diffraction. Banerjee, Ritubarna; Liu, Qiuli; Tengco, John; Regalbuto, John. *Catalysis Letters*. Jul2017, Vol. 147 Issue 7, p1754-1764. 11p. DOI: [10.1007/s10562-017-2060-2](#).

Multivariate analysis of Scotch whisky by the total reflection x-ray fluorescence and chemometric methods: A potential tool in the identification of counterfeit. Shand, Charles A.; Wendler, Renate; Dawson, Lorna; Yates, Kyari; Stephenson, Hayleigh. *Analytica Chimica Acta*. Jul2017, Vol. 976, p14-24. 11p. DOI: [10.1016/j.aca.2017.04.041](#).

Inelastic X-ray scattering on liquid benzene analyzed using a generalized Langevin equation. Yoshida, Koji; Fukuyama, Nami; Yamaguchi, Toshio; Hosokawa, Shinya; Uchiyama, Hiroshi; Tsutsui, Satoshi; Baron, Alfred Q.R. *Chemical Physics Letters*. Jul2017, Vol. 680, p1-5. 5p. DOI: [10.1016/j.cpl.2017.05.005](#).

The Opposite Effect of Water and N-Methyl-2-Pyrrolidone Cosolvents on the Nanostructural Organization of Ethylammonium Butanoate Ionic Liquid: A Small- and Wide-Angle X-Ray Scattering and Molecular Dynamics Simulations Study. Salma, Umme; Plechkova, Natalia V.; Caminiti, Ruggero; Gontrani, Lorenzo. *Journal of Physical Chemistry B*. Jul2017, Vol. 121 Issue 26, p6399-6407. 9p. DOI: [10.1021/acs.jpcc.7b01837](#).

In situ grazing incidence small-angle X-ray scattering study of solvent vapor annealing in lamellae-forming block copolymer thin films: Trade-off of defects in deswelling. Sun, Zhiwei; Russell, Thomas P. *Journal of Polymer Science Part B: Polymer Physics*. Jul2017, Vol. 55 Issue 13, p980-989. 11p. DOI: [10.1002/polb.24346](#).

Trace element determinations in uranium by total reflection X-ray fluorescence spectrometry using polychromatic X-ray excitation. Kanrar, Buddhadev; Sanyal, Kaushik; Misra, Nand Lal. *XRS: X-ray Spectrometry*. Jul/Aug2017, Vol. 46 Issue 4, p277-282. 6p. DOI: [10.1002/xrs.2771](#).

Spectroscopic investigations on kidney stones using Fourier transform infrared and X-ray fluorescence spectrometry. Singh, Vivek K.; Jaiswal, Brij Bir S.; Sharma, Jitendra; Rai, Pradeep K. *XRS: X-ray Spectrometry*. Jul/Aug2017, Vol. 46 Issue 4, p283-291. 9p. DOI: [10.1002/xrs.2775](#).

Application of principal component analysis for improvement of X-ray fluorescence images obtained by polycapillary-based micro-XRF technique. Aida, S.; Matsuno, T.; Hasegawa, T.; Tsuji, K. *Nuclear Instruments & Methods in Physics Research Section B*. Jul2017, Vol. 402, p267-273. 7p. DOI: [10.1016/j.nimb.2017.03.123](#).

Numerical studies of residual welding stresses in tubular joints and experimental validations by means of x-ray and neutron diffraction analysis. Hemmesi, Kimiya; Farajian, Majid; Boin, Mirko. *Materials & Design*. Jul2017, Vol. 126, p339-350. 12p. DOI: [10.1016/j.matdes.2017.03.088](#).

Investigation of residual stress distribution in single point incremental forming of aluminum parts by X-ray diffraction technique. Jiménez, Isaac; López, Cecilio; Martínez-Romero, Oscar; Mares, Pedro; Siller, H.; Diabb, J.; Sandoval-Robles, Jesús; Elias-Zúñiga, Alex. *International Journal of Advanced Manufacturing Technology*. Jul2017, Vol. 91 Issue 5-8, p2571-2580. 10p. 5 Color Photographs, 4 Diagrams, 2 Charts, 4 Graphs. DOI: [10.1007/s00170-016-9952-y](#).

Asymmetrical reciprocal space mapping using X-ray diffraction: A technique for structural characterization of GaN/AlN superlattices. Stanchu, H. V.; Kuchuk, A. V.; Barchuk, M.; Mazur, Yu. I.; Kladko, V. P.; Wang, Zh. M.; Rafaja, D.; Salamo, G. J. *CrystEngComm*. p2977-2982. 6p. DOI: [10.1039/c7ce00584a](#).

Insights into post-annealing and silver doping effects on the internal microstructure of ZnO nanoparticles through X-ray diffraction probe. Dastafkan, Ali; Dastafkan, Kamran; Rahimi, Moammad; Ghadam Dezfouli, Mohammad Amin. *Solid State Sciences*. Jul2017, Vol. 69, p71-81. 11p. DOI: [10.1016/j.solidstatesciences.2017.05.004](#).

X-ray Powder Diffraction for Characterization of Strawn Materials in Banknotes. Marabello, Domenica; Benzi, Paola; Lombardo, Antonietta; Strano, Morela. *Journal of Forensic Sciences*. Jul2017, Vol. 62 Issue 4, p962-970. 9p. DOI: [10.1111/1556-4029.13392](#).

Dynamical X-ray diffraction theory: Characterization of defects and strains in as-grown and ion-implanted garnet structures. Olikhovskii, S. I.; Molodkin, V. B.; Skakunova, O. S.; Len, E. G.; Kyslovskiy, Ye. M.; Vladimirova, T. P.; Reshetnyk, O. V.; Kochelab, E. V.; Lizunova, S. V.; Pilyay, V. M.; Ostafiychuk, B. K.; Garpul, O. Z. *Physica Status Solidi (B)*. Jul2017, Vol. 254 Issue 7, p19/n/a. 22p. DOI: [10.1002/psbb.201600689](#).

Interactions of lattice distortion fields in nano polycrystalline materials revealed by molecular dynamics and X-ray powder diffraction. Leonardi, Alberto; Bish, David L. *Acta Materialia*. Jul2017, Vol. 133, p380-392. 13p. DOI: [10.1016/j.actamat.2017.04.072](#).

High-resolution X-ray diffraction with no sample preparation. Hansford, G. M.; Turner, S. M. R.; Degryse, P.; Shortland, A. J. *Crystallographica. Section A, Foundations & Advances*. Jul2017, Vol. 73 Issue 4, p293-311. 18p. DOI: [10.1107/S2053273317008592](#).

A new way to parameterize hydraulic conductances of pore elements: A step towards creating pore-networks without pore shape simplifications. Miao, Xiuxiu; Gerke, Kirill M.; Sizonenko, Timofey O. *Advances in Water Resources*. Jul2017, Vol. 105, p162-172. 11p. DOI: [10.1016/j.advwatres.2017.04.021](#).