

橋THE BRIDGE

XtaLAB mini™ - Benchtop chemical crystallography system



The Rigaku XtaLAB mini benchtop

X-ray crystallography system is a

molecular structure determination

For small molecule 3D

compact single crystal X-ray diffractometer designed to produce publication-quality 3D structures. The perfect addition to any synthetic chemistry laboratory, the XtaLAB mini will enhance research productivity by offering affordable structure analysis capability without the necessity of relying on a departmental facility. With the XtaLAB mini, you no longer have to wait in line to determine your structures. Instead your research group can rapidly analyze new compounds as they are synthesized in the lab. For more >

Katana™ – Fast and accurate

alloy identification



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 more > Video of the Month



capture X-ray portraits of living organisms such as cyanobacteria.

technique called X-ray diffraction to

scientists at the Linac Coherent

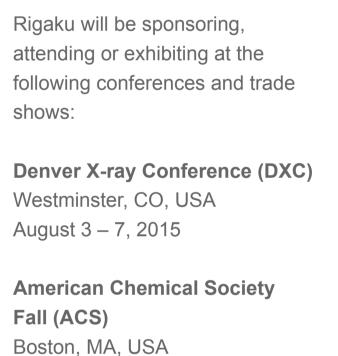
Light Source (LCLS) can use a

Watch the video > **Survey of the Month** July 15 Bridge Survey

optical emission spectrometry (ICP-OES) atomic absorption spectrometry (AA)

X-ray fluorescence spectroscopy (XRF) atomic fluorescence spectrometry (AFS)

- Other (please specify)
- Take the Survey >
- **Conferences and Workshops**



See the complete list >

gm/cm^3 (enter negative value to use tal on Energy (eV) ▼ from 30

This calculator provides the X-ray attenuation length of a solid. The attenuation length is defined as the depth into the material where the intensity of the X-rays has decreased to about 37% (1/e) of the value at the surface. User defined materials may be entered

as a chemical formula. This

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-

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100% 80% 60% 40% 20%

Monday, August 3 marks the beginning of the 64th annual conference on applications of X-ray

Welcome

analysis: The Denver X-ray Conference. As this event provides a unique mixture of sessions on training, education, applications and papers about state-of-the-art techniques and future developments in X-ray analysis, we encourage you to attend. Speaking of state-of-the-art, this week marks the introduction of the Rigaku Katana, a handheld

laser induced breakdown (LIBS) spectrometer designed for identification of the most difficult alloy grades. For your continuing education, the final installment of the X-ray diffraction Thin Film Training

Textbook is published. Our laboratory in the spotlight features Dr. Brandon Q. Mercado, the X-ray facility manager of the Chemical and Biological Instrumentation Center (CBIC) at Yale University. Enjoy the newsletter. R.C. Tisdale, Ph.D. - Editor

Thin Film Training Textbook



Featured XRD Rigaku Journal Article A current perspective of the state-of-the-art in stress analysis

selected three examples thought to be the most practical from among the many X-

residual stress measurement of samples with shear stress in the depth direction, and (3) residual stress measurement and line-broadening of diffraction in samples with fibre texture using the crystallite strain analysis method. For more > **Featured XRD Product Introduction** <u>AutoMATE II – Micro area X-ray stress measurement system</u> Rigaku Corporation

We have improved the conventional micro area stress measurement system

(AutoMATE) by replacing the gas flowing Position Sensitive Proportional Counter

(PSPC) detector with a semiconductor detector, the D/teX Ultra 1000. This new

presented are: (1) residual stress measurement using the multiple-hkl method, (2)



AutoMATE II provides the user with new functions, high sensitivity, high counting rate and good energy resolution. For more >

XRD Application Note

Rigaku Corporation Many active pharmaceutical ingredients have multiple crystal forms, and it is known

manufacturing process, active ingredients may sometimes undergo a crystalline

phase transition to another crystal form, due to factors such as heat, light, humidity or pressure, and there is a need to check what crystal form the ingredient is in, in

its final product state. For more >

WDXRF Application Note Chlorine Analysis of Aluminosilicate for Fluid Catalytic Cracking Catalyst by **WDXRF** Rigaku Corporation It is important to control the chlorine content of FCC catalyst to guard against the formation of hazardous organo-chloride compounds such as dioxins and to prevent degradation of catalytic activity. This application note documents the performance



aluminosilicate catalyst. For more >

of a Rigaku ZSX Primus series spectrometer for analysis of chlorine in FCC

Ore is ground, cleaned, separated and concentrated in preparation for smelting.

Impurities such as silicon dioxide and sulfur are considered penalty elements as

monitoring elemental composition of ores and concentrates, and is a tool that can

they can adversely affect the quality of the beneficiation, concentrating and

smelting processes, as well as the final properties of the iron or steel being

produced. Rigaku NEX QC+ offers technicians a fast and simple means of

Handheld Raman is an attractive ID method because it provides a portable

preparation. Progeny, a handheld Raman analyzer with 1064 nm excitation, is less

prone to fluorescence interference typically experienced by handheld analyzers

be used for quality checks throughout the entire smelting process.



measurement that can distinguish different concentrations of active pharmaceutical ingredients (API) in drug product (DP) doses and placebos with little or no sample

Raman Application Note

Rigaku Raman Technologies

For more >

For more >

Drug Product Identification Using Handheld Raman

Lab in the Spotlight Chemical and Biophysical Instrumentation Center at Yale University Dr. Brandon Q. Mercado is the X-ray facility manager of the Chemical and Biological Instrumentation Center (CBIC) at Yale University. The CBIC owns an SCXmini and an R-AXIS SPIDER with Mo target for small molecule crystallography and a MicroMax-007 HF microfocus rotating anode with Cu target equipped with a



News for July 2015

Scientific Book Reviews

Material Analysis in the News

Basics of Crystallography and Diffraction. For more >

panels for direct solar hydrogen production with low cost. Kevin Sivula and colleagues at EPFL addressed this problem with an innovative and cheap method that uses the boundary between two non-mixing liquids. **July 6, 2015.** An international team of scientists, led by Jennifer Mass, Winterthur Museum's senior scientist and an affiliated University of Delaware faculty member, has announced new findings on why a bright yellow pigment favored a century ago by master artists like Henri Matisse fades to drab beige. The research team found that the original chemical compound, cadmium sulphide, which is highly water-

> July 14, 2015. NASA's New Horizons probe flew by Pluto, capturing history's first up-close looks at the far-flung world. Closest approach came at 11:49 GMT, when unveiled the latest photo of Pluto, showing a reddish world with a stunning heartshaped feature on its face. July 16, 2015. A team of researchers based in Japan and the US is claiming to

> have fabricated the first vertical Schottky barrier diodes made from AIN. Their new

approach is to deposit films using a faster deposition technique, HVPE. This is the

approach taken by the Japan-US collaboration, which involves researchers from

July 22, 2015. For the past 60 years, the best guide to the line between quantum

paper shows that Bell's Inequality is not the guidepost it was believed to be, which

and classical worlds has been a theorem called Bell's Inequality, but now a new

Tsukuba Research Laboratories, Fuji Electric Company, Tokyo University of

Agriculture and Technology, HexaTech and North Carolina State University.

means that as the world of quantum computing brings quantum strangeness closer to our daily lives, we understand the frontiers of that world less well than scientists have thought. July 24, 2015. Postdoctoral researcher Stephen Wu of the U.S. Department of Energy's Argonne National Laboratory discovered that a magnetic material is not needed to create spin current from insulators. This is a finding that has important

Measurement Scenarios. Rouillon, Marek; Kristensen, Louise J.; Gore, Damian B. Applied Spectroscopy. Jul2015, Vol. 69 Issue 7, p815-822. 8p. DOI: 10.1366/14-07809. Quantitative x-ray spectrometric analysis with peak to Compton ratios. Uzunoğlu, Zeynep; Yılmaz, Demet; Şahin, Yusuf. Radiation Physics & Chemistry. Jul2015, Vol. 112, p189-194. 6p. DOI: 10.1016/j.radphyschem.2015.03.039.

Preliminary experiment of X-ray diffraction imaging. Yamanashi, Masaki; Kometani, Noritsugu; Tsuji, Kouichi. Nuclear Instruments & Methods in Physics Research Section B. Jul2015, Vol. 355, p272-275. 4p. DOI: 10.1016/j.nimb.2015.02.049. Quantitative X-ray Diffraction (QXRD) analysis for revealing thermal transformations of red

diagnose the impact suffered by built heritage in urban atmospheres. Gómez-Laserna, Olivia; Arrizabalaga, Iker; Prieto-Taboada, Nagore; Olazabal, María; Árana, Gorka; Madariaga, Juan. Analytical & Bioanalytical Chemistry. Jul2015, Vol. 407 Issue 19, p5635-5647. 13p. DOI:

below glass transition temperature with WAXS and SAXS. Guo, Huilong; Wang, Jiayi; Zhou,

Christiansen, Jesper; Yu, Donghong; Wu, Zhonghua; Jiang, Shichun. *Polymer*. Jul2015, Vol. 70,

Chengbo; Zhang, Wenyang; Wang, Zixuan; Xu, Bihui; Li, Jingqing; Shang, Yingrui; de Claville

mud. Liao, Chang-Zhong; Zeng, Lingmin; Shih, Kaimin. Chemosphere. Jul2015, Vol. 131, p171-

p109-117. 9p. DOI: 10.1016/j.polymer.2015.06.013. The history of Portuguese interior plaster coatings: a mineralogical survey using XRD. Freire, M. T.; Silva, A. Santos; Do Rosário Veiga, M.; De Brito, J. Archaeometry. 2015 Supplement, Vol. 57, p147-165. 19p. DOI: 10.1111/arcm.12130.

Synthesis and small angle X-ray scattering (SAXS) characterization of silica spheres covered with gel-like particles formed by means of solvent evaporation. Gutsche, Alexander; Guo, Xiaoai; Dingenouts, Nico; Nirschl, Hermann. Powder Technology. Jul 2015, Vol. 278, p257-

p803-818. 16p. DOI: 10.1080/17458080.2014.902543. Construction of amorphous TiO₂/BiOBr heterojunctions via facets coupling for enhanced

Liu, Shuang-jun; Li, Bo. *Journal of Hazardous Materials*. Jul2015, Vol. 292, p126-136. 11p. DOI: 10.1016/j.jhazmat.2015.03.030. Microstructural development and helium bubble formation in Cu/W(Re) nanometer multilayer films irradiated by He⁺ ion. Chen, Shunli; Liu, Bo; Lin, Liwei; Jiao, Guohua. *Nuclear*

photocatalytic activity. Wang, Xiao-jing; Yang, Wen-yan; Li, Fa-tang; Zhao, Jun; Liu, Rui-hong;

Characterization of Ni-cermet degradation phenomena I. Long term resistivity monitoring, image processing and X-ray fluorescence analysis. Ananyev, M.V.; Bronin, D.I.; Osinkin, D.A.; Eremin, V.A.; Steinberger-Wilckens, R.; de Haart, L.G.J.; Mertens, J. Journal of Power Sources.

Identification of the crystal form of the active pharmaceutical ingredient in a tablet that solubility and bioavailability vary depending on the crystal form. In the drug

EDXRF Application Note Analysis of Iron Concentrates Applied Rigaku Technologies



with 785 nm excitation.

Saturn 944 CCD detector for protein crystallography. For more >

By Joseph D. Ferrara, Ph.D., Rigaku Chief Science Officer This month I am doing a series of short reviews of what I've been reading for fun this summer. Next month I'll provide a review of Hammond's 4th edition of The

July 1, 2015. Scientists from École polytechnique fédérale de Lausanne have now

developed a simple, unconventional method to fabricate high-quality, efficient solar

July 10, 2015. Crystal phase-transitions keep babies in third-world countries warm.

To optimize the longevity of the release of heat, physicists Uma Ramabadran and

Gillian Ryan at Kettering University are exploring - with X-ray diffraction - how it

July 14, 2015. Scientists at the University of Tokyo announced that they had

just a little bit of pressure applied. The material is a ceramic called stripe-type-

created a material that could store up heat and then release it on command, with

may be possible to slow down the liquid-to-solid phase transition.



insoluble and bright yellow, is subject to a light-induced oxidation process that transforms it into a colorless, water-soluble cadmium sulphate.

lambda-trititanium-pentoxide. This new ceramic can store heat over the course of a day, and then release it when needed. the spacecraft whizzed within 12,500 km of Pluto's surface. To celebrate, NASA

implications for the field of spintronics and the development of high-speed, lowpower electronics that use electron spin rather than charge to carry information.

Recent Scientific Papers of Interest is a monthly compilation of material analysis

papers appearing in recently released journals and publications. See below

Handheld X-ray Fluorescence Spectrometers: Radiation Exposure Risks of Matrix-Specific

Preparation of Thin Films for Elemental Analysis of Nail Polish by Wavelength Dispersive X-

Levine, Keith E.; Felder, Lauren; Young, Daniel J.; Harrington, James M. Analytical Letters. 2015,

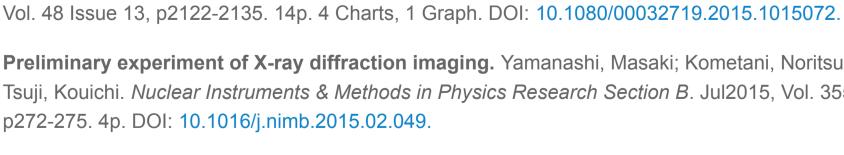
Ray Fluorescence Spectroscopy. McWilliams, Andrea C.; Martin, Al A.; Levine, Michael A.;

Recent Scientific Papers of Interest

Papers for July 2015

Influence of manufacturing parameters on the crackling process of ancient Chinese glazed ceramics. Lahlil, Sophia; Xu, Jiming; Li, Weidong. Journal of Cultural Heritage. Jul 2015, Vol. 16 Issue 4, p401-412. 12p. DOI: 10.1016/j.culher.2014.10.003.

177. 7p. DOI: 10.1016/j.chemosphere.2015.03.034.



10.1007/s00216-015-8738-7. Direct investigations of deformation and yield induced structure transitions in polyamide 6

In situ DRIFT, Raman, and XRF implementation in a multianalytical methodology to

Identification of pyroxene minerals used as black pigments in painted human bones excavated in Northern Patagonia by Raman spectroscopy and XRD. Tomasini, Eugenia P.;

Favier Dubois, Cristian M.; Little, Nicole C.; Centeno, Silvia A.; Maier, Marta S. *Microchemical*

Journal. Jul2015, Vol. 121, p157-162. 6p. DOI: 10.1016/j.microc.2015.03.003.

265. 9p. DOI: 10.1016/j.powtec.2015.03.037. Magnetic, morphological and structural investigations of CoFe/Si interfacial structures. Kumar, Arvind; Srivastava, P.C. Journal of Experimental Nanoscience. Jul2015, Vol. 10 Issue 10,

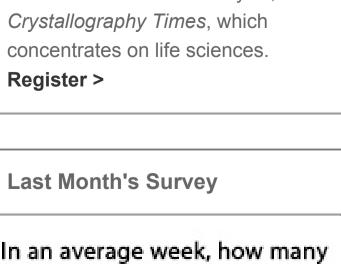
Instruments & Methods in Physics Research Section B. Jul2015, Vol. 354, p244-248. 5p. DOI: 10.1016/j.nimb.2015.01.003.

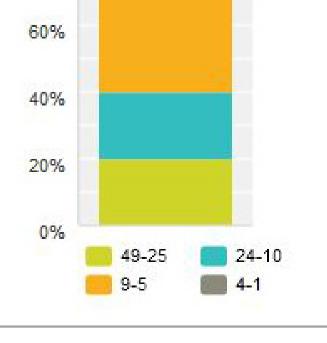
Jul2015, Vol. 286, p414-426. 13p. DOI: 10.1016/j.jpowsour.2015.03.168.

m a list of common materials: Enter Formula

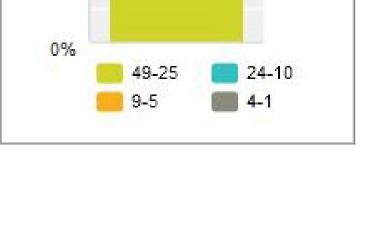
X-ray attenuation length

Sciences Division (MSD). For more > **Planning to Submit a Grant? GRANTS** Rigaku is happy to assist





eNewsletters: The Bridge, which focuses on Materials Analysis, and



atomic mass spectrometry (MS, ICP-MS)

to 1000 ergies must be in the range $30 \text{ eV} \le E \le 30,000 \text{ e}$ = 90 ▼ press this button: Submit Requ t values, press this button: Reset

calculator is courtesy of The Center for X-Ray Optics ... a multidisciplined research group within Lawrence Berkeley National Laboratory's (<u>LBNL</u>) Materials

Rigaku's Materials Analysis eNewsletter, The Bridge **SUBSCRIBE TO**

breakdown (LIBS) spectrometer Designed for on-the-spot



What is your favorite method for elemental analysis?

- prompt-gamma neutron activation (PGNAA)
- Join Rigaku at future meetings

September 14 – 15, 2015

Canadian Mineral Analysts

August 16 – 18, 2015

Ottawa, ON, Canada

(CMA)

ormula: Si3N4

- **Useful link of the Month**
- ngle (deg) ▼ Plot

tion best suited for your analytical

needs. Start the process >

In an average week, how many

Join us Each month, Rigaku distributes two

samples does your lab run using X-ray instrumentation?

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High-resolution X-ray Diffraction Method (Part 19) Rigaku Corporation This is the final installment of the X-ray diffraction Thin Film Training Textbook. In this section we will discuss the Laue function — a function incorporated into the crystal structure factor and expresses the relationship between crystallinity and angular distribution of the scattered X-rays. For more >

nku joui Rigaku Corporation This article discusses recent methods in X-ray stress analysis. The authors have ray stress measurement and analysis methods. The examples of analyses